

# BD241C (NPN), BD242B (PNP), BD242C (PNP)



ON Semiconductor®

<http://onsemi.com>

## Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications.

### Features

- Collector–Emitter Saturation Voltage –  
 $V_{CE} = 1.2 \text{ Vdc (Max) @ } I_C = 3.0 \text{ Adc}$
- Collector–Emitter Sustaining Voltage –  
 $V_{CEO(sus)} = 100 \text{ Vdc (Min) BD241C, BD242C}$
- High Current Gain – Bandwidth Product  
 $f_T = 3.0 \text{ MHz (Min) @ } I_C = 500 \text{ mAdc}$
- Compact TO–220 AB Package
- Epoxy Meets UL94 V–0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V  
Machine Model, C > 400 V
- Pb–Free Packages are Available\*

### MAXIMUM RATINGS

Rating	Symbol	BD242B	BD241C BD242C	Unit
Collector–Emitter Voltage	$V_{CEO}$	80	100	Vdc
Collector–Emitter Voltage	$V_{CES}$	90	115	Vdc
Emitter–Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current Continuous Peak	$I_C$	3.0 5.0		Adc
Base Current	$I_B$	1.0		Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	$P_D$	40 0.32		W W/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–65 to +150		°C

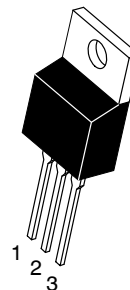
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	3.125	°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.

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

**POWER TRANSISTORS  
COMPLEMENTARY  
SILICON  
3 AMP  
80–100 VOLTS  
40 WATTS**



TO–220AB  
CASE 221A–09  
STYLE 1

### MARKING DIAGRAM



BD24xx = Device Code  
xx = 1C, 2B, or 2C  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb–Free Package

### ORDERING INFORMATION

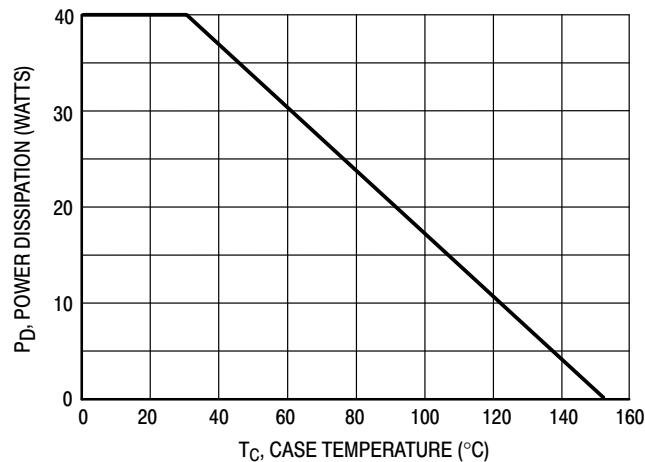
Device	Package	Shipping
BD241C	TO–220AB	50 Units/Rail
BD241CG	TO–220AB (Pb–Free)	50 Units/Rail
BD242B	TO–220AB	50 Units/Rail
BD242BG	TO–220AB (Pb–Free)	50 Units/Rail
BD242C	TO–220AB	50 Units/Rail
BD242CG	TO–220AB (Pb–Free)	50 Units/Rail

# BD241C (NPN), BD242B (PNP), BD242C (PNP)

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (Note 1) ( $I_C = 30\text{ mA}$ , $I_B = 0$ )	$V_{CEO}$	80 100		Vdc
Collector Cutoff Current ( $V_{CE} = 50\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$		0.3	mA
Collector Cutoff Current ( $V_{CE} = 80\text{ Vdc}$ , $V_{EB} = 0$ ) ( $V_{CE} = 100\text{ Vdc}$ , $V_{EB} = 0$ )	$I_{CES}$		200	$\mu\text{A}$
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$		1.0	mA
<b>ON CHARACTERISTICS (Note 1)</b>				
DC Current Gain ( $I_C = 1.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ ) ( $I_C = 3.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )	$h_{FE}$	25 10		
Collector–Emitter Saturation Voltage ( $I_C = 3.0\text{ A}$ , $I_B = 0.6\text{ A}$ )	$V_{CE(sat)}$		1.2	Vdc
Base–Emitter On Voltage ( $I_C = 3.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )	$V_{BE(on)}$		1.8	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Current Gain – Bandwidth Product (Note 2) ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )	$f_T$	3.0		MHz
Small–Signal Current Gain ( $I_C = 0.5\text{ A}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{fe}$	20		

