

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 |

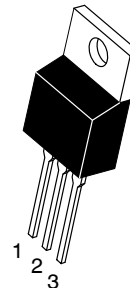
THERMAL CHARACTERISTICS

| 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.

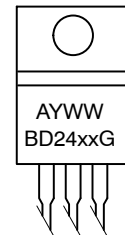
*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**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 |

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

| Characteristic | Symbol | Min | Max | Unit |
|---|---------------|-----|-----|---------------|
| OFF CHARACTERISTICS | | | | |
| Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 30\text{ mA}$, $I_B = 0$) | V_{CEO} | 80 | | Vdc |
| BD242B BD241C, BD242C | | 100 | | |
| Collector Cutoff Current ($V_{CE} = 50\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 60\text{ Vdc}$, $I_B = 0$) | I_{CEO} | | 0.3 | mA |
| BD242B BD241C, BD242C | | | | |
| Collector Cutoff Current ($V_{CE} = 80\text{ Vdc}$, $V_{EB} = 0$) ($V_{CE} = 100\text{ Vdc}$, $V_{EB} = 0$) | I_{CES} | | 200 | μA |
| BD242B BD241C, BD242C | | | | |
| Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | | 1.0 | mA |
| ON CHARACTERISTICS (Note 1) | | | | |
| 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 |
| DYNAMIC CHARACTERISTICS | | | | |
| 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. $f_T = |h_{fe}| \cdot f_{test}$.

