



NPN MEDIUM POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/393

Qualified Levels:
JAN, JANTX and
JANTXV

DESCRIPTION

This family of high-frequency, epitaxial planar transistors feature low saturation voltage. These devices are also available in TO-5 and low profile U4 packages. Microsemi also offers numerous other transistor products to meet higher and lower power ratings with various switching speed requirements in both through-hole and surface-mount packages.

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

FEATURES

- JEDEC registered 2N3418 through 2N3421 series.
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/393.
- RoHS compliant versions available (commercial grade only).
- $V_{CE(sat)} = 0.25\text{ V @ } I_C = 1\text{ A}$.
- Rise time $t_r = 0.22\ \mu\text{s max @ } I_C = 1.0\text{ A, } I_{B1} = 100\text{ mA}$.
- Fall time $t_f = 0.20\ \mu\text{s max @ } I_C = 1.0\text{ A, } I_{B2} = -10\text{ mA}$.

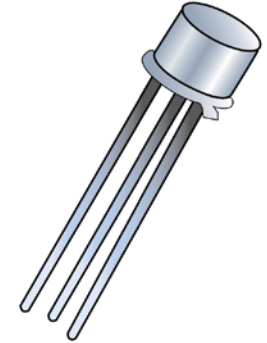
APPLICATIONS / BENEFITS

- General purpose transistors for medium power applications requiring high frequency switching and low package profile.
- Military and other high-reliability applications.

MAXIMUM RATINGS

| Parameters / Test Conditions | Symbol | 2N3418S 2N3420S | 2N3419S 2N3421S | Unit |
|--|----------------|--------------------|--------------------|------------------|
| Collector-Emitter Voltage | V_{CEO} | 60 | 80 | V |
| Collector-Base Voltage | V_{CBO} | 85 | 125 | V |
| Emitter-Base Voltage | V_{EBO} | 8 | | V |
| Collector Current $t_p \leq 1\text{ ms, duty cycle } \leq 50\%$ | I_C | 3 5 | | A |
| Total Power Dissipation @ $T_A = +25\text{ }^\circ\text{C}^{(1)}$ @ $T_C = +100\text{ }^\circ\text{C}^{(2)}$ | P_D | 1 5 | | W |
| Operating & Storage Junction Temperature Range | T_J, T_{stg} | -65 to +200 | | $^\circ\text{C}$ |


- Notes:**
1. Derate linearly 5.72 mW/ $^\circ\text{C}$ for $T_A > +25\text{ }^\circ\text{C}$.
 2. Derate linearly 150 mW/ $^\circ\text{C}$ for $T_C > +100\text{ }^\circ\text{C}$.




**TO-39 (TO-205AD)
Package**

Also available in:

**TO-5 package
(lead)**

 [2N3418 – 2N3421](#)

**U4 package
(surface mount)**

 [2N3418U4 – 2N3421U4](#)

MSC – Lawrence

6 Lake Street,
Lawrence, MA 01841
Tel: 1-800-446-1158 or
(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland

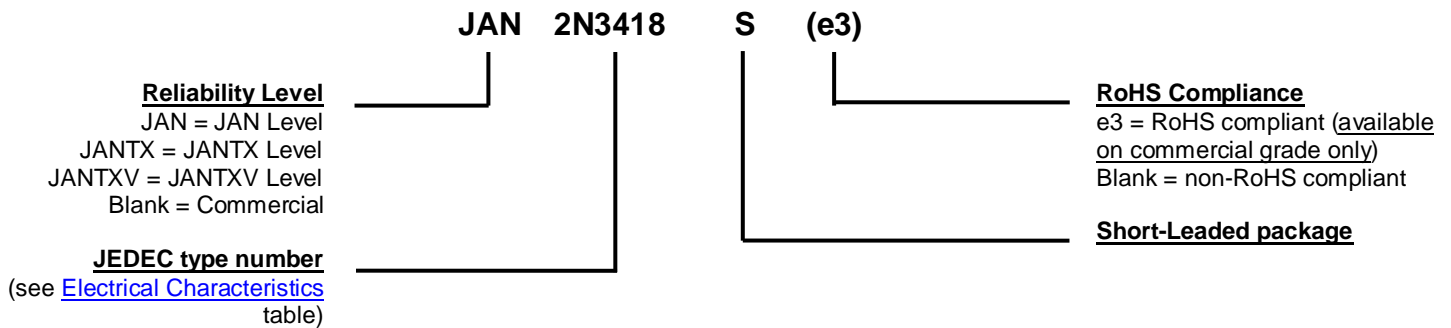
Gort Road Business Park,
Ennis, Co. Clare, Ireland
Tel: +353 (0) 65 6840044
Fax: +353 (0) 65 6822298

