

Features

- Epitaxial Planar Die Construction
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **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)**

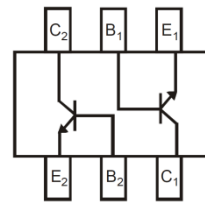
Mechanical Data

- Case: 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 Ⓔ
- Weight: 0.006 grams (Approximate)

SOT363



Top View



Device Schematic
Top View

Ordering Information (Note 5)

| Product | Status | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|---------------|--------|------------|---------|--------------------|-----------------|-------------------|
| MMDT3904Q-7-F | Active | Automotive | K6N | 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 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. Refer to http://www.diodes.com/product_compliance_definitions.html.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information

SOT363



K6N = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: D = 2016)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|------|------|------|------|------|------|------|------|------|
| Code | D | E | F | G | H | I | J | K |

| 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 _{CB0} | 60 | V |
| Collector-Emitter Voltage | V _{CEO} | 40 | V |
| Emitter-Base Voltage | V _{EBO} | 6.0 | V |
| Collector Current | I _C | 200 | mA |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6) | P _D | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 625 | °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 |

- Notes:
- 6. For the device mounted on minimum recommended pad layout FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 - 7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristic and Derating Information

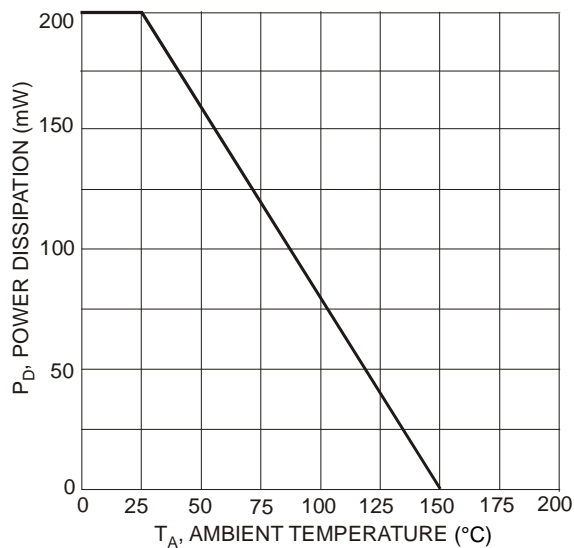


Fig. 1, Power Dissipation vs. Ambient Temperature (Total Device)

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

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|--|----------------------|-----------------------------|-------------------------|--------------------|--|
| OFF CHARACTERISTICS | | | | | |
| Collector-Base Breakdown Voltage | BV _{CBO} | 60 | — | V | I _C = 100μA, I _E = 0 |
| Collector-Emitter Breakdown Voltage (Note 8) | BV _{CEO} | 40 | — | V | I _C = 10.0mA, I _B = 0 |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 6.0 | — | V | I _E = 100μA, I _C = 0 |
| Collector-Base Cut-Off Current | I _{CBO} | — | 50 | nA | V _{CB} = 50V |
| Collector-Emitter Cut-Off Current | I _{CEV} | — | 50 | nA | V _{CE} = 40V, V _{BE(OFF)} = 3.0V |
| | | | 50 | | V _{CE} = 40V, V _{BE(ON)} = 0.25V |
| Emitter-Base Cut-Off Current | I _{EBO} | — | 50 | nA | V _{EB} = 5V |
| ON CHARACTERISTICS (Note 8) | | | | | |
| DC Current Gain | h _{FE} | 40 70 100 60 30 | — — 300 — — | — | I _C = 100μA, V _{CE} = 1.0V I _C = 1.0mA, V _{CE} = 1.0V I _C = 10mA, V _{CE} = 1.0V I _C = 50mA, V _{CE} = 1.0V I _C = 100mA, V _{CE} = 1.0V |
| Collector-Emitter Saturation Voltage | V _{CE(SAT)} | — | 0.20 0.30 | V | I _C = 10mA, I _B = 1.0mA I _C = 50mA, I _B = 5.0mA |
| Base-Emitter Saturation Voltage | V _{BE(SAT)} | 0.65 — | 0.85 0.95 | V | I _C = 10mA, I _B = 1.0mA I _C = 50mA, I _B = 5.0mA |
| SMALL SIGNAL CHARACTERISTICS | | | | | |
| Output Capacitance | C _{obo} | — | 4.0 | pF | V _{CB} = 5.0V, f = 1.0MHz, I _E = 0 |
| Input Capacitance | C _{ibo} | — | 8.0 | pF | V _{EB} = 0.5V, f = 1.0MHz, I _C = 0 |
| Input Impedance | h _{ie} | 1.0 | 10 | kΩ | V _{CE} = 10V, I _C = 1.0mA, f = 1.0kHz |
| Voltage Feedback Ratio | h _{re} | 0.5 | 8.0 | x 10 ⁻⁴ | |
| Small Signal Current Gain | h _{fe} | 100 | 400 | — | |
| Output Admittance | h _{oe} | 1.0 | 40 | μs | |
| Current Gain-Bandwidth Product | f _T | 300 | — | MHz | V _{CE} = 20V, I _C = 10mA, f = 100MHz |
| Noise Figure | NF | — | 5.0 | dB | V _{CE} = 5.0V, I _C = 100μA, R _S = 1.0kΩ, f = 1.0kHz |
| SWITCHING CHARACTERISTICS | | | | | |
| Delay Time | t _D | — | 35 | ns | V _{CC} = 3.0V, I _C = 10mA, |
| Rise Time | t _R | — | 35 | ns | V _{BE(OFF)} = -0.5V, I _{B1} = 1.0mA |
| Storage Time | t _S | — | 200 | ns | V _{CC} = 3.0V, I _C = 10mA, |
| Fall Time | t _F | — | 50 | ns | I _{B1} = -I _{B2} = 1.0mA |

