2N5400, 2N5401

Preferred Device

Amplifier Transistors

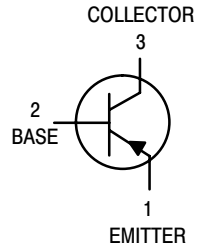
PNP Silicon

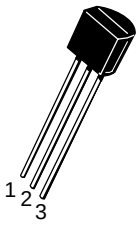
Features

- Pb−Free Packages are Available*

ON Semiconductor®

http://onsemi.com





TO−92
CASE 29
STYLE 1

MAXIMUM RATINGS

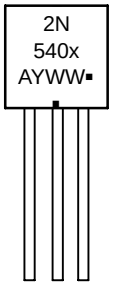
Rating	Symbol	2N5400	2N5401	Unit
Collector − Emitter Voltage	V_{CEO}	120	150	Vdc
Collector − Base Voltage	V_{CBO}	130	160	Vdc
Emitter − Base Voltage	V_{EBO}	5.0		Vdc
Collector Current − Continuous	I_C	600		mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Device 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



A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 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.

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage(1)		$V_{(BR)CEO}$			Vdc
(I_C = 1.0 mAdc, I_B = 0)	2N5400		120	−	
	2N5401		150	−	
Collector−Base Breakdown Voltage		$V_{(BR)CBO}$			Vdc
(I_C = 100 μAdc, I_E = 0)	2N5400		130	−	
	2N5401		160	−	
Emitter−Base Breakdown Voltage		$V_{(BR)EBO}$	5.0	−	Vdc
(I_E = 10 μAdc, I_C = 0)					
Collector Cutoff Current		I_{CBO}			
(V_{CB} = 100 Vdc, I_E = 0)	2N5400		−	100	nAdc
(V_{CB} = 120 Vdc, I_E = 0)	2N5401		−	50	
(V_{CB} = 100 Vdc, I_E = 0, T_A = 100°C)	2N5400		−	100	μAdc
(V_{CB} = 120 Vdc, I_E = 0, T_A = 100°C)	2N5401		−	50	
Emitter Cutoff Current		I_{EBO}	−	50	nAdc
(V_{EB} = 3.0 Vdc, I_C = 0)					
ON CHARACTERISTICS (Note 1)					
DC Current Gain		h_{FE}			−
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc)	2N5400		30	−	
	2N5401		50	−	
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc)	2N5400		40	180	
	2N5401		60	240	
(I_C = 50 mAdc, V_{CE} = 5.0 Vdc)	2N5400		40	−	
	2N5401		50	−	
Collector−Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)			−	0.2	
(I_C = 50 mAdc, I_B = 5.0 mAdc)			−	0.5	
Base−Emitter Saturation Voltage		$V_{BE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)			−	1.0	
(I_C = 50 mAdc, I_B = 5.0 mAdc)			−	1.0	
SMALL−SIGNAL CHARACTERISTICS					
Current−Gain — Bandwidth Product		f_T			MHz
(I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	2N5400		100	400	
	2N5401		100	300	
Output Capacitance		C_{obo}	−	6.0	pF
(V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)					
Small−Signal Current Gain		h_{fe}			−
(I_C = 1.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	2N5400		30	200	
	2N5401		40	200	
Noise Figure		NF	−	8.0	dB
(I_C = 250 μAdc, V_{CE} = 5.0 Vdc, R_S = 1.0 kΩ, f = 1.0 kHz)					

