

Description

This bipolar junction transistor (BJT) is designed to meet the stringent requirements of automotive applications.

Features

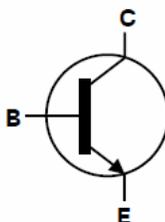
- $BV_{CEO} > 25V$
- $I_C = 50mA$ Continuous Collector Current
- Designed for VHF/UHF Amplifier Applications and High Output VHF Oscillators
- High Current Gain Bandwidth Product
- Ideal for Mixer and RF Amplifier Applications with Collector Currents in the 100 μA to 30mA Range
- **Totally Lead-Free & 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

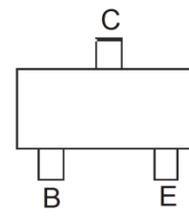
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (63)
- Weight: 0.008 grams (Approximate)



Top View



Device Symbol



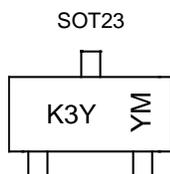
Top View Pin-Out

Ordering Information (Note 5)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity Per Reel |
|--------------|------------|---------|--------------------|-----------------|-------------------|
| MMBTH10Q-7-F | Automotive | K3Y | 7 | 8 | 3000 |

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



K3Y = Product Type Marking Code
 YM = Date Code Marking
 Y = Year ex: F = 2018
 M = Month ex: 9 = September

Date Code Key

| Year | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | F | G | H | I | J | K | L | M | N | O | P | Q |

| 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.)

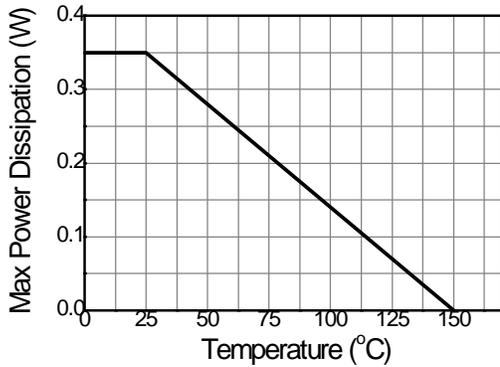
| Characteristic | Symbol | Value | Unit |
|---------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CB0} | 30 | V |
| Collector-Emitter Voltage | V_{CEO} | 25 | V |
| Emitter-Base Voltage | V_{EBO} | 3 | V |
| Collector Current | I_C | 50 | mA |

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

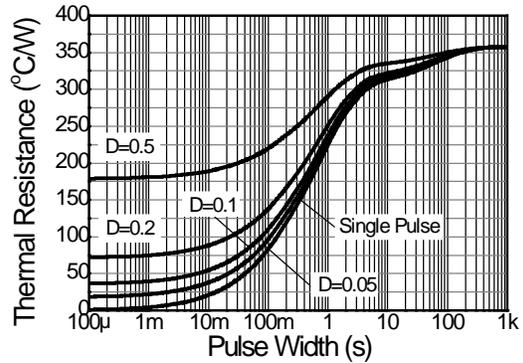
| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|--------------------|
| Power Dissipation | P_D | (Note 6) | 310 |
| | | (Note 7) | 350 |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | (Note 6) | 403 |
| | | (Note 7) | 357 |
| Thermal Resistance, Junction to Leads | $R_{\theta JL}$ | 350 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -65 to +150 | $^\circ\text{C}$ |

- Notes:
- 6. For a device mounted on minimum recommended pad layout FR-4 PCB with high coverage of single sided 1oz copper; device is measured under still air conditions whilst operating in a steady-state.
 - 7. Same as Note 6, except mounted on 15mm x 15mm 1oz copper.
 - 8. Thermal resistance from junction to solder-point (at the end of the collector lead).

