2N5401

Preferred Device

Amplifier Transistors

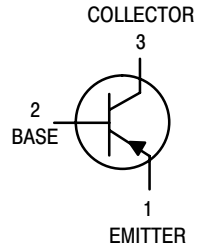
PNP Silicon

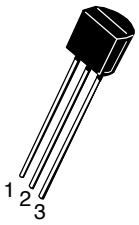
Features

- Pb–Free Packages are Available*

ON Semiconductor®

http://onsemi.com





TO–92
CASE 29
STYLE 1

MAXIMUM RATINGS

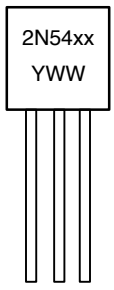
Rating	Symbol	2N5400	2N5401	Unit
Collector – Emitter Voltage	V_{CEO}	120	150	Vdc
Collector – Base Voltage	V_{CBO}	130	160	Vdc
Emitter – Base Voltage	V_{EBO}	5.0		Vdc
Collector Current – Continuous	I_C	600		mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12		Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150		°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	83.3	°C/W

MARKING DIAGRAM



Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

Preferred devices are recommended choices for future use and best overall value.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage[1] (I_C = 1.0 mAdc, I_B = 0)	2N5400 2N5401	$V_{(BR)CEO}$	 150	 –	Vdc
Collector−Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	2N5400 2N5401	$V_{(BR)CBO}$	 160	 –	Vdc
Emitter−Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	5.0	–	Vdc
Collector Cutoff Current (V_{CB} = 120 Vdc, I_E = 0) (V_{CB} = 120 Vdc, I_E = 0, T_A = 100°C)	 2N5401 2N5401	I_{CBO}	 – –	 50 50	
Emitter Cutoff Current (V_{EB} = 3.0 Vdc, I_C = 0)		I_{EBO}	–	50	nAdc
ON CHARACTERISTICS (Note 1)					
DC Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc) (I_C = 10 mAdc, V_{CE} = 5.0 Vdc) (I_C = 50 mAdc, V_{CE} = 5.0 Vdc)		h_{FE}	 50 60 50	 – 240 –	–
Collector−Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)		$V_{CE(sat)}$	 – –	 0.2 0.5	Vdc
Base−Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)		$V_{BE(sat)}$	 – –	 1.0 1.0	Vdc
SMALL−SIGNAL CHARACTERISTICS					
Current−Gain — Bandwidth Product (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)		f_T	100	300	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)		C_{obo}	–	6.0	pF
Small−Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)		h_{fe}	40	200	–
Noise Figure (I_C = 250 μAdc, V_{CE} = 5.0 Vdc, R_S = 1.0 kΩ, f = 1.0 kHz)		NF	–	8.0	dB

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

ORDERING INFORMATION

Device	Package	Shipping†
2N5401	TO−92	5000 Unit / Bulk
2N5401RL1	TO−92	2000 Tape & Reel
2N5401RLRA	TO−92	2000 Tape & Reel
2N5401RLRAG	TO−92 (Pb−Free)	2000 Tape & Reel
2N5401RLRM	TO−92	2000 Tape & Ammo Box
2N5401ZL1	TO−92	2000 Tape & Ammo Box