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .
2.  $f_T = |h_{fe}| \cdot f_{test}$ .



**Figure 1. Power Derating**

# BD241C (NPN), BD242B (PNP), BD242C (PNP)

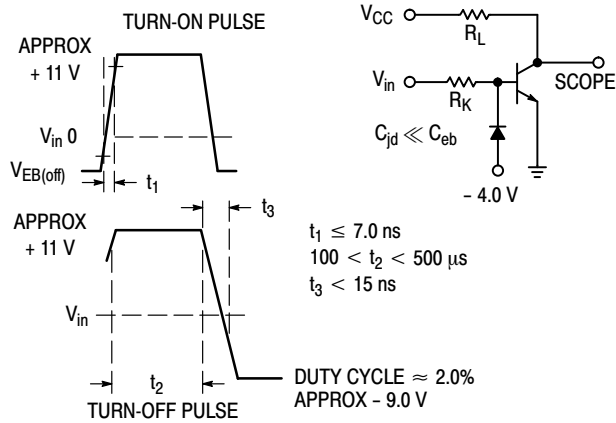


Figure 2. Switching Time Equivalent Circuit

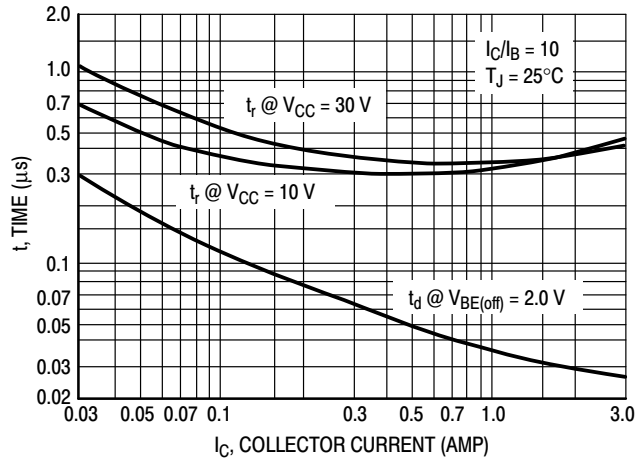


Figure 3. Turn-On Time

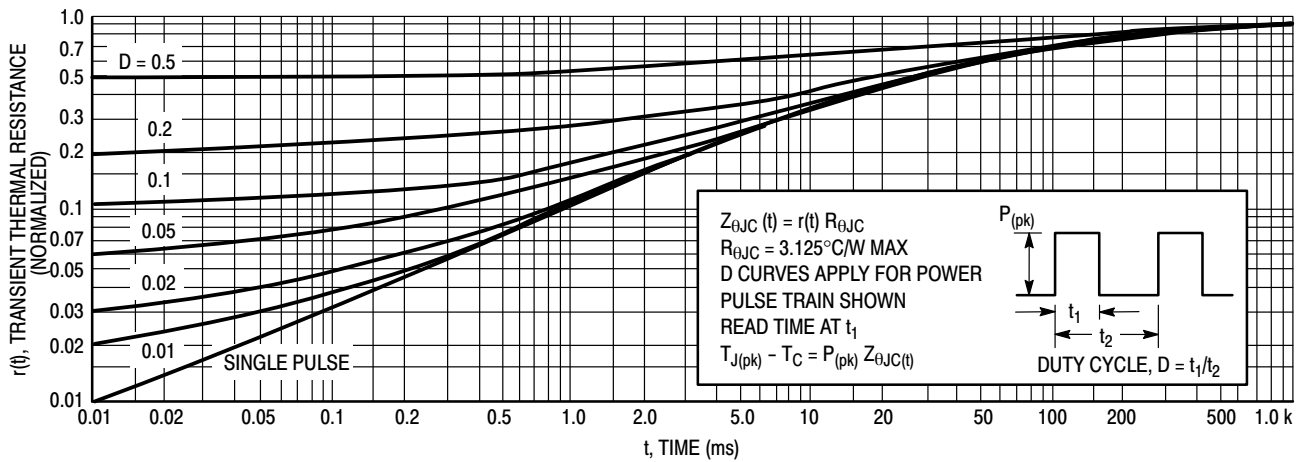


Figure 4. Thermal Response

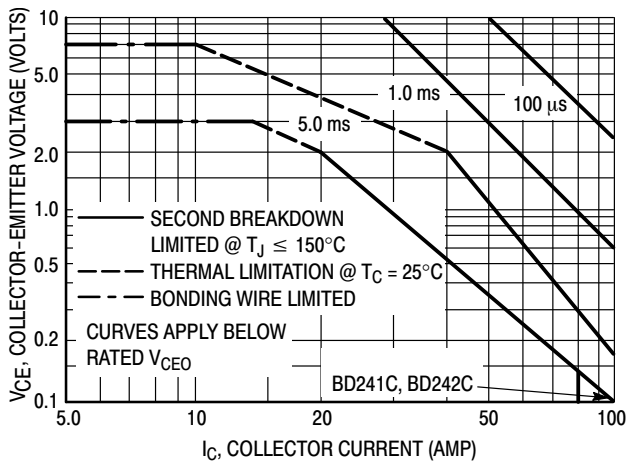


Figure 5. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation, i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

