

# 2N4029, 2N4033

## Product Preview Small Signal Switching Transistor

### PNP Silicon

#### Features

- MIL-PRF-19500/512 Qualified
- Available as JAN, JANTX, and JANTXV

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	-80	Vdc
Collector-Base Voltage	$V_{CBO}$	-80	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current - Continuous	$I_C$	1	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ 2N4029 2N4033	$P_T$	0.5 0.8	W
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ 2N4029 2N4033	$P_T$	1.0 4.0	W
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

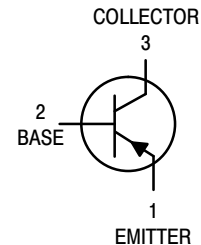
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient 2N4029 2N4033	$R_{\theta JA}$	325 195	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case 2N4029 2N4033	$R_{\theta JC}$	150 40	$^\circ\text{C}/\text{W}$

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.

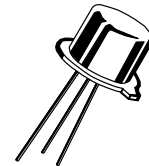


ON Semiconductor®

<http://onsemi.com>



TO-18  
CASE 206AA  
STYLE 1  
2N4029



TO-39  
CASE 205AB  
STYLE 1  
2N4033

#### ORDERING INFORMATION

Level	Device	Package	Shipping
JAN	2N4029	TO-18	Bulk
JANTX	2N4033	TO-39	Bulk
JANTXV			

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## 2N4029, 2N4033

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

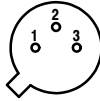
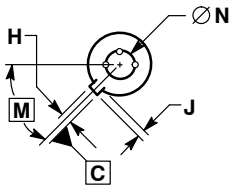
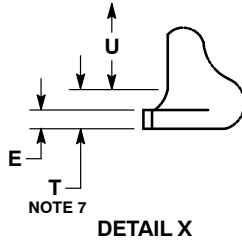
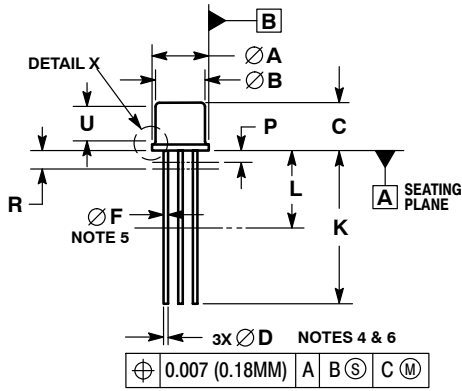
Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector - Emitter Breakdown Voltage ( $I_C = -10 \text{ mAdc}$ )	$V_{(BR)CEO}$	-80	-	Vdc
Collector - Emitter Cutoff Current ( $V_{CE} = -60 \text{ Vdc}$ )	$I_{CES}$	-	-25	nAdc
Collector - Base Cutoff Current ( $V_{CB} = -80 \text{ Vdc}, I_E = 0$ ) ( $V_{CB} = -60 \text{ Vdc}, I_E = 0$ )	$I_{CBO}$	- -	-10 -10	$\mu\text{A}$ nA
Emitter - Base Cutoff Current ( $V_{EB} = -5 \text{ Vdc}$ ) ( $V_{EB} = -3 \text{ Vdc}$ )	$I_{EBO}$	- -	-10 -25	$\mu\text{A}$ nA
<b>ON CHARACTERISTICS (Note 1)</b>				
DC Current Gain ( $I_C = -0.1 \text{ mAdc}, V_{CE} = -5 \text{ Vdc}$ ) ( $I_C = -100 \text{ mAdc}, V_{CE} = -5 \text{ Vdc}$ ) ( $I_C = -500 \text{ mAdc}, V_{CE} = -5 \text{ Vdc}$ ) ( $I_C = -1 \text{ Adc}, V_{CE} = -5 \text{ Vdc}$ )	$h_{FE}$	50 100 70 25	- 300 - -	-
Collector - Emitter Saturation Voltage ( $I_C = -150 \text{ mAdc}, I_B = -15 \text{ mAdc}$ ) ( $I_C = -500 \text{ mAdc}, I_B = -50 \text{ mAdc}$ ) ( $I_C = -1 \text{ Adc}, I_B = -100 \text{ mAdc}$ )	$V_{CE(sat)}$	- - -	-0.15 -0.5 -1.0	Vdc
Base - Emitter Saturation Voltage ( $I_C = -150 \text{ mAdc}, I_B = -15 \text{ mAdc}$ ) ( $I_C = -500 \text{ mAdc}, I_B = -50 \text{ mAdc}$ )	$V_{BE(sat)}$	- -	-0.9 -1.2	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Magnitude of Small-Signal Current Gain ( $I_C = -50 \text{ mAdc}, V_{CE} = -10 \text{ Vdc}, f = 100 \text{ MHz}$ )	$ h_{fe} $	1.5	6.0	-
Output Capacitance ( $V_{CB} = -10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$ )	$C_{obo}$	-	20	pF
Input Capacitance ( $V_{EB} = -0.5 \text{ Vdc}, I_C = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$ )	$C_{ibo}$	-	80	pF
<b>SWITCHING CHARACTERISTICS</b>				
Delay Time (Reference Figure in MIL-PRF-19500/512)	$t_d$	-	15	ns
Rise Time (Reference Figure in MIL-PRF-19500/512)	$t_r$	-	25	ns
Storage Time (Reference Figure in MIL-PRF-19500/512)	$t_s$	-	175	ns
Fall Time (Reference Figure in MIL-PRF-19500/512)	$t_f$	-	35	ns

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

# 2N4029, 2N4033

## PACKAGE DIMENSIONS

TO-18 3  
CASE 206AA  
ISSUE A



LEAD IDENTIFICATION  
DETAIL

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	---

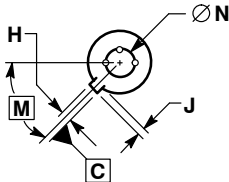
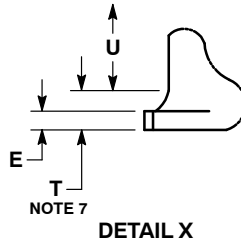
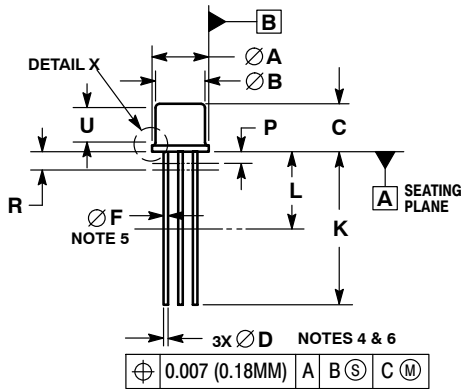
STYLE 1:

1. EMITTER
2. BASE
3. COLLECTOR

# 2N4029, 2N4033

## PACKAGE DIMENSIONS

### TO-39 3-Lead CASE 205AB ISSUE A



#### 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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