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

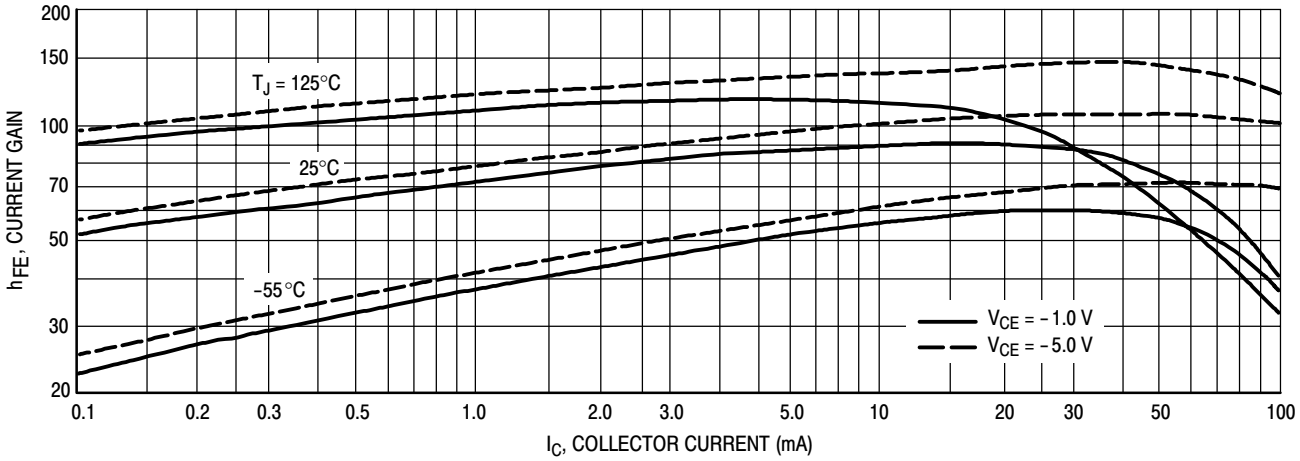


Figure 1. DC Current Gain

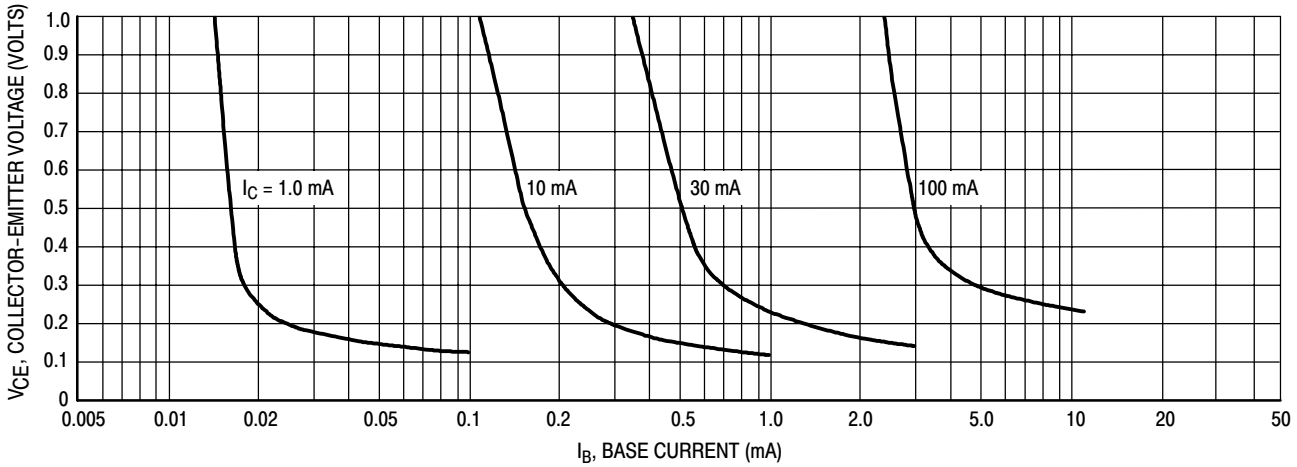


Figure 2. Collector Saturation Region

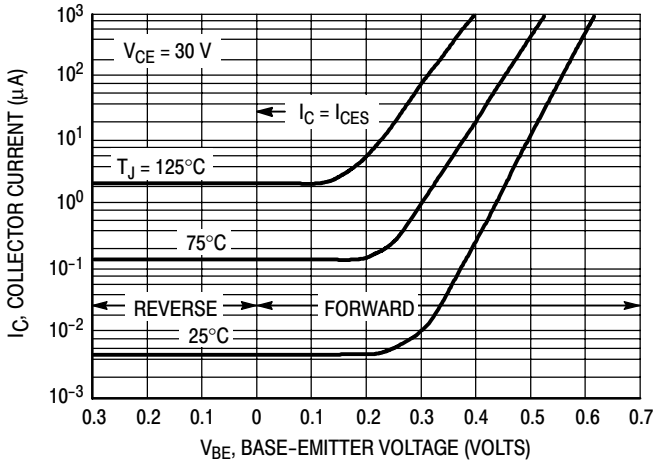


Figure 3. Collector Cut−Off Region

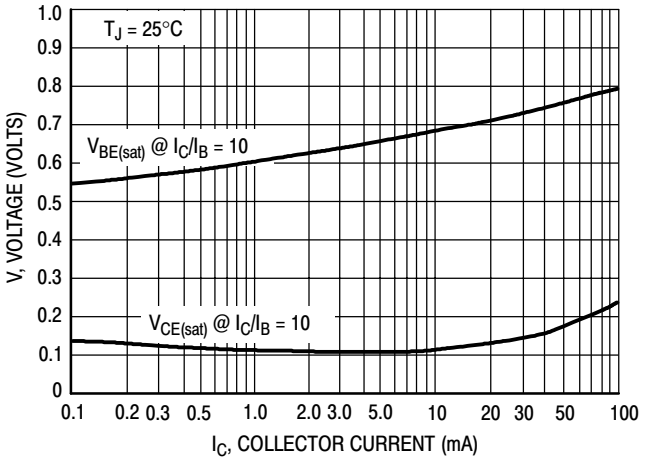


Figure 4. “On” Voltages

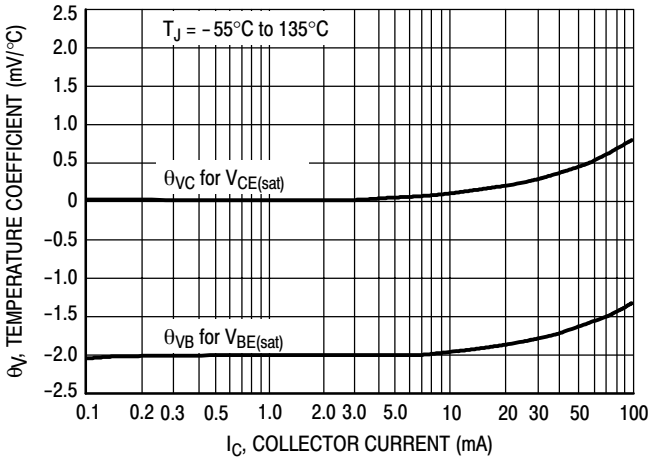


Figure 5. Temperature Coefficients

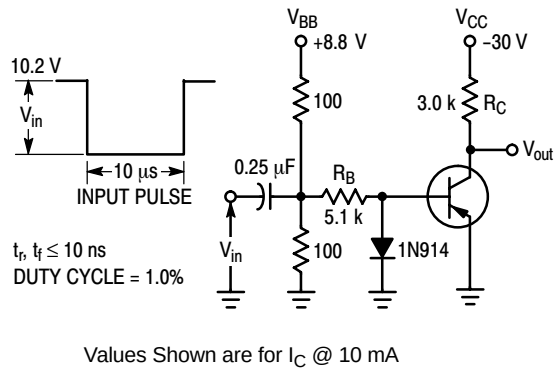


Figure 6. Switching Time Test Circuit

