



NPN/PNP SILICON COMPLEMENTARY SMALL SIGNAL DUAL TRANSISTOR

Qualified per MIL-PRF-19500/421

Qualified Levels:
JAN, JANTX, and
JANTXV

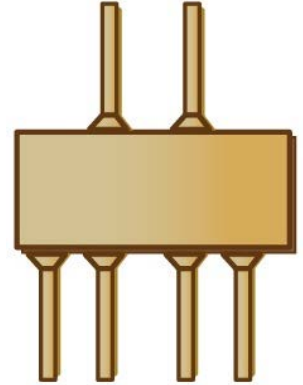
DESCRIPTION

This 2N3838 device in a 6-pin Flatpack package is military qualified up to a JANTXV level for high-reliability applications. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- JAN, JANTX, and JANTXV qualifications also available per MIL-PRF-19500/421.
- RoHS compliant versions available (commercial grade only).




**6-Pin Flatpack
Package**

APPLICATIONS / BENEFITS

- Two complementary small signal silicon transistors in a single package design.
- Lightweight.

Also available in:

 **TO-78 package**
(leaded)
[2N4854](#)

 **6-Pin U package**
(surface mount)
[2N4854U](#)

MAXIMUM RATINGS

| Parameters/Test Conditions | Symbol | Value per | | Unit |
|--|-------------------------------------|-----------------|---------------|------|
| | | Each Transistor | Total Package | |
| Thermal Resistance Junction-to-Case | R _{θJC} | 250 | 125 | °C/W |
| Thermal Resistance Junction-to-Ambient | R _{θJA} | 350 | 290 | °C/W |
| Total Power Dissipation @ T _A = +25 °C ⁽¹⁾ | P _T | 0.25 | 0.35 | W |
| Total Power Dissipation @ T _C = +25 °C ⁽²⁾ | P _T | 0.7 | 1.4 | W |
| Junction and Storage Temperature | T _J and T _{STG} | -65 to +200 | | °C |
| Collector-Base Voltage, Emitter Open | V _{CB0} | 60 | | V |
| Emitter-Base Voltage, Collector Open | V _{EB0} | 5 | | V |
| Collector-Emitter Voltage, Base Open | V _{CEO} | 40 | | V |
| Collector Current, dc | I _C | 600 | | mA |
| Lead to Case Voltage | | +/- 120 | | V |
| Solder Temperature @ 10 s | T _{SP} | 260 | | °C |

Notes: 1. For T_A > +25 °C, derate linearly 1.43 mW/°C one transistor, 2.00 mW/°C both transistors.
2. For T_C > +25 °C, derate linearly 4.0 mW/°C one transistor, 8.0 mW/°C both transistors.

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MECHANICAL and PACKAGING

- CASE: Hermetic ceramic (white), Au over Ni plated kovar cover.
- TERMINALS: Au over Ni plated copper.
- MARKING: Manufacturer's ID, part number, date code, Pin 1 Identifier.
- POLARITY: See Case Outline.
- See [Package Dimensions](#) on last page.

