

# 2N3019, 2N3019S, 2N3700

## 80V, 1A NPN Small Signal Transistor

### Features

- MIL-PRF-19500/391 Qualified
- Available as JAN, JANTX, and JANTXV

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Value	Unit
Collector - Emitter Voltage	$V_{CEO}$	80	Vdc
Collector - Base Voltage	$V_{CBO}$	140	Vdc
Emitter - Base Voltage	$V_{EBO}$	7.0	Vdc
Collector Current - Continuous	$I_C$	1.0	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ 2N3019, 2N3019S 2N3700	$P_T$	800 500	mW
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ 2N3019, 2N3019S 2N3700	$P_T$	5.0 1.0	W
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

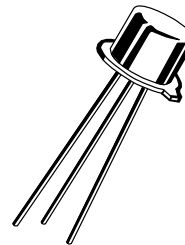
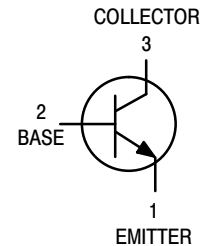
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient 2N3019, 2N3019S 2N3700	$R_{\theta JA}$	195 325	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case 2N3019, 2N3019S 2N3700	$R_{\theta JC}$	30 150	$^\circ\text{C/W}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

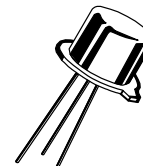


ON Semiconductor®

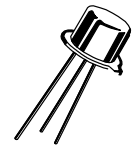
<http://onsemi.com>



TO-5  
CASE 205AA  
STYLE 1  
2N3019



TO-39  
CASE 205AB  
STYLE 1  
2N3019S



TO-18  
CASE 206AA  
STYLE 1  
2N3700

### ORDERING INFORMATION

Device	Package	Shipping
JAN2N3019	TO-5	Bulk
JANTX2N3019		
JANTXV2N3019		
JAN2N3019S	TO-39	Bulk
JANTX2N3019S		
JANTXV2N3019S		
JAN2N3700	TO-18	Bulk
JANTX2N3700		
JANTXV2N3700		

## 2N3019, 2N3019S, 2N3700

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Breakdown Voltage ( $I_C = 30\text{ mA}$ )	$V_{(BR)CEO}$	80	–	Vdc
Emitter–Base Cutoff Current ( $V_{EB} = 5.0\text{ Vdc}$ ) ( $V_{EB} = 7.0\text{ Vdc}$ )	$I_{EBO}$	– –	10 10	nAdc $\mu\text{Adc}$
Collector–Emitter Cutoff Current ( $V_{CE} = 90\text{ Vdc}$ )	$I_{CEO}$	–	10	nAdc
Collector–Base Cutoff Current ( $V_{CB} = 140\text{ Vdc}$ )	$I_{CBO}$	–	10	$\mu\text{Adc}$
<b>ON CHARACTERISTICS (Note 1)</b>				
DC Current Gain ( $I_C = 0.1\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 10\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 150\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ )	$h_{FE}$	50 90 100 50 15	300 – 300 300 –	–
Collector–Emitter Saturation Voltage ( $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$ ) ( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )	$V_{CE(sat)}$	– –	0.2 0.5	Vdc
Base–Emitter Saturation Voltage ( $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$ )	$V_{BE(sat)}$	–	1.1	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Magnitude of Small–Signal Current Gain ( $I_C = 50\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )	$ h_{fe} $	5.0	20	–
Small–Signal Current Gain ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 5\text{ Vdc}$ , $f = 1\text{ kHz}$ )	$h_{fe}$	80	400	–
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ )	$C_{obo}$	–	12	pF
Input Capacitance ( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ )	$C_{ibo}$	–	60	pF
Noise Figure ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 100\text{ }\mu\text{Adc}$ , $R_g = 1\text{ k}\Omega$ , $\text{PBW} = 200\text{ Hz}$ )	NF	–	4.0	dB
Collector–Base Time Constant ( $V_{CB} = 10\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $f = 79.8\text{ MHz}$ )	$r'_{b,C_C}$	–	400	ps
<b>SWITCHING CHARACTERISTICS</b>				
Pulse Response (Reference Figure in MIL-PRF-19500/391)	$t_{on} + t_{off}$	–	30	ns

