



**THE DATASHEET OF  
DMMT3906W-7-F**



## Features

- $BV_{CEO} > -40V$
- $I_C = -200mA$  High Collector Current
- Pair of PNP Transistors That Are Intrinsicly Matched (Note 1)
- 2% Matching on Current Gain ( $h_{FE}$ )
- 2mV Matching on Base-Emitter Voltage ( $V_{BE}$ )
- Fully Internally Isolated in a Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 2 & 3)**
- **Halogen and Antimony Free. "Green" Device (Note 4)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 5)**

## Mechanical Data

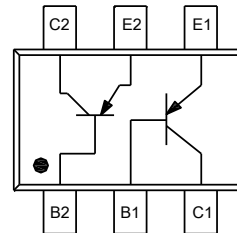
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.006 grams (Approximate)

## Applications

- Current Mirrors
- Differential and Instrumentation Amplifiers
- Comparators



Top View



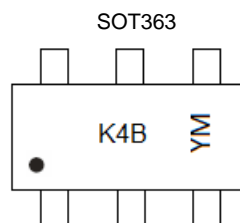
Device Schematic and Pin-Out Top View

## Ordering Information (Notes 5 & 6)

| Part Number    | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|----------------|------------|---------|--------------------|-----------------|-------------------|
| DMMT3906W-7-F  | AEC-Q101   | K4B     | 7                  | 8               | 3,000             |
| DMMT3906WQ-7-F | Automotive | K4B     | 7                  | 8               | 3,000             |

- Notes:
1. Intrinsicly matched pair as this is built with adjacent die from the same wafer.
  2. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  3. 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.
  4. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  5. 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/).
  6. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



K4B = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: F = 2018)  
 M = Month (ex: 2 = February)

### Date Code Key

| Year  | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code  | E    | F    | G    | H    | I    | J    | K    | L    | M    | N    | O    | P    |
| 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> | -40   | V    |
| Collector-Emitter Voltage | V <sub>CEO</sub> | -40   | V    |
| Emitter-Base Voltage      | V <sub>EBO</sub> | -5.0  | V    |
| Collector Current         | I <sub>c</sub>   | -200  | mA   |

**Thermal Characteristics – Total Device** (@T<sub>A</sub> = +25°C unless otherwise specified.)

| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 7) Total Device          | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient (Note 7) | R <sub>θJA</sub>                  | 625         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -65 to +150 | °C   |

**ESD Ratings** (Note 8)

| 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:
- 7. For a device mounted on minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state.
  - 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics – Total Device**

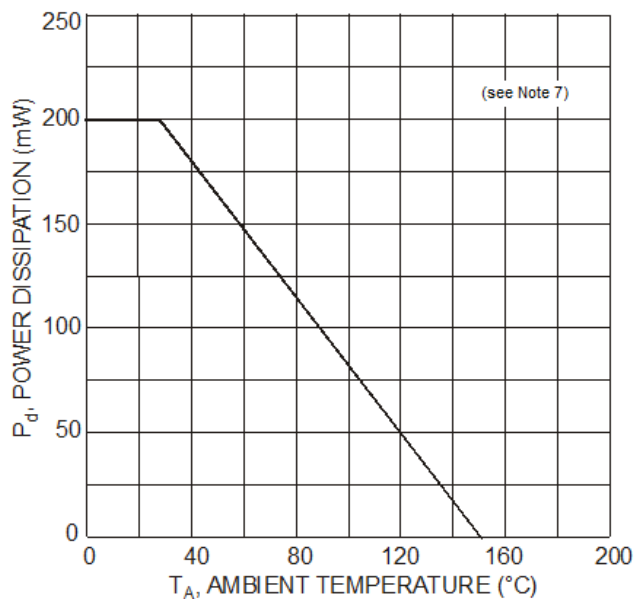


Fig. 1, Power Derating Curve (Total Device)