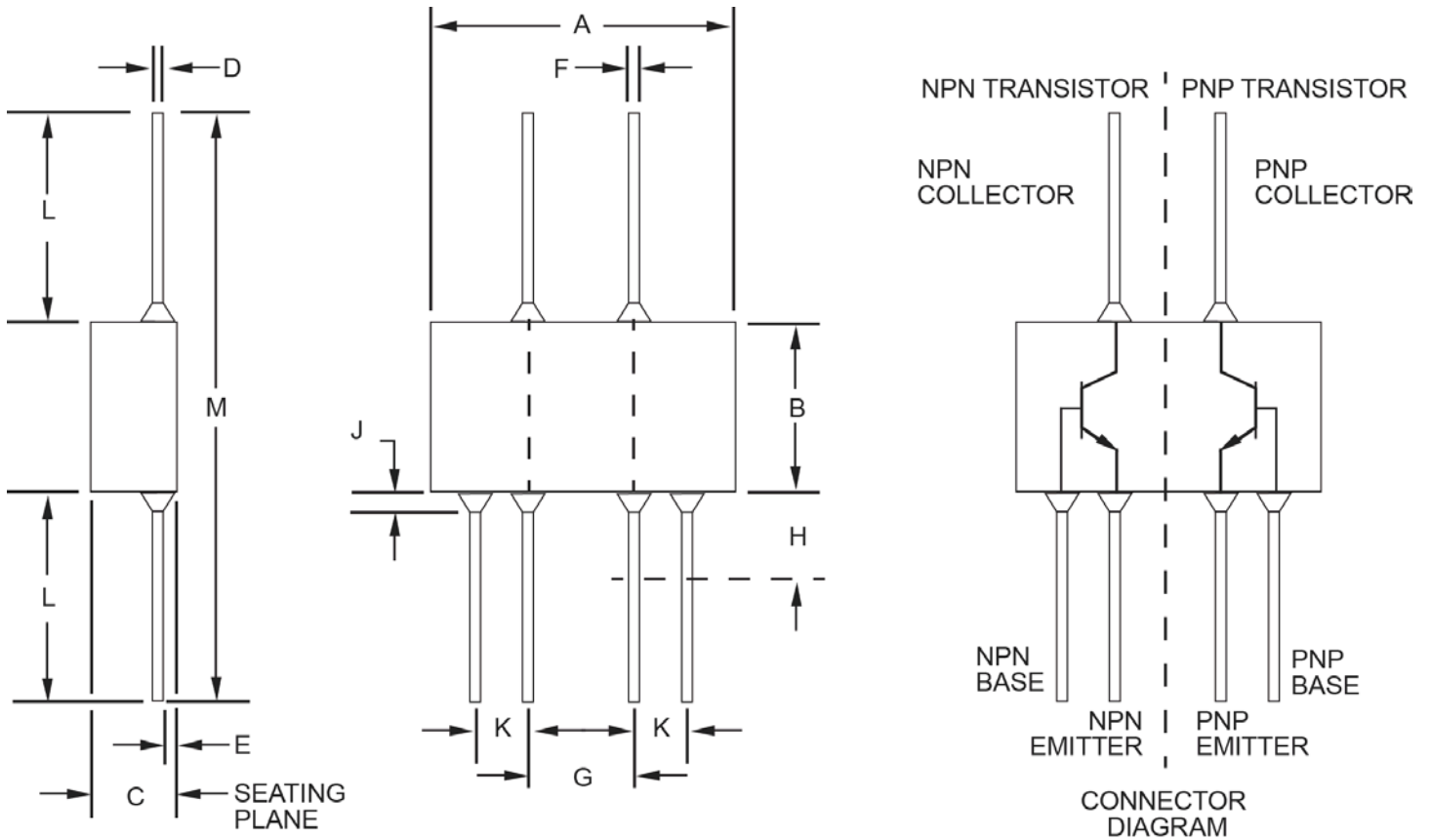
PART NOMENCLATURE

SYMBOLS & DEFINITIONS

| Symbol | Definition |
|----------|--|
| I_B | Base Current, dc. |
| I_C | Collector Current, dc. |
| I_E | Emitter Current, dc. |
| I_o | Average Rectified Output Current: The Output Current averaged over a full cycle with a 50 Hz or 60 Hz sine-wave input and a 180 degree conduction angle. |
| V_{CB} | Collector-Base Voltage (dc). |
| V_{CE} | Collector-Emitter Voltage, dc. |
| V_{EB} | Emitter-Base Voltage (dc). |

ELECTRICAL CHARACTERISTICS @ $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted.