Website:

www.microsemi.com

MECHANICAL and PACKAGING

- CASE: Hermetically sealed, kovar base, nickel cap.
- MARKING: Part number, date code, manufacturer's ID.
- POLARITY: See [Package Dimensions](#) on last page.

PART NOMENCLATURE

SYMBOLS & DEFINITIONS

| Symbol | Definition |
|-----------|---|
| C_{obo} | Common-base open-circuit output capacitance. |
| I_{CEO} | Collector cutoff current, base open. |
| I_{CEX} | Collector cutoff current, circuit between base and emitter. |
| I_{EBO} | Emitter cutoff current, collector open. |
| h_{FE} | Common-emitter static forward current transfer ratio. |
| T_A | Ambient temperature, free-air temperature. |
| V_{CEO} | Collector-emitter voltage, base open. |
| V_{CBO} | Collector-emitter voltage, emitter open. |
| V_{EBO} | Emitter-base voltage, collector open. |

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted)

OFF CHARACTERISTICS

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|---|---------------|----------|------------|---------------|
| Collector-Emitter Breakdown Current $I_C = 50\text{ mA}$, $I_B = 0$ 2N3418S, 2N3420S 2N3419S, 2N3421S | $V_{(BR)CEO}$ | 60 80 | | V |
| Collector-Emitter Cutoff Current $V_{BE} = -0.5\text{ V}$, $V_{CE} = 80\text{ V}$ $V_{BE} = -0.5\text{ V}$, $V_{CE} = 120\text{ V}$ 2N3418S, 2N3420S 2N3419S, 2N3421S | I_{CEX} | | 0.3 0.3 | μA |
| Collector-Base Cutoff Current $V_{CE} = 45\text{ V}$, $I_B = 0$ $V_{CE} = 60\text{ V}$, $I_B = 0$ 2N3418S, 2N3420S 2N3419S, 2N3421S | I_{CEO} | | 5.0 5.0 | μA |
| Emitter-Base Cutoff Current $V_{EB} = 6.0\text{ V}$, $I_C = 0$ $V_{EB} = 8.0\text{ V}$, $I_C = 0$ | I_{EBO} | | 0.5 10 | μA |

ON CHARACTERISTICS ⁽¹⁾

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|--|---------------|------------|-------------|------|
| Forward-Current Transfer Ratio $I_C = 100\text{ mA}$, $V_{CE} = 2.0\text{ V}$ 2N3418S, 2N3419S 2N3420S, 2N3421S | h_{FE} | 20 40 | | |
| $I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ V}$ 2N3418S, 2N3419S 2N3420S, 2N3421S | | 20 40 | 60 120 | |
| $I_C = 2.0\text{ A}$, $V_{CE} = 2.0\text{ V}$ 2N3418S, 2N3419S 2N3420S, 2N3421S | | 15 30 | | |
| $I_C = 5.0\text{ A}$, $V_{CE} = 5.0\text{ V}$ 2N3418S, 2N3419S 2N3420S, 2N3421S | | 10 15 | | |
| Collector-Emitter Saturation Voltage $I_C = 1.0\text{ A}$, $I_B = 0.1\text{ A}$ $I_C = 2.0\text{ A}$, $I_B = 0.2\text{ A}$ | $V_{CE(sat)}$ | | 0.25 0.5 | V |
| Base-Emitter Saturation Voltage $I_C = 1.0\text{ A}$, $I_B = 0.1\text{ A}$ $I_C = 2.0\text{ A}$, $I_B = 0.2\text{ A}$ | $V_{BE(sat)}$ | 0.6 0.7 | 1.2 1.4 | V |