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

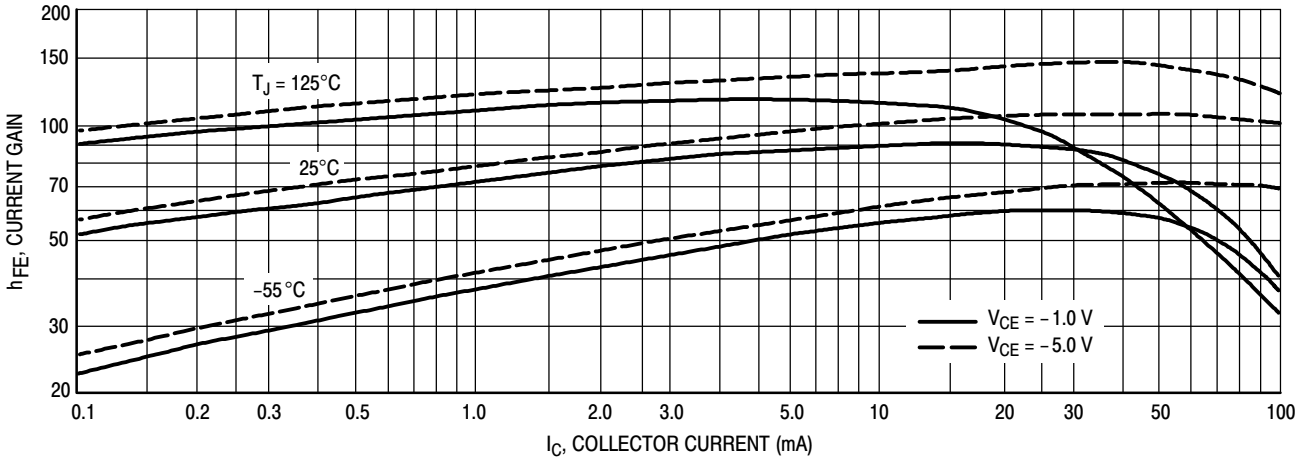


Figure 1. DC Current Gain

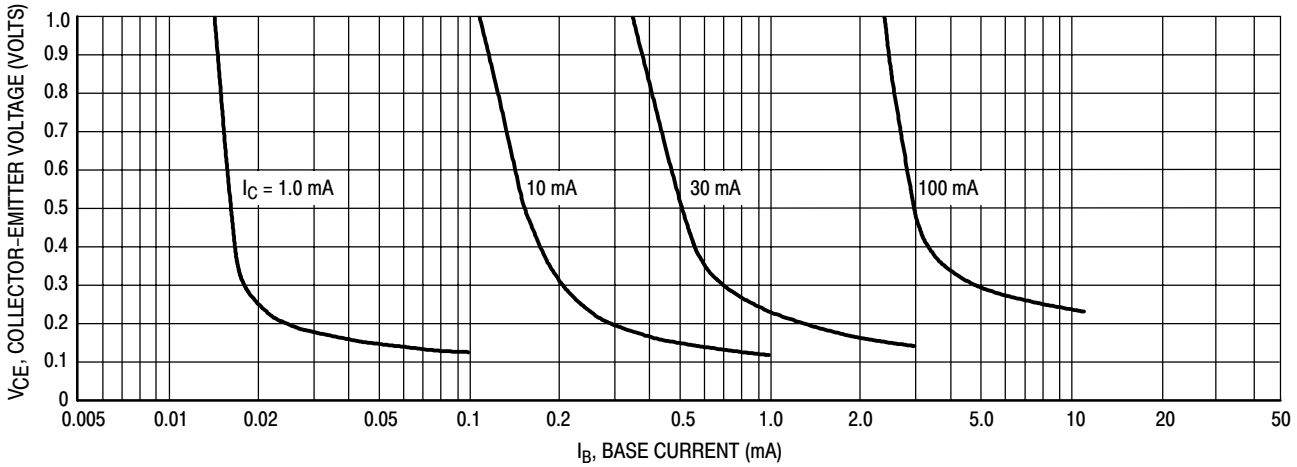


Figure 2. Collector Saturation Region

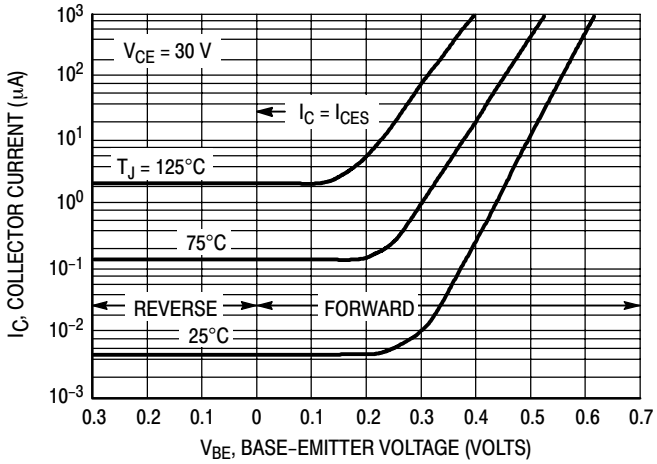


Figure 3. Collector Cut−Off Region

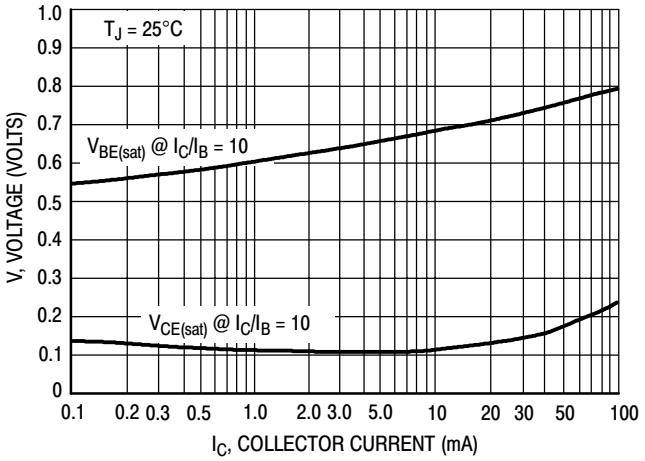


Figure 4. “On” Voltages

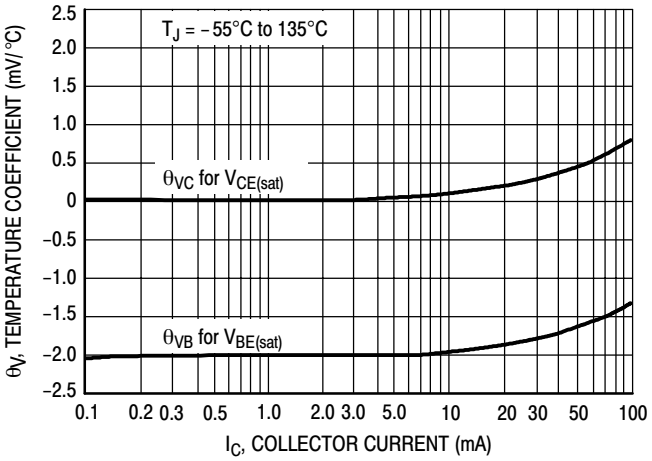


Figure 5. Temperature Coefficients

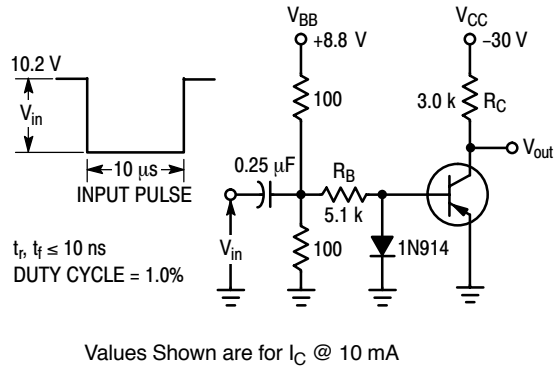


Figure 6. Switching Time Test Circuit

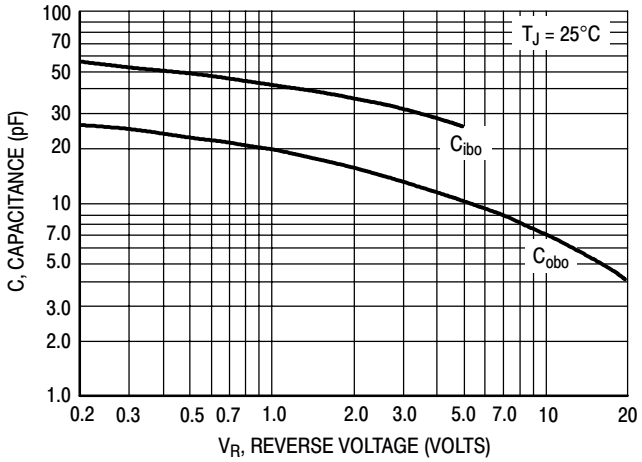