1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

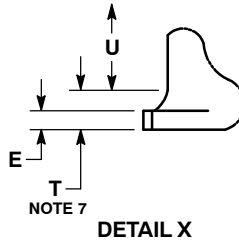
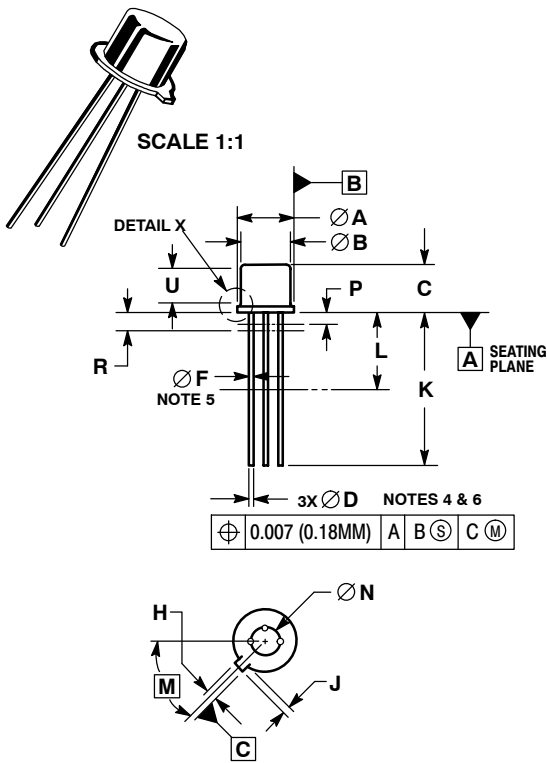
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®



## TO-5 3-Lead CASE 205AA ISSUE B

DATE 06 JUL 2012



STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION J MEASURED FROM DIAMETER A TO EDGE.
4. LEAD TRUE POSITION TO BE DETERMINED AT THE GAUGE PLANE DEFINED BY DIMENSION R.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L.
6. DIMENSION D APPLIES BETWEEN DIMENSION L AND K.
7. BODY CONTOUR OPTIONAL WITHIN ZONE DEFINED BY DIMENSIONS A, B, AND T.
8. DIMENSION B SHALL NOT VARY MORE THAN 0.010 IN ZONE P.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.89	9.40	0.350	0.370
B	8.00	8.51	0.315	0.335
C	6.10	6.60	0.240	0.260
D	0.41	0.53	0.016	0.021
E	0.23	3.18	0.009	0.125
F	0.41	0.48	0.016	0.019
H	0.71	0.86	0.028	0.034
J	0.73	1.02	0.029	0.040
K	38.10	44.45	1.500	1.750
L	6.35	---	0.250	---
M	45° BSC		45° BSC	
N	5.08 BSC		0.200 BSC	
P	---	1.27	---	0.050
R	1.37 BSC		0.054 BSC	
T	---	0.76	---	0.030
U	2.54	---	0.100	---

DOCUMENT NUMBER:	98AON49138E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
STATUS:	ON SEMICONDUCTOR STANDARD	
NEW STANDARD:		
DESCRIPTION:	TO-5 3-LEAD	PAGE 1 OF 2



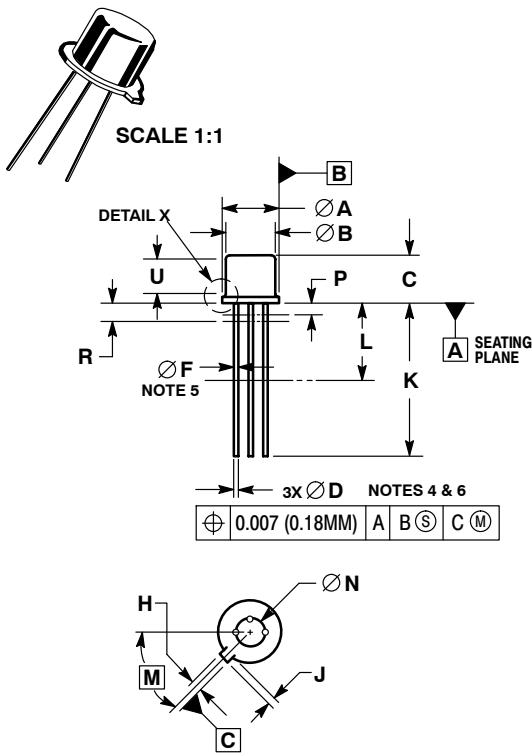
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®