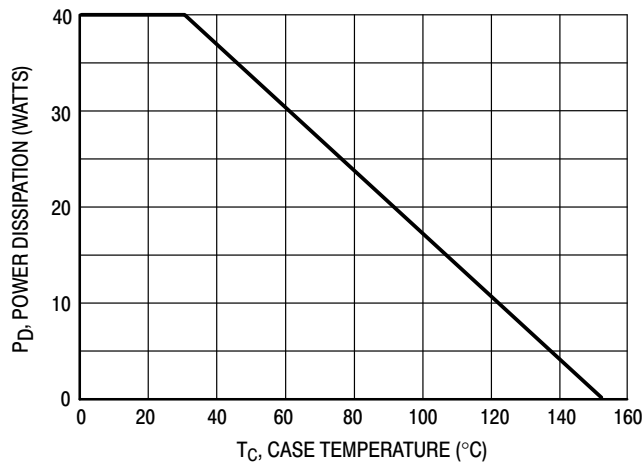


Figure 1. Power Derating

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

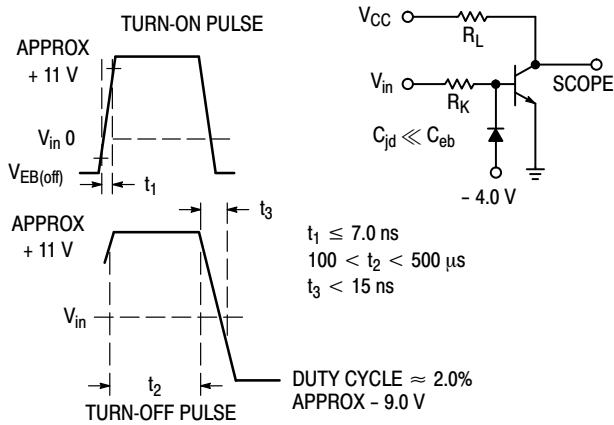


Figure 2. Switching Time Equivalent Circuit

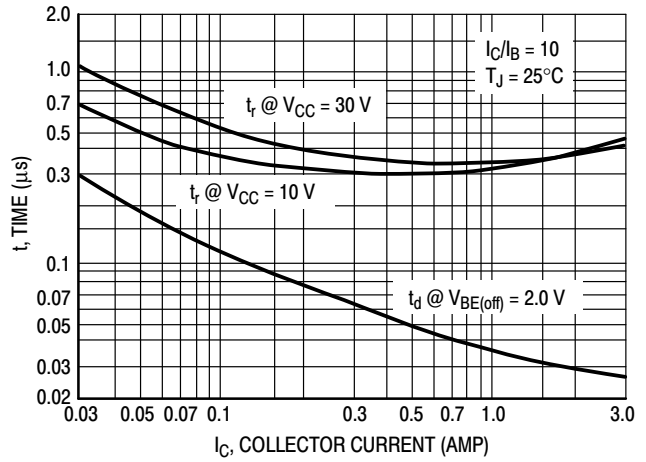


Figure 3. Turn-On Time

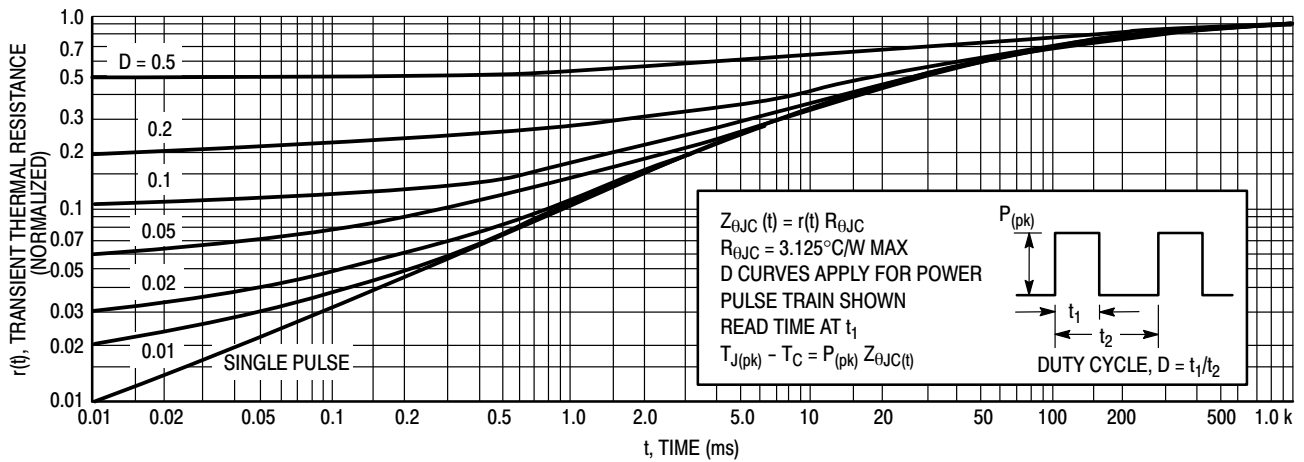


Figure 4. Thermal Response

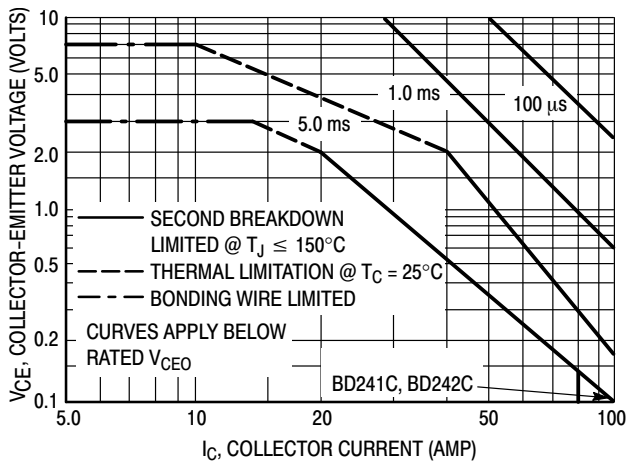


Figure 5. Active Region Safe Operating Area

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)

