

# 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	$V_{CE0}$	80	Vdc
Collector - Base Voltage	$V_{CB0}$	140	Vdc
Emitter - Base Voltage	$V_{EB0}$	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

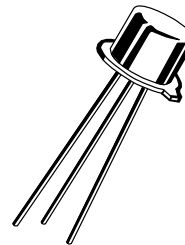
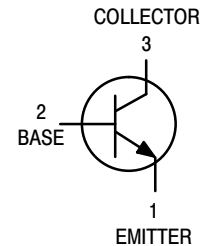
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient 2N3019, 2N3019S 2N3700	$R_{\theta JA}$	195 325	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case 2N3019, 2N3019S 2N3700	$R_{\theta JC}$	30 150	$^\circ\text{C/W}$

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.

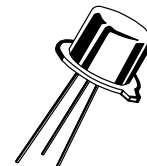


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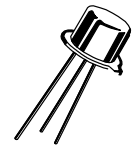
<http://onsemi.com>



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 ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 100\text{ }\mu\text{Adc}$ , $R_g = 1\text{ k}\Omega$ , $PBW = 200\text{ Hz}$ )	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  $\leq 2.0\%$ .

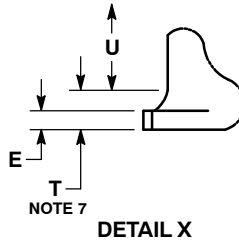
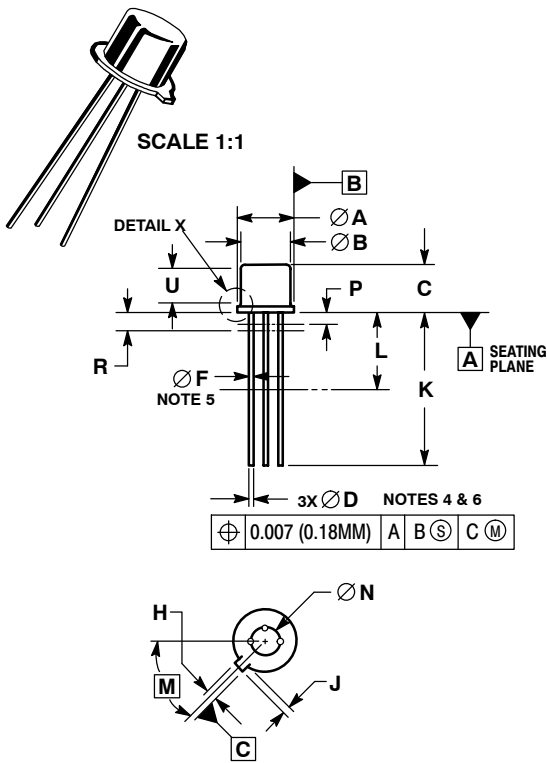
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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	---

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DESCRIPTION:	TO-5 3-LEAD	PAGE 1 OF 2



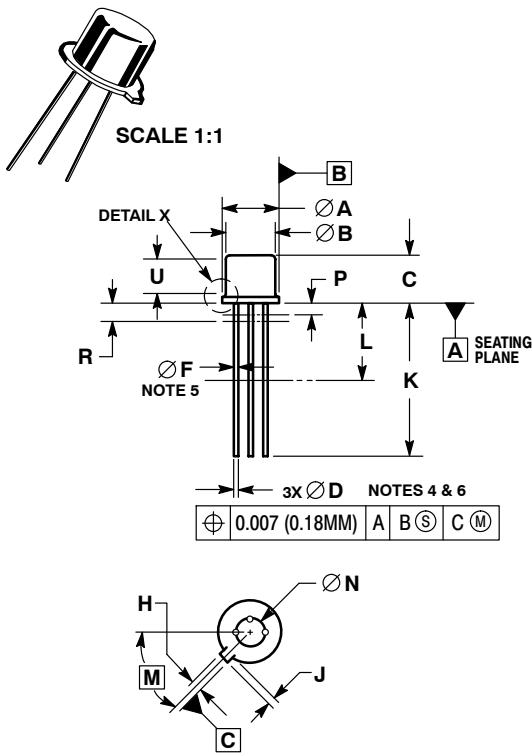
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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

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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

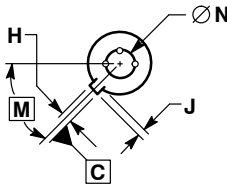
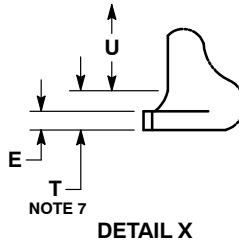
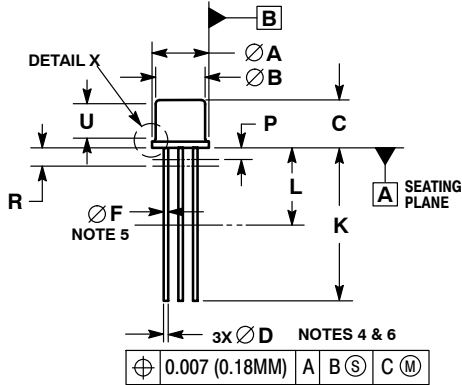
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SCALE 1:1

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

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

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

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

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

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

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

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

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

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

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

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