TO-39 3-Lead  
CASE 205AB  
ISSUE A

DATE 25 JUN 2012



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION J MEASURED FROM DIAMETER A TO EDGE.
4. LEAD TRUE POSITION TO BE DETERMINED AT THE GAUGE PLANE DEFINED BY DIMENSION R.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L.
6. DIMENSION D APPLIES BETWEEN DIMENSION L AND K.
7. BODY CONTOUR OPTIONAL WITHIN ZONE DEFINED BY DIMENSIONS A, B, AND T.
8. DIMENSION B SHALL NOT VARY MORE THAN 0.010 IN ZONE P.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.89	9.40	0.350	0.370
B	8.00	8.51	0.315	0.335
C	6.10	6.60	0.240	0.260
D	0.41	0.48	0.016	0.019
E	0.23	3.18	0.009	0.125
F	0.41	0.48	0.016	0.019
H	0.71	0.86	0.028	0.034
J	0.73	1.02	0.029	0.040
K	12.70	14.73	0.500	0.580
L	6.35	---	0.250	---
M	45° BSC		45° BSC	
N	5.08 BSC		0.200 BSC	
P	---	1.27	---	0.050
R	1.37 BSC		0.054 BSC	
T	---	0.76	---	0.030
U	2.54	---	0.100	---

STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

DOCUMENT NUMBER:	98AON49134E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
STATUS:	ON SEMICONDUCTOR STANDARD	
NEW STANDARD:		
DESCRIPTION:	TO-39 3-LEAD	PAGE 1 OF 2



# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

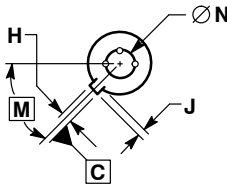
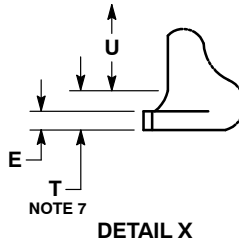
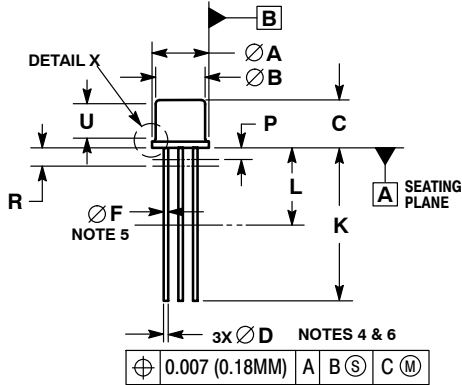
ON Semiconductor®



SCALE 1:1

### TO-18 CASE 206AA ISSUE A

DATE 21 AUG 2012



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION J MEASURED FROM DIAMETER A TO EDGE.
4. LEAD TRUE POSITION TO BE DETERMINED AT THE GAUGE PLANE DEFINED BY DIMENSION R.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L.
6. DIMENSION D APPLIES BETWEEN DIMENSION L AND K.
7. BODY CONTOUR OPTIONAL WITHIN ZONE DEFINED BY DIMENSIONS A, B, AND T.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.41	0.53	0.016	0.021
E	---	0.76	---	0.030
F	0.41	0.48	0.016	0.019
H	0.91	1.17	0.036	0.046
J	0.71	1.22	0.028	0.048
K	12.70	19.05	0.500	0.750
L	6.35	---	0.250	---
M	45° BSC		45° BSC	
N	2.54 BSC		0.100 BSC	
P	---	1.27	---	0.050
R	1.37 BSC		0.054 BSC	
T	---	0.76	---	0.030
U	2.54	---	0.100	---

STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 4:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE & CASE

STYLE 7:  
PIN 1. ANODE  
2. BASE  
3. CATHODE

STYLE 10:  
PIN 1. BASE  
2. EMITTER  
3. BASE

STYLE 2:  
PIN 1. SOURCE, SUBSTRATE  
& CASE  
2. GATE  
3. DRAIN

STYLE 5:  
PIN 1. EMITTER  
2. BASE 1  
3. BASE 2

STYLE 8:  
PIN 1. GATE  
2. ANODE 1  
3. ANODE 2

STYLE 11:  
PIN 1. DRAIN  
2. GATE  
3. SOURCE, SUBSTRATE

STYLE 3:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 6:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

STYLE 9:  
PIN 1. ANODE 2  
2. ANODE 1  
3. GATE  
(CONNECTED TO CASE)

STYLE 12:  
PIN 1. SOURCE  
2. GATE  
3. DRAIN (CASE)

DOCUMENT NUMBER:	98AON45207E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-18 3-LEAD	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

---

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)