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

| Characteristic                                 | Symbol  | Min                         | TYP | Max                     | Unit               | Test Condition   |
|--|---|-----------------------------|-----|-------------------------|--------------------|--|
| <b>OFF CHARACTERISTICS</b>                     |   |                             |     |                         |                    |  |
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>                             | -40                         | —   | —                       | V                  | I <sub>C</sub> = -100μA, I <sub>E</sub> = 0  |
| Collector-Emitter Breakdown Voltage (Note 9)   | BV <sub>CEO</sub>                             | -40                         | —   | —                       | V                  | I <sub>C</sub> = -1.0mA, I <sub>B</sub> = 0  |
| Emitter-Base Breakdown Voltage                 | BV <sub>EBO</sub>                             | -5.0                        | —   | —                       | V                  | I <sub>E</sub> = -100μA, I <sub>C</sub> = 0  |
| Collector Cutoff Current                       | I <sub>CEx</sub>                              | —                           | —   | -50                     | nA                 | V <sub>CE</sub> = -30V, V <sub>EB(OFF)</sub> = 3.0V  |
| Base Cutoff Current                            | I <sub>BL</sub>                               | —                           | —   | -50                     | nA                 | V <sub>CE</sub> = -30V, V <sub>EB(OFF)</sub> = 3.0V  |
| <b>ON CHARACTERISTICS (Note 9)</b>             |   |                             |     |                         |                    |  |
| DC Current Gain                                | h <sub>FE</sub>                               | 60<br>80<br>100<br>60<br>30 | —   | —<br>—<br>300<br>—<br>— | —                  | I <sub>C</sub> = -100μA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -1.0mA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -10mA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -50mA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -100mA, V <sub>CE</sub> = -1.0V |
| Collector-Emitter Saturation Voltage           | V <sub>CE(SAT)</sub>                          | —                           | —   | -250<br>-400            | mV                 | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA<br>I <sub>C</sub> = -50mA, I <sub>B</sub> = -5.0mA   |
| Base-Emitter Saturation Voltage                | V <sub>BE(SAT)</sub>                          | 0.65<br>—                   | —   | -850<br>-950            | mV                 | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA<br>I <sub>C</sub> = -50mA, I <sub>B</sub> = -5.0mA   |
| <b>MATCHING CHARACTERISTICS</b>                |   |                             |     |                         |                    |  |
| DC Current Gain Matching (Note 10)             | h <sub>FE1</sub> / h <sub>FE2</sub>           | —                           | 1   | 2                       | %                  | I <sub>C</sub> = -2mA, V <sub>CE</sub> = -5V   |
| Base-Emitter Voltage Matching (Note 11)        | V <sub>BE1</sub> - V <sub>BE2</sub>           | —                           | 1   | 2                       | mV                 | I <sub>C</sub> = -2mA, V <sub>CE</sub> = -5V   |
| Collector-Emitter Saturation Voltage (Note 10) | V <sub>CE(SAT)1</sub> / V <sub>CE(SAT)2</sub> | —                           | 1   | 2                       | %                  | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA  |
| Base-Emitter Saturation Voltage (Note 10)      | V <sub>BE(SAT)1</sub> / V <sub>BE(SAT)2</sub> | —                           | 1   | 2                       | %                  | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA  |
| <b>SMALL SIGNAL CHARACTERISTICS</b>            |   |                             |     |                         |                    |  |
| Output Capacitance                             | C <sub>OBO</sub>                              | —                           | —   | 4.5                     | pF                 | V <sub>CB</sub> = -5.0V, f = 1.0MHz, I <sub>E</sub> = 0  |
| Input Capacitance                              | C <sub>IBO</sub>                              | —                           | —   | 10.0                    | pF                 | V <sub>EB</sub> = -0.5V, f = 1.0MHz, I <sub>C</sub> = 0  |
| Input Impedance                                | h <sub>iE</sub>                               | 2.0                         | —   | 12                      | kΩ                 | V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA,<br>f = 1.0kHz   |
| Voltage Feedback Ratio                         | h <sub>RE</sub>                               | 0.1                         | —   | 10                      | x 10 <sup>-4</sup> |  |
| Small Signal Current Gain                      | h <sub>FE</sub>                               | 100                         | —   | 400                     | —                  |  |
| Output Admittance                              | h <sub>OE</sub>                               | 3.0                         | —   | 60                      | μS                 |  |
| Current Gain-Bandwidth Product                 | f <sub>T</sub>                                | 250                         | —   | —                       | MHz                | V <sub>CE</sub> = -20V, I <sub>C</sub> = -10mA,<br>f = 100MHz  |
| Noise Figure                                   | NF  | —                           | —   | 4.0                     | dB                 | V <sub>CE</sub> = -5.0V, I <sub>C</sub> = -100μA,<br>R <sub>S</sub> = 1.0kΩ, f = 1.0kHz  |
| <b>SWITCHING CHARACTERISTICS</b>               |   |                             |     |                         |                    |  |
| Delay Time                                     | t <sub>D</sub>                                | —                           | —   | 35                      | ns                 | V <sub>CC</sub> = -3.0V, I <sub>C</sub> = -10mA,   |
| Rise Time                                      | t <sub>R</sub>                                | —                           | —   | 35                      | ns                 | V <sub>BE(OFF)</sub> = 0.5V, I <sub>B1</sub> = -1.0mA  |
| Storage Time                                   | t <sub>S</sub>                                | —                           | —   | 225                     | ns                 | V <sub>CC</sub> = -3.0V, I <sub>C</sub> = -10mA,<br>I <sub>B1</sub> = I <sub>B2</sub> = -1.0mA   |
| Fall Time                                      | t <sub>F</sub>                                | —                           | —   | 75                      | ns                 |  |