| Characteristics | Symbol | Min. | Max. | Unit |
|---|------------------------------|-----------------------------------|----------|---------------------|
| OFF CHARACTERISTICS | | | | |
| Collector-Emitter Breakdown Current $I_C = 10\text{ mA}$ (pulsed) | $V_{(BR)CEO}$ | 40 | | V |
| Collector-Base Cutoff Current $V_{EB} = 5\text{ V}$ | $I_{CBO(1)}$ | | 10 | μA |
| Collector-Base Cutoff Current $V_{CB} = 50\text{ V}$ | $I_{CBO(2)}$ | | 50 | nA |
| Emitter-Base Cutoff Current $V_{EB} = 5.0\text{ V}$ $V_{EB} = 3.0\text{ V}$ | $I_{EBO(1)}$ $I_{EBO(2)}$ | | 10 10 | μA nA |
| ON CHARACTERISTICS | | | | |
| Forward-Current Transfer Ratio $I_C = 150\text{ mA}$, $V_{CE} = 1\text{ V}$ $I_C = 100\text{ }\mu\text{A}$, $V_{CE} = 10\text{ V}$ $I_C = 1.0\text{ mA}$, $V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}$, $V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}$, $V_{CE} = 10\text{ V}$ $I_C = 300\text{ mA}$, $V_{CE} = 10\text{ V}$ | h_{FE} | 50 35 50 75 100 35 | 300 | |
| Collector-Emitter Saturation Voltage $I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$ | $V_{CE(sat)}$ | | 0.40 | V |
| Base-Emitter Saturation Voltage $I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$ | $V_{BE(sat)}$ | 0.80 | 1.25 | V |
| DYNAMIC CHARACTERISTICS | | | | |
| Forward Current Transfer Ratio $I_C = 1.0\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ kHz}$ | h_{fe} | 60 | 300 | |
| Forward Current Transfer Ratio, Magnitude $I_C = 20\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 100\text{ MHz}$ | $ h_{fe} $ | 2.0 | 10 | |
| Small-Signal Common Emitter Input Impedance $I_C = 1.0\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ kHz}$ | h_{ie} | 1.5 | 9.0 | $\text{k}\Omega$ |
| Small-Signal Common Emitter Output Admittance $I_C = 1.0\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ kHz}$ | h_{oe} | | 50 | μhmo |
| Open Circuit Output Capacitance $V_{CB} = 10\text{ V}$, $I_E = 0$, $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ | C_{obo} | | 8.0 | pF |
| Noise Figure $I_C = 100\text{ }\mu\text{A}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ kHz}$, $R_G = 1.0\text{ k}\Omega$ | NF | | 8.0 | dB |
| SWITCHING CHARACTERISTICS | | | | |
| Turn-On Time (Saturated) (Reference MIL-PRF-19500/421, figure 7) | t_{on} | | 45 | ns |
| Turn-Off Time (Saturated) (Reference MIL-PRF-19500/421, figure 8) | t_{off} | | 300 | ns |
| Pulse Response (Non-Saturated) (Reference MIL-PRF-19500/421, figure 9) | $t_{on} + t_{off}$ | | 18 | ns |
| Collector-Emitter Non-Latching Voltage | V_{CEO} | 40 | | V |

PACKAGE DIMENSIONS


| Ltr | Dimensions | | | | Notes |
|-----|------------|------|-------------|------|-------|
| | Inch | | Millimeters | | |
| | Min | Max | Min | Max | |
| A | .240 | .290 | 6.10 | 7.37 | |
| B | .115 | .160 | 2.92 | 4.06 | |
| C | .030 | .080 | 0.76 | 2.03 | |
| D | .003 | .006 | 0.08 | 0.15 | 4 |
| E | .005 | .035 | 0.13 | 0.89 | |
| F | .010 | .019 | 0.25 | 0.48 | 4, 6 |

| Ltr | Dimension | | | | Notes |
|-----|-----------|------|-------------|-------|-------|
| | Inch | | Millimeters | | |
| | Min | Max | Min | Max | |
| G | .100 TP | | 2.54 TP | | 6,7 |
| H | - | .050 | - | 1.27 | |
| J | - | .015 | - | 0.38 | 5 |
| K | .050 TP | | 1.27 TP | | 6,7 |
| L | .070 | .250 | 1.78 | 6.35 | 3,4 |
| M | .260 | .650 | 6.60 | 16.51 | |

NOTES:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Maximum limit of this dimension does not apply to device supplied in a carrier.
- All six leads.
- Lead dimensions are uncontrolled in this zone.
- Dimensions "F", "G", and "K" to be measured in zone "H".
- Leads within .005 inch (0.13 mm) total of true position (TP) at "H" with maximum material condition.
- In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

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