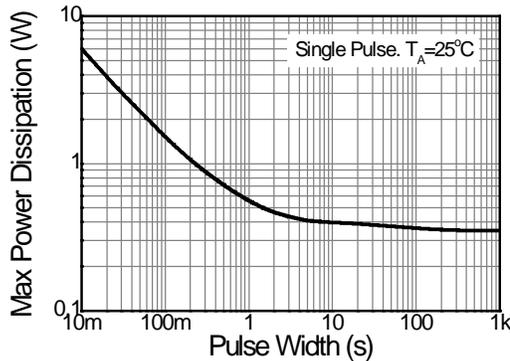
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--------------------------------------|--------------------------------|-----|-----|------|------|---|
| OFF CHARACTERISTICS (Note 9) | | | | | | |
| Collector-Base Breakdown Voltage | BV _{CBO} | 30 | — | — | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 25 | — | — | V | I _C = 1mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 3 | — | — | V | I _C = 100μA |
| Collector-Base Cut-Off Current | I _{CBO} | — | — | 100 | nA | V _{CB} = 25V |
| Emitter-Base Cut-Off Current | I _{EBO} | — | — | 100 | nA | V _{EB} = 2V |
| ON CHARACTERISTICS (Note 9) | | | | | | |
| DC Current Gain | h _{FE} | 60 | — | — | — | V _{CE} = 10V, I _C = 4mA |
| Collector-Emitter Saturation Voltage | V _{CE(SAT)} | — | — | 0.5 | V | I _C = 4mA, I _B = 400μA |
| Base-Emitter Voltage | V _{BE(SAT)} | — | — | 0.95 | V | I _C = 4mA, I _B = 400μA |
| Base-Emitter Turn-on Voltage | V _{BE(ON)} | — | — | 0.95 | V | V _{CE} = 10V, I _C = 4mA |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| Current Gain Bandwidth Product | f _T | 650 | — | — | MHz | V _{CE} = 10V, I _C = 4mA, f = 100MHz |
| Collector-Base Capacitance | C _{CBO} | — | — | 0.7 | pF | V _{CB} = 10V, f = 1MHz |
| Collector-Base Feedback Capacitance | C _{RBO} | — | — | 0.65 | pF | V _{CB} = 10V, f = 1MHz |
| Collector-Base Time Constant | R _b 'C _c | — | — | 9 | ps | V _{CB} = 10V, f = 31.8MHz, I _C = 4mA |