# BD241C (NPN), BD242B (PNP), BD242C (PNP)

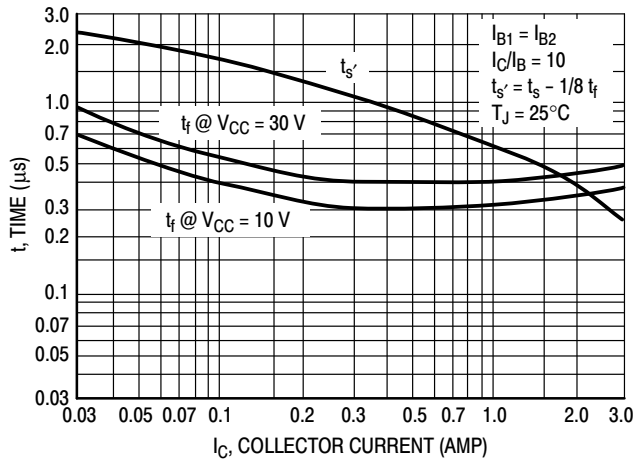


Figure 6. Turn-Off Time

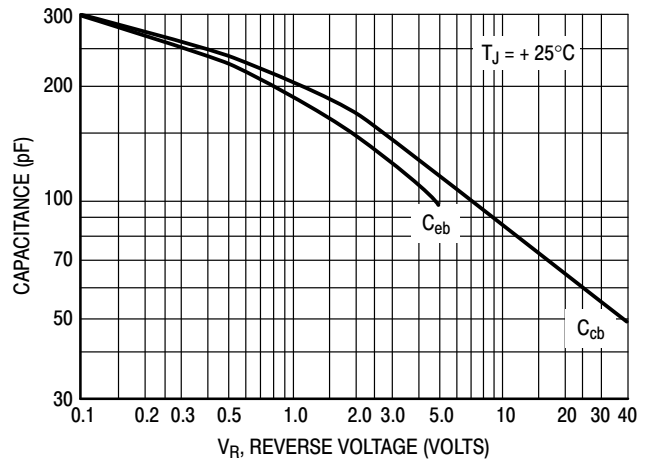


Figure 7. Capacitance

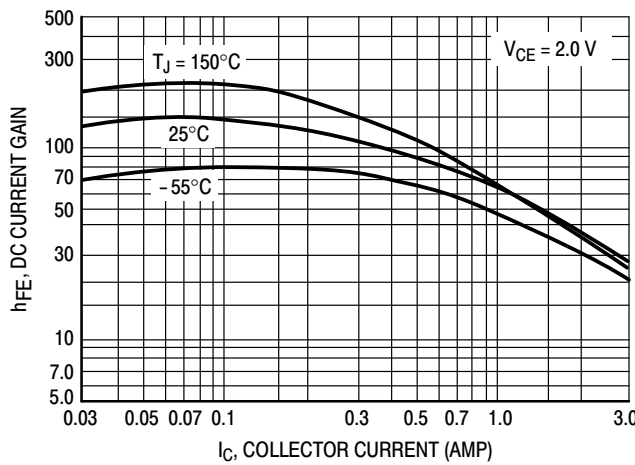


Figure 8. DC Current Gain

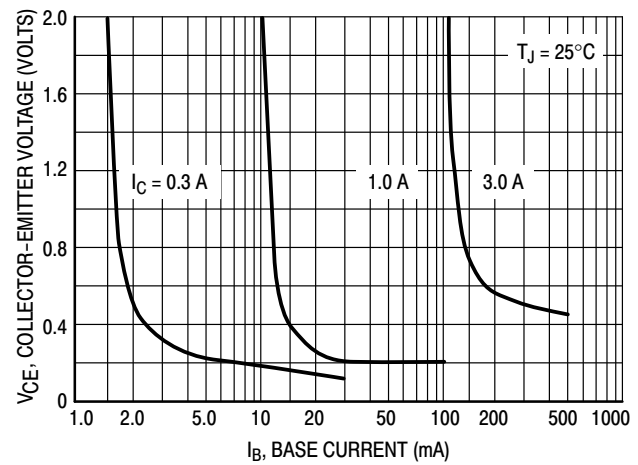


Figure 9. Collector Saturation Region