- Notes:
9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.
  10. Is the ratio of one transistor compared to the other transistor.
  11. V<sub>BE1</sub> - V<sub>BE2</sub> is the absolute difference of one transistor compared to the other transistor.

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

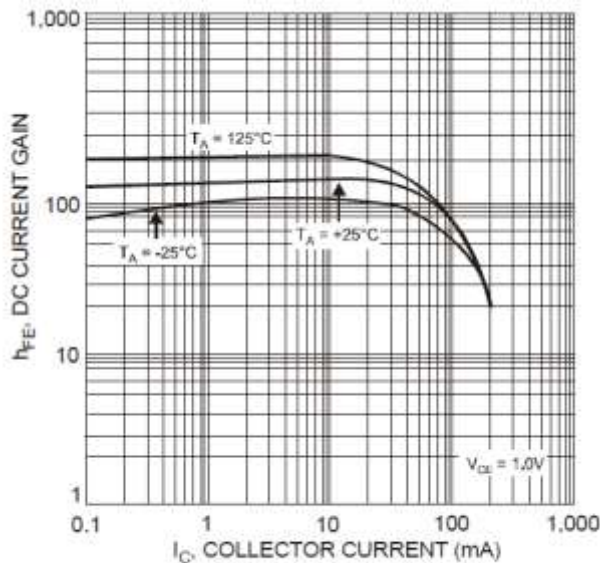


Fig. 3. Typical DC Current Gain vs. Collector Current

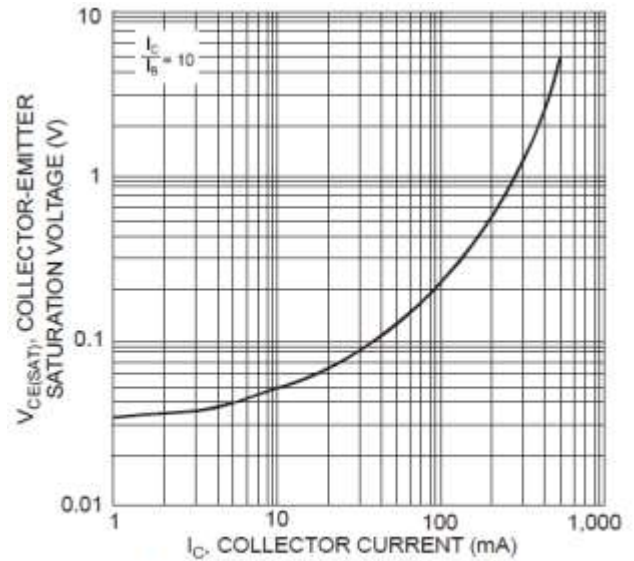


Fig. 4. Typical Collector-Emitter Saturation Voltage vs. Collector Current

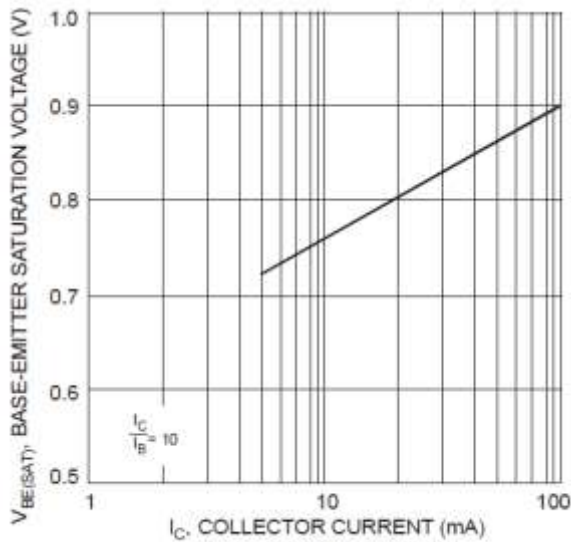


Fig. 5. Typical Base-Emitter Saturation Voltage vs. Collector Current

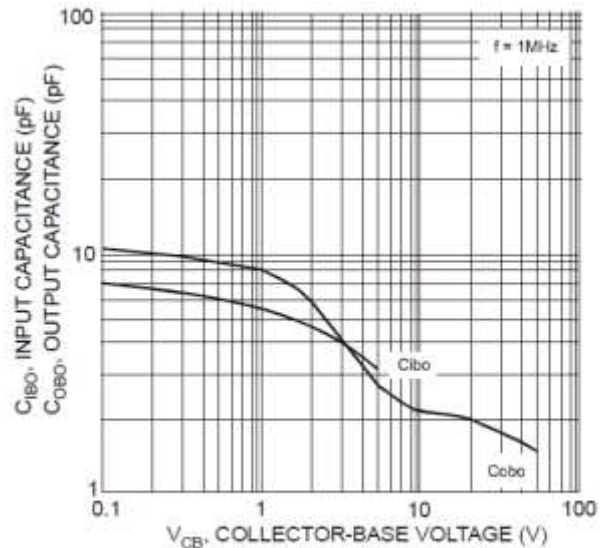
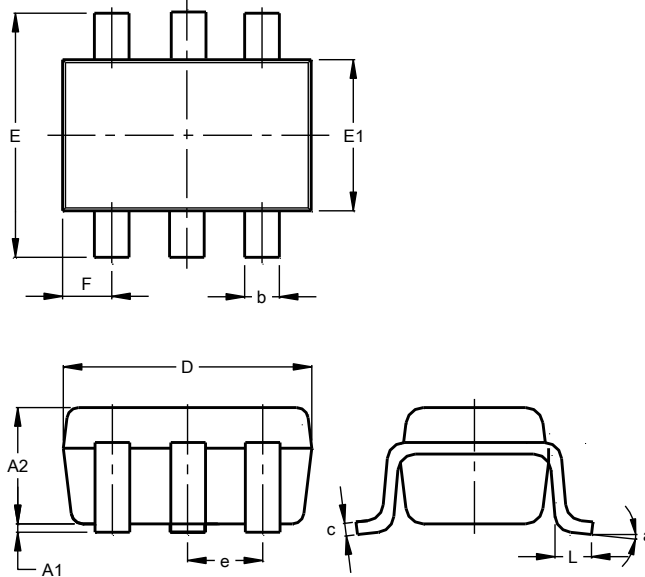


Fig. 2. Input and Output Capacitance vs. Collector-Base Voltage

**Package Outline Dimensions**

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

**SOT363**

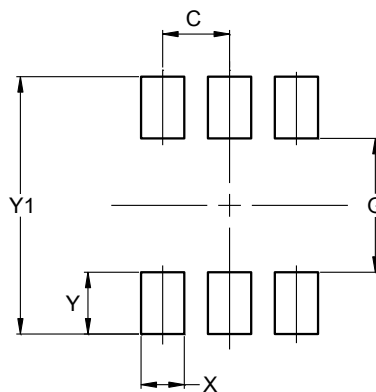


| SOT363               |           |      |       |
|----------------------|-----------|------|-------|
| Dim                  | Min       | Max  | Typ   |
| A1                   | 0.00      | 0.10 | 0.05  |
| A2                   | 0.90      | 1.00 | 1.00  |
| b                    | 0.10      | 0.30 | 0.25  |
| c                    | 0.10      | 0.22 | 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 |      |       |
| F                    | 0.40      | 0.45 | 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.

**SOT363**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| G          | 1.300         |
| X          | 0.420         |
| Y          | 0.600         |
| Y1         | 2.500         |

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