Note 9: Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

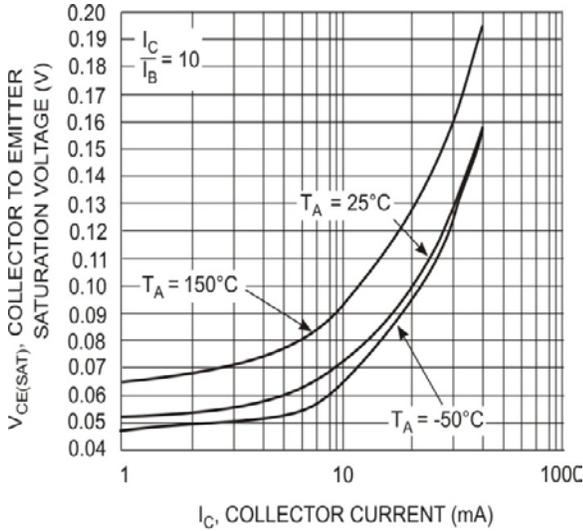


Fig. 1 Collector-Emitter Saturation Voltage vs. Collector Current

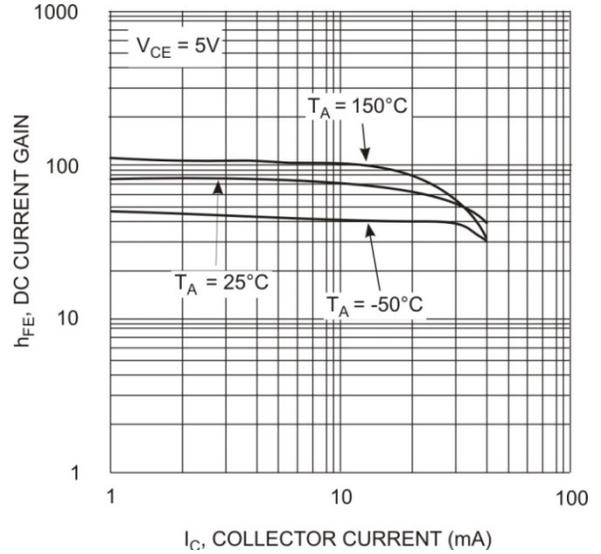


Fig. 2 DC Current Gain vs. Collector Current

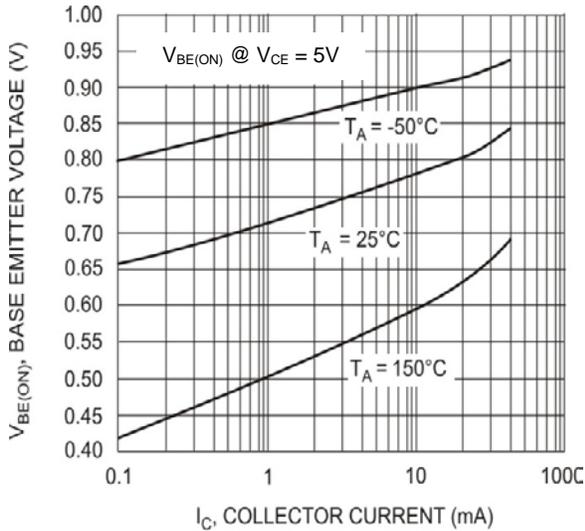


Fig. 3 Base-Emitter Voltage vs. Collector Current

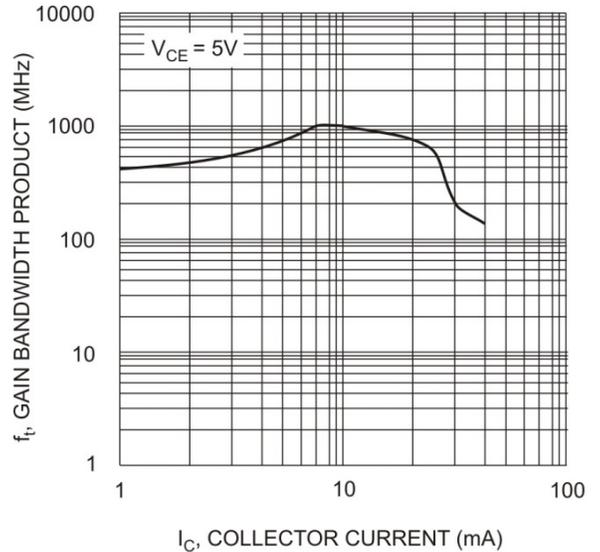
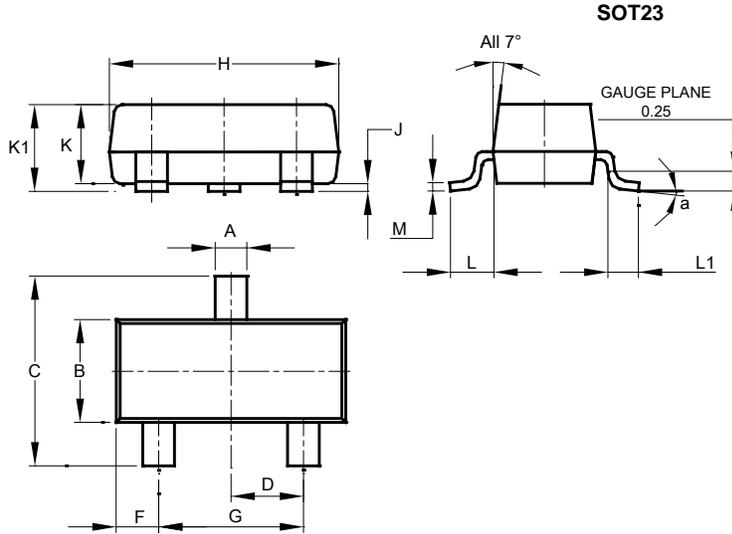


Fig. 4 Gain Bandwidth Product vs. Collector Current

Package Outline Dimensions

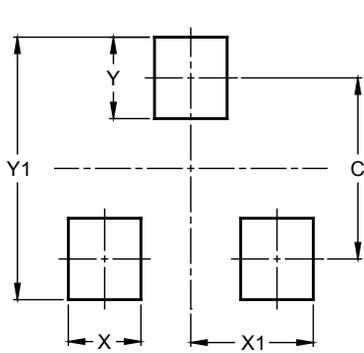
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

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



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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