Figure 7. Capacitances

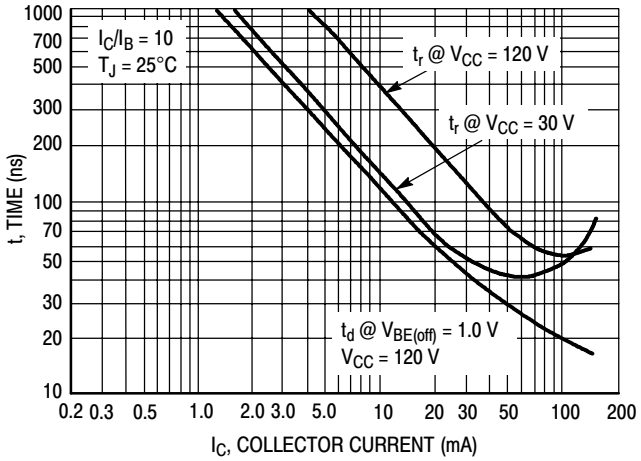


Figure 8. Turn–On Time

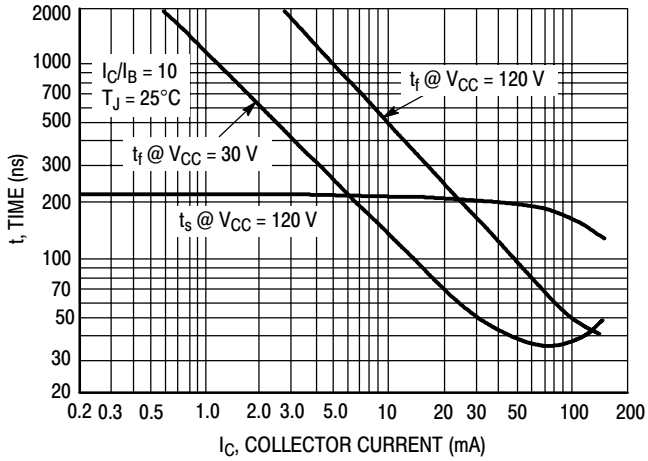
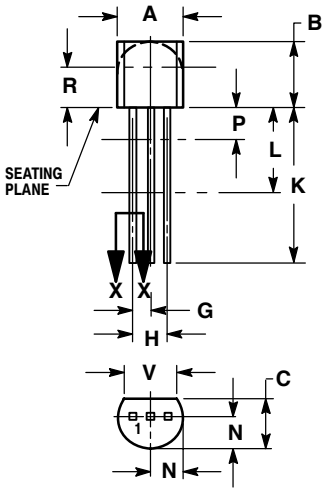
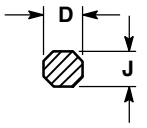


Figure 9. Turn–Off Time

PACKAGE DIMENSIONS

TO–92
CASE 29–11
ISSUE AL





SECTION X–X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
Phone: 81−3−5773−3850

ON Semiconductor Website: http://onsemi.com

Order Literature: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.

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