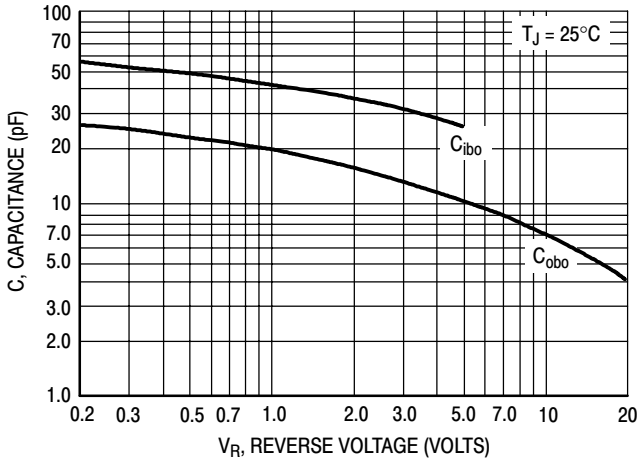


Figure 7. Capacitances

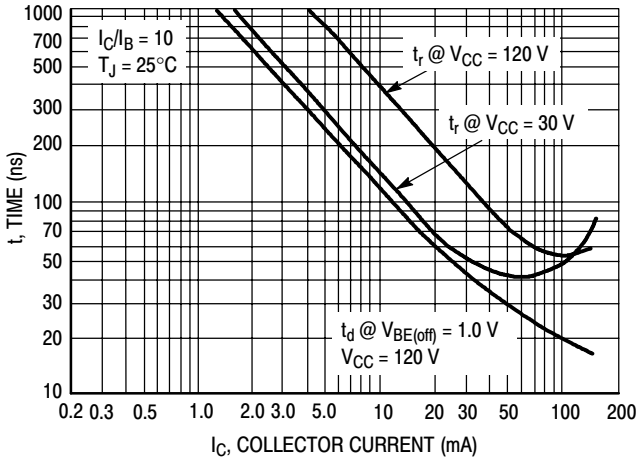


Figure 8. Turn−On Time

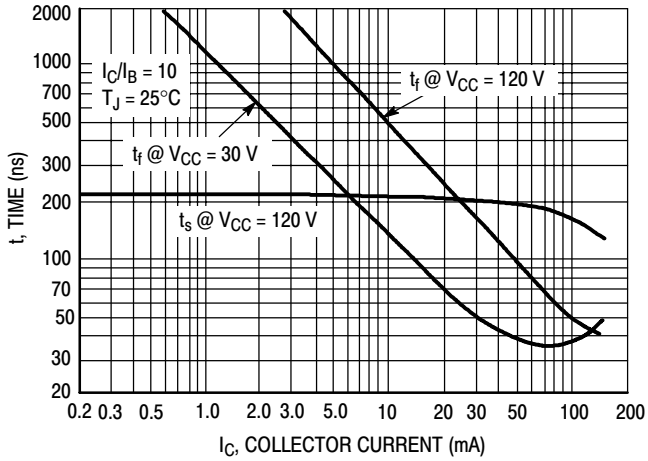


Figure 9. Turn−Off Time

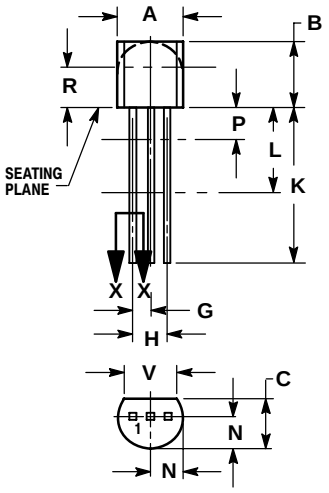
ORDERING INFORMATION

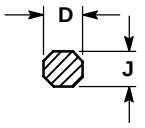
Device	Package	Shipping†
2N5400	TO−92	5000 Unit / Bulk
2N5400G	TO−92 (Pb−Free)	5000 Unit / Bulk
2N5400RLRP	TO−92	2000 Tape & Reel
2N5400RLRPG	TO−92 (Pb−Free)	2000 Tape & Reel
2N5401	TO−92	5000 Unit / Bulk
2N5401G	TO−92 (Pb−Free)	5000 Unit / Bulk
2N5401RL1	TO−92	2000 Tape & Reel
2N5401RL1G	TO−92 (Pb−Free)	2000 Tape & Reel
2N5401RLRA	TO−92	2000 Tape & Reel
2N5401RLRAG	TO−92 (Pb−Free)	2000 Tape & Reel
2N5401RLRM	TO−92	2000 Tape & Ammo Box
2N5401RLRMG	TO−92 (Pb−Free)	2000 Tape & Ammo Box
2N5401ZL1	TO−92	2000 Tape & Ammo Box
2N5401ZL1G	TO−92 (Pb−Free)	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.

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

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