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

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

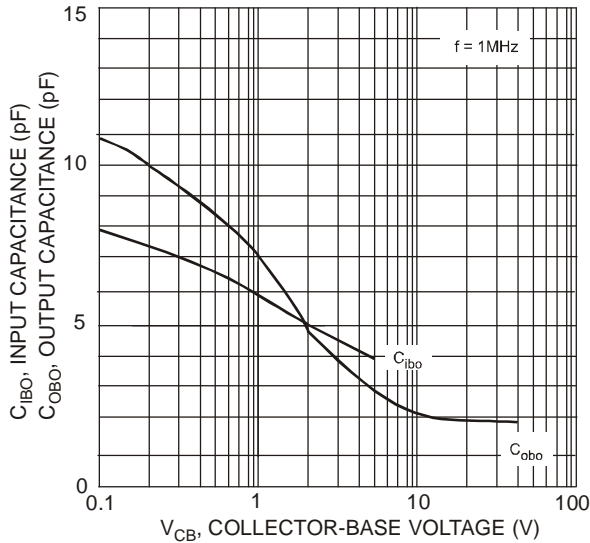


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

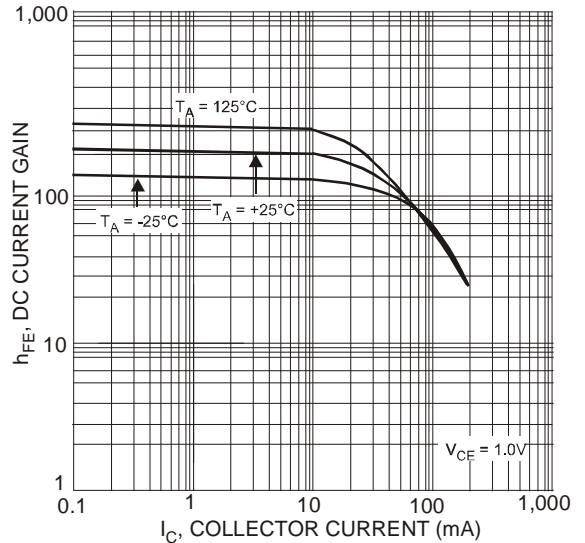


Fig. 3, Typical DC Current Gain vs. Collector Current

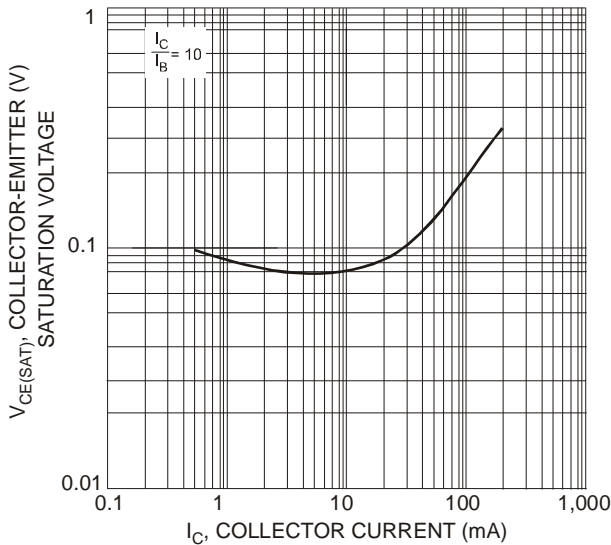


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

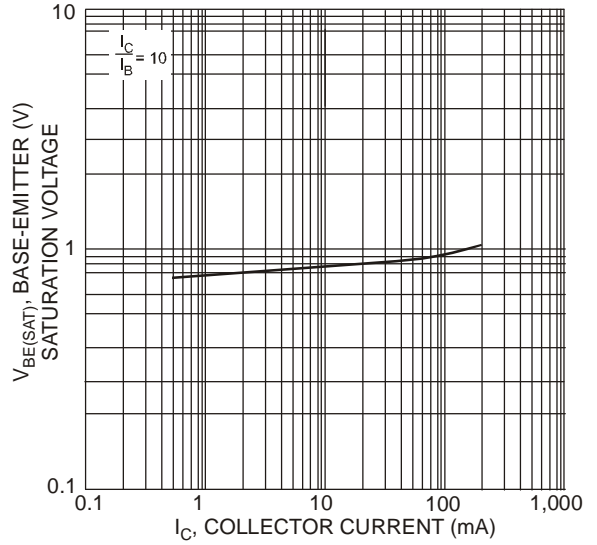
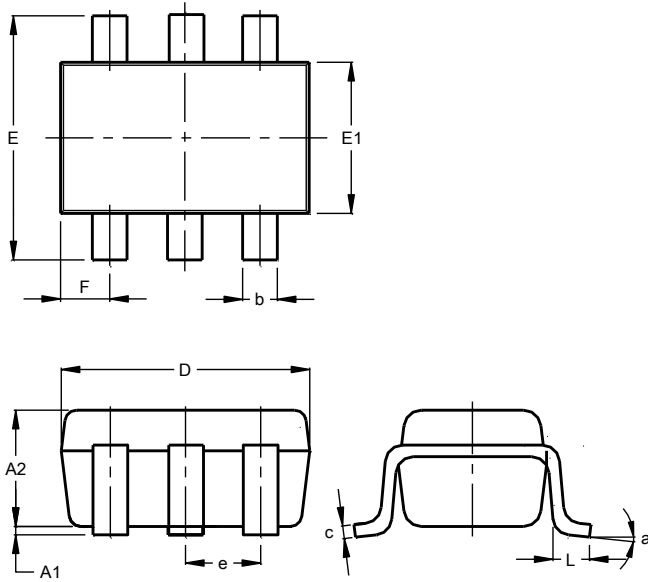


Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

Package Outline Dimensions

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

SOT363

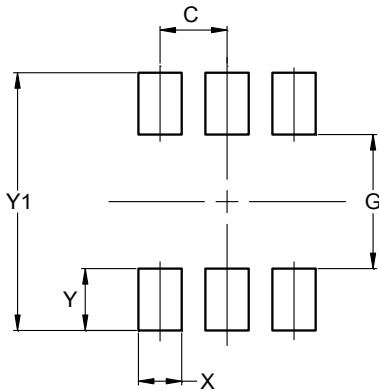


| SOT363 | | | |
|----------------------|-----------|------|-------|
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.90 | 1.00 | 1.00 |
| b | 0.10 | 0.30 | 0.25 |
| c | 0.10 | 0.22 | 0.11 |
| D | 1.80 | 2.20 | 2.15 |
| E | 2.00 | 2.20 | 2.10 |
| E1 | 1.15 | 1.35 | 1.30 |
| e | 0.650 BSC | | |
| 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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