DYNAMIC CHARACTERISTICS

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|--|------------|------|------|------|
| Magnitude of Common Emitter Small-Signal Short Circuit Forward Current Transfer Ratio $I_C = 0.1\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 20\text{ MHz}$ | $ h_{fe} $ | 1.3 | 0.8 | |
| Output Capacitance $V_{CB} = 10\text{ V}$, $I_E = 0$, $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ | C_{obo} | | 150 | pF |

NOTES: (1) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

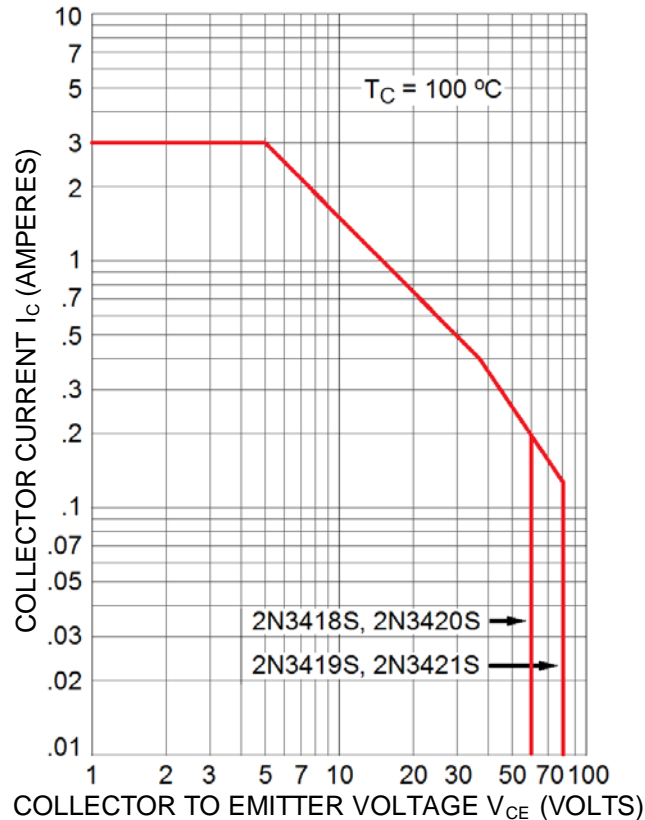
ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted) continued