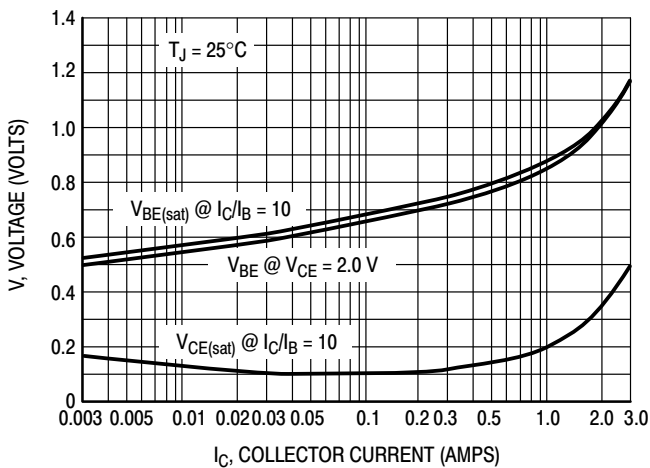


Figure 10. "On" Voltages

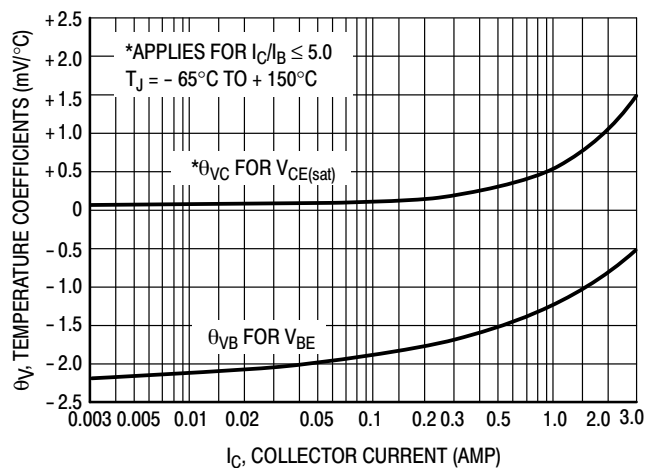
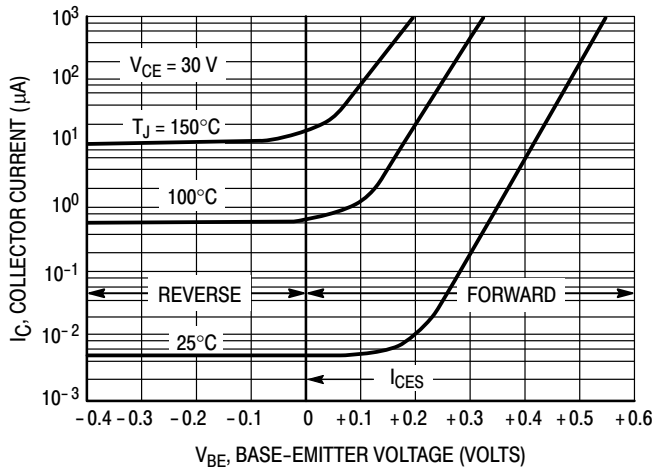
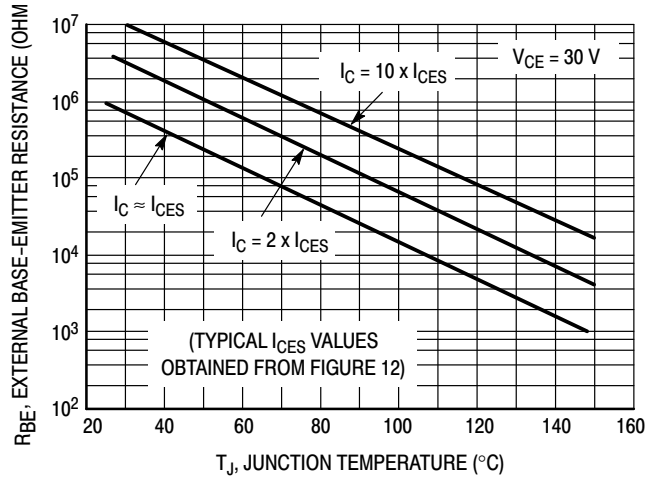


Figure 11. Temperature Coefficients

**BD241C (NPN), BD242B (PNP), BD242C (PNP)**



**Figure 12. Collector Cut-Off Region**

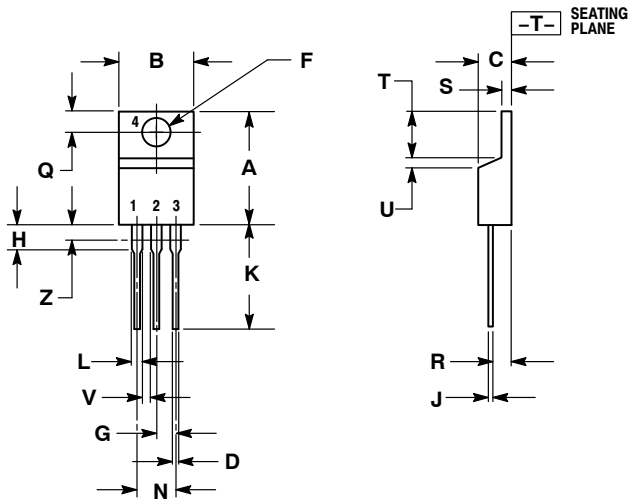


**Figure 13. Effects of Base-Emitter Resistance**

# BD241C (NPN), BD242B (PNP), BD242C (PNP)

## PACKAGE DIMENSIONS

### TO-220 CASE 221A-09 ISSUE AG



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

**STYLE 1:**

1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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