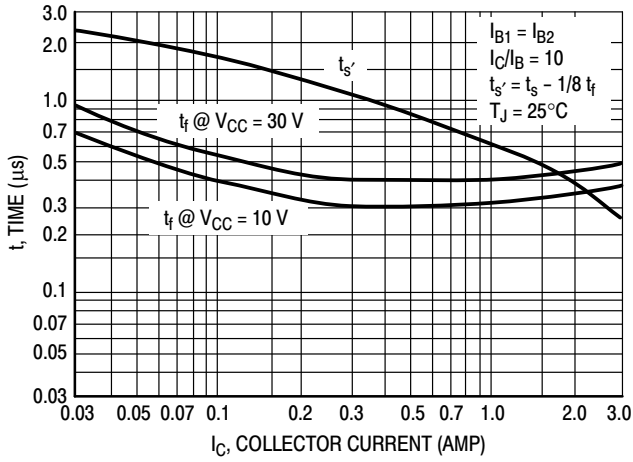


Figure 6. Turn-Off Time

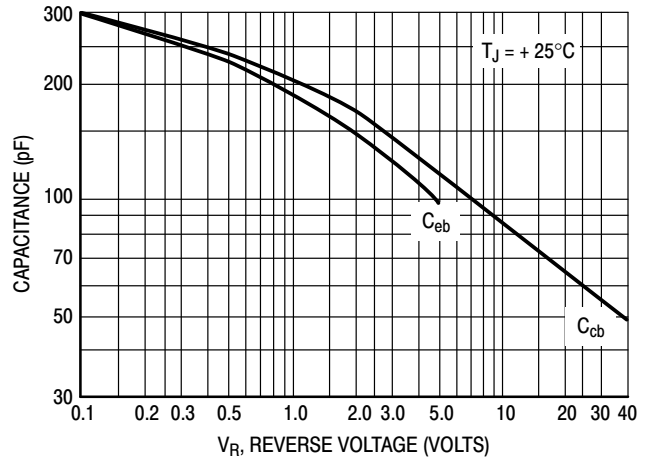


Figure 7. Capacitance

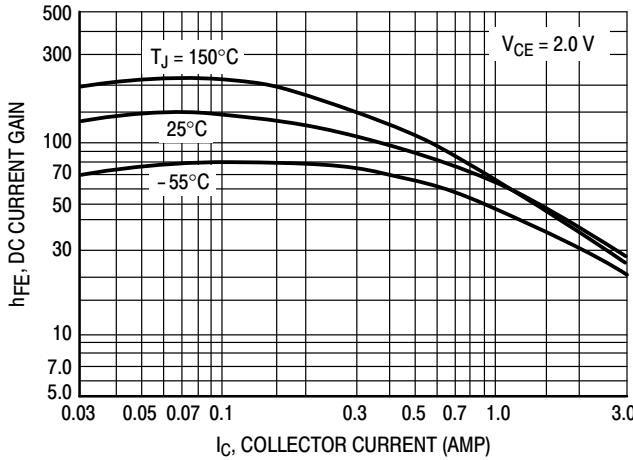


Figure 8. DC Current Gain

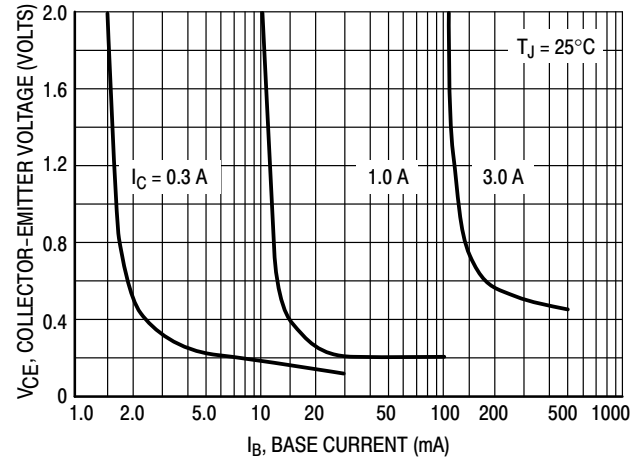


Figure 9. Collector Saturation Region

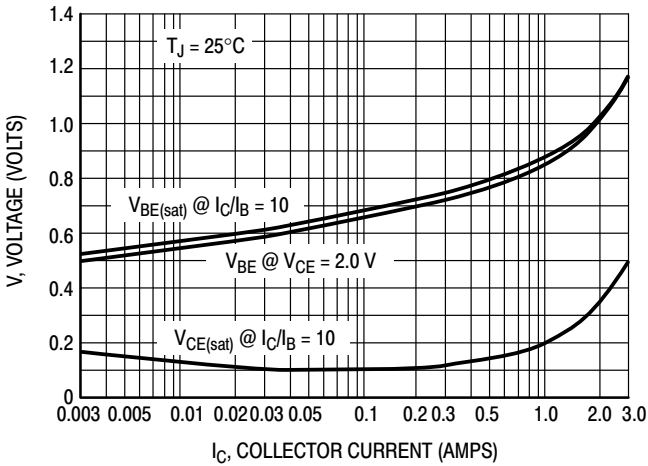


Figure 10. "On" Voltages

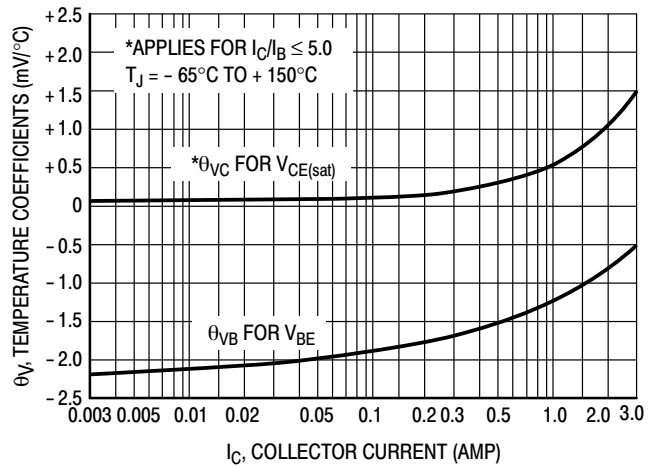


Figure 11. Temperature Coefficients

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