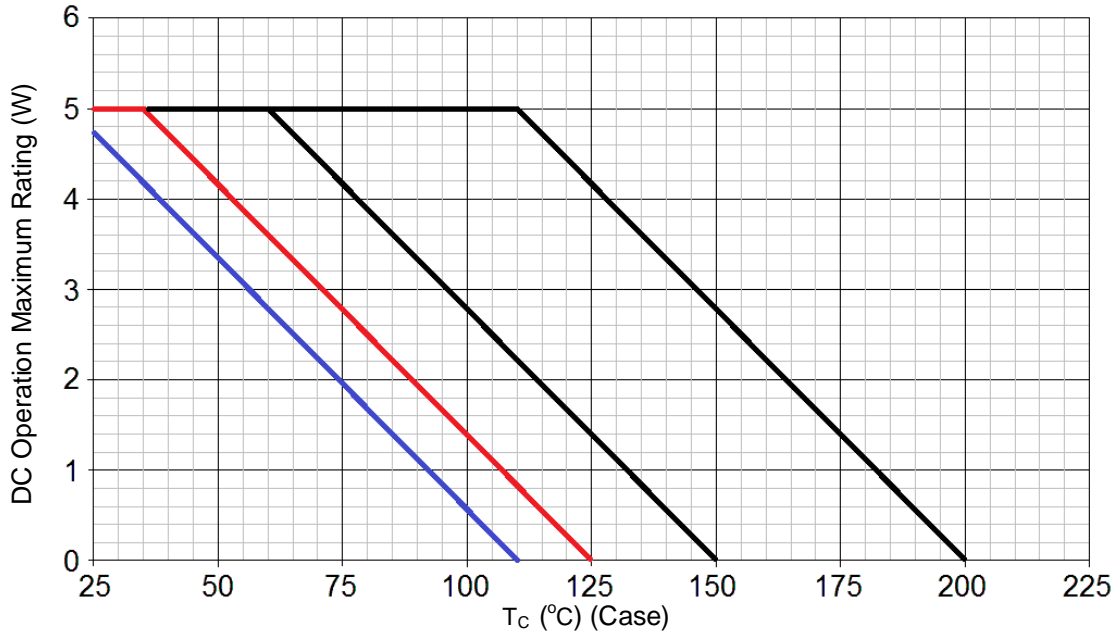
SWITCHING CHARACTERISTICS

| Parameters / Test Conditions (for all symbols) | Symbol | Min. | Max. | Unit |
|--|--|----------------|--------------|---------------|
| Delay Time Rise Time | $V_{BE(off)} = -3.7\text{ V}$, $I_C = 1.0\text{ A}$, $I_{B1} = 100\text{ mA}$ | t_d t_r | 0.08 0.22 | μs |
| Storage Time Fall Time | $V_{BE(off)} = -3.7\text{ V}$, $I_C = 1.0\text{ A}$, $I_{B2} = -100\text{ mA}$ | t_s t_f | 1.10 0.20 | μs |
| Turn-Off Time | $V_{BE(off)} = -3.7\text{ V}$, $I_C = 1.0\text{ A}$, $I_{B2} = -100\text{ mA}$, $R_L = 20\ \Omega$ | t_{off} | 1.20 | μs |

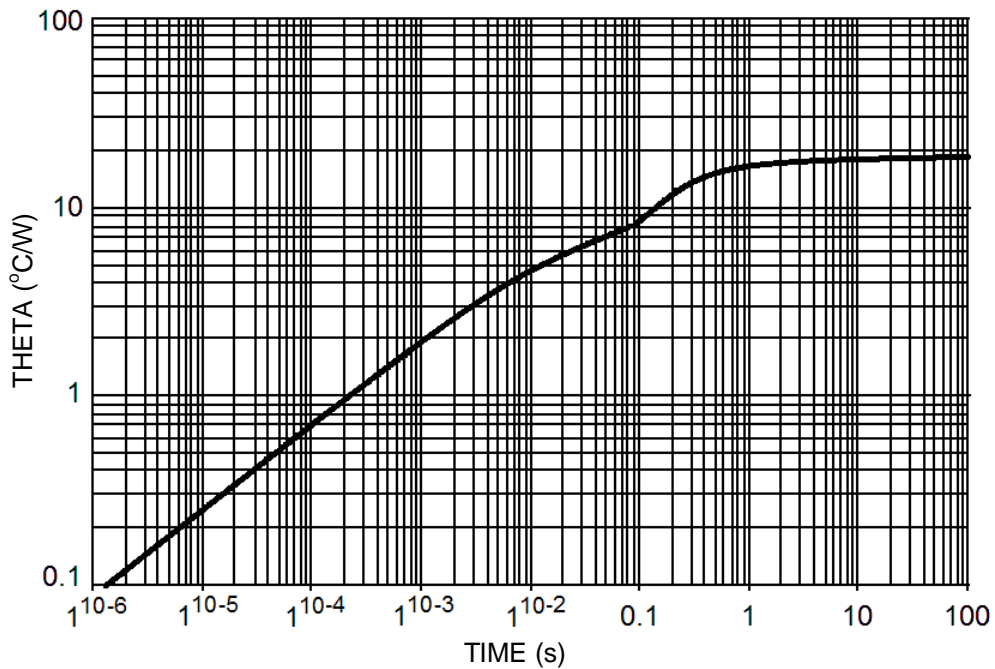
SAFE OPERATING AREA (See graph below and reference [MIL-STD-750, method 3053](#))

| | |
|---|---|
| DC Test | |
| $T_C = +100^\circ\text{C}$, 1 cycle, $t \geq 1.0\text{ s}$ | |
| Test 1 | |
| $V_{CE} = 5.0\text{ V}$, $I_C = 3.0\text{ A}$ | |
| Test 2 | |
| $V_{CE} = 37\text{ V}$, $I_C = 0.4\text{ A}$ | |
| Test 3 | |
| $V_{CE} = 60\text{ V}$, $I_C = 0.185\text{ A}$ | 2N3418S, 2N3420S |
| $V_{CE} = 80\text{ V}$, $I_C = 0.12\text{ A}$ | 2N3419S, 2N3421S |
| Clamped Switching | $T_A = +25^\circ\text{C}$, $I_B = 0.5\text{ A}$, $I_C = 3.0\text{ A}$ |

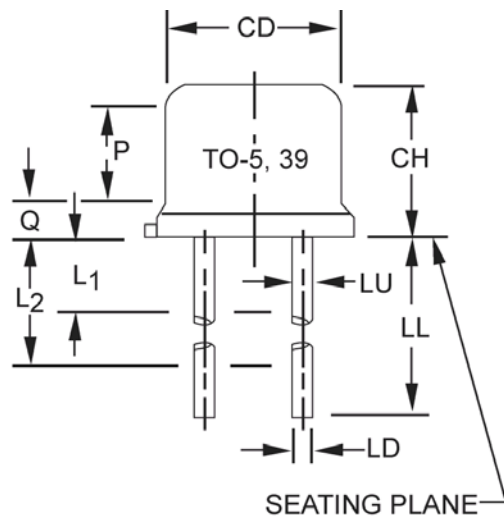

Maximum Safe Operating Area (continuous dc)

GRAPHS

FIGURE 1
Temperature-Power Derating Curve

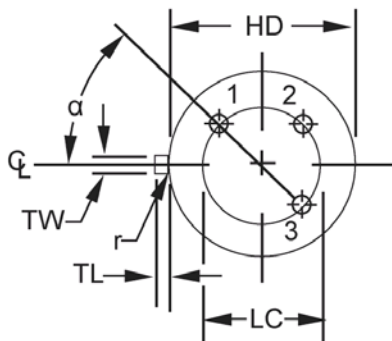
NOTES: Thermal Resistance Junction to Case = 4.5 °C/W
Max Finish-Alloy Temp = 175.0 °C


FIGURE 2
Maximum Thermal Impedance

NOTE: $T_C = +25\text{ }^\circ\text{C}$, Thermal Resistance $R_{\theta JC} = 4.5\text{ }^\circ\text{C/W}$

PACKAGE DIMENSIONS


| Symbol | Dimensions | | | | Note |
|----------------|---------------------|------|-------------|-------|-------|
| | Inches | | Millimeters | | |
| | Min | Max | Min | Max | |
| CD | .305 | .335 | 7.75 | 8.51 | |
| CH | .240 | .260 | 6.10 | 6.60 | |
| HD | .335 | .370 | 8.51 | 9.40 | |
| LC | .200 TP | | 5.08 TP | | 6 |
| LD | .016 | .021 | 0.41 | 0.53 | |
| LL | .500 | .750 | 12.7 | 19.05 | 7 |
| LU | See notes 7, 13, 14 | | | | |
| L ₁ | | .050 | | 1.27 | 7 |
| L ₂ | .250 | | 6.35 | | 7 |
| P | .100 | | 2.54 | | 5 |
| Q | | .040 | | 1.02 | 4 |
| TL | .029 | .045 | 0.74 | 1.14 | 3, 10 |
| TW | .028 | .034 | 0.71 | .86 | 9, 10 |
| r | | .010 | | 0.25 | 11 |
| α | 45° TP | | 45° TP | | 6 |



- Dimensions are in inches.
- Millimeters are given for general information only.
- Symbol TL is measured from HD maximum.
- Details of outline in this zone are optional.
- Symbol CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- Leads at gauge plane .054 inch (1.37 mm) +.001 inch (0.03 mm) -.000 inch (0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of TP relative to tab. Device may be measured by direct methods or by gauge.
- Symbol LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
- Lead number 3 is electrically connected to case.
- Beyond r maximum, TW shall be held for a minimum length of .021 inch (0.53 mm).
- Lead number 4 omitted on this variation.
- Symbol r applied to both inside corners of tab.
- For transistor types 2N3418S, 2N3419S, 2N3420S, 2N3421S, LL is .500 (12.70 mm) minimum and .750 (19.05 mm) maximum.
- In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.
- Lead 1 is emitter, lead 2 is base, and lead 3 is collector.



Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331