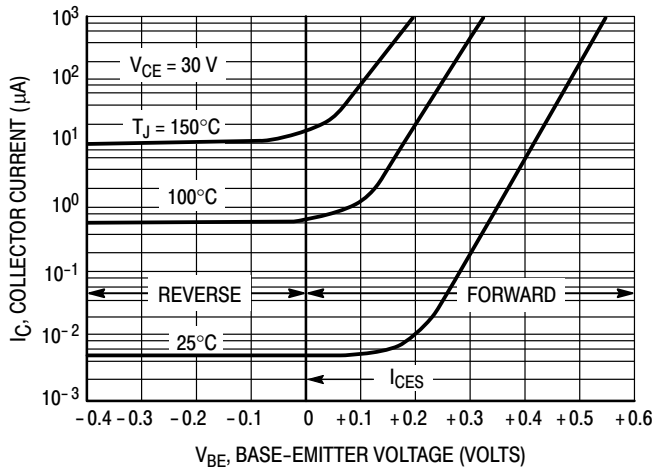


Figure 12. Collector Cut-Off Region

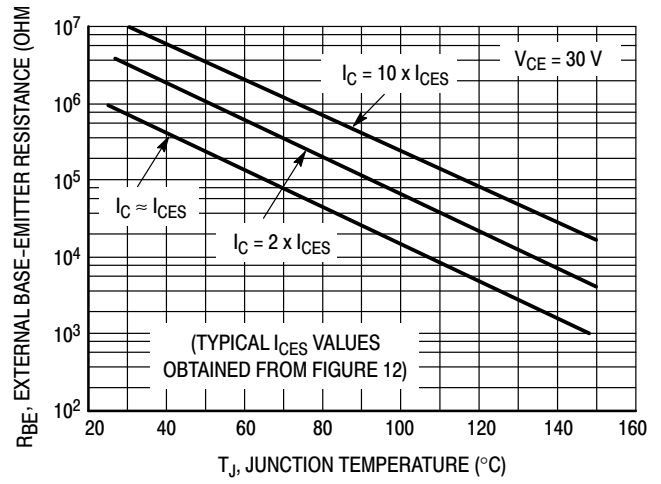
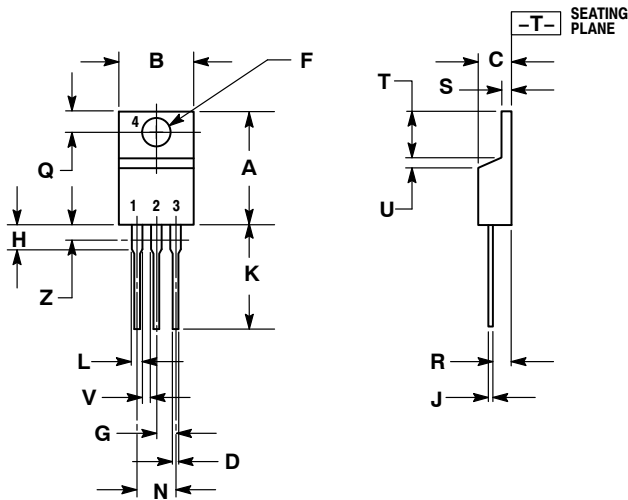


Figure 13. Effects of Base-Emitter Resistance

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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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Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
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