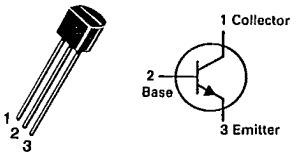
# BC413, B, C
# BC414, B, C

**CASE 29-04, STYLE 17**
**TO-92 (TO-226AA)**




**LOW NOISE TRANSISTORS**

**NPN SILICON**

Refer to BC549 for graphs.

## MAXIMUM RATINGS

| Rating | Symbol | BC 413 | BC 414 | Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 30 | 45 | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | 45 | 50 | Vdc |
| Emitter-Base Voltage | $V_{EBO}$ | 5.0 | | Vdc |
| Collector Current – Continuous | $I_C$ | 100 | | mAdc |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 350<br>2.8 | | mW<br>mW/°C |
| Total Device Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 1.0<br>8.0 | | Watt<br>mW/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | | °C |

## THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 125 | °C/W |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 357 | °C/W |

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

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector-Emitter Breakdown Voltage<br>($I_C$ = 10 mAdc, $I_B$ = 0) BC413<br>BC414 | $V_{(BR)CEO}$ | <br>30<br>45 | | | Vdc |
| Collector-Base Breakdown Voltage<br>($I_C$ = 10 µAdc, $I_E$ = 0) BC413<br>BC414 | $V_{(BR)CBO}$ | <br>45<br>50 | | | Vdc |
| Emitter-Base Breakdown Voltage<br>($I_E$ = 10 µAdc, $I_C$ = 0) | $V_{(BR)EBO}$ | 5 | | | Vdc |
| Collector Cutoff Current<br>($V_{CB}$ = 30 Vdc, $I_E$ = 0)<br>($V_{CB}$ = 30 Vdc, $I_E$ = 0, $T_A$ = +125°C) | $I_{CBO}$ | | | 15<br>5 | nAdc<br>µAdc |
| Emitter Cutoff Current<br>($V_{EB}$ = 4 Vdc, $I_C$ = 0) | $I_{EBO}$ | | | 15 | nAdc |
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain<br>($I_C$ = 10 µAdc, $V_{CE}$ = 5 Vdc) BC413B/BC414B<br>BC413C/BC414C<br>($I_C$ = 2 mAdc, $V_{CE}$ = 5 Vdc) BC413B/BC414B<br>BC413C/BC414C<br>BC413/BC414 | $h_{FE}$ | <br>100<br>100<br>180<br>380<br>180 | <br>150<br>270<br>290<br>500<br>350 | <br><br>460<br>800<br>800 | |
| Collector-Emitter Saturation Voltage<br>($I_C$ = 10 mAdc, $I_B$ = 0.5 mAdc)<br>($I_C$ = 10 mAdc, $I_B$ = see note 1)<br>($I_C$ = 100 mAdc, $I_B$ = 5 mAdc, see note 2) | $V_{CE(sat)}$ | | <br>0.075<br>0.3<br>0.25 | <br>0.25<br>0.6<br>0.6 | Vdc |
| Base-Emitter Saturation Voltage<br>($I_C$ = 100 mAdc, $I_B$ = 5 mAdc) | $V_{BE(sat)}$ | | 1.1 | | Vdc |
| Base-Emitter On Voltage<br>($I_C$ = 10 µAdc, $V_{CE}$ = 5 Vdc)<br>($I_C$ = 100 µAdc, $V_{CE}$ = 5 Vdc)<br>($I_C$ = 2 mAdc, $V_{CE}$ = 5 Vdc) | $V_{BE(on)}$ | <br><br>0.55 | <br>0.52<br>0.55<br>0.62 | <br><br>0.75 | Vdc |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | |
| Current-Gain-Bandwidth Product<br>($I_C$ = 10 mAdc, $V_{CE}$ = 5 Vdc, f = 100 MHz) | $f_T$ | | 250 | | MHz |
| Collector-Base Capacitance<br>($V_{CE}$ = 10 Vdc, $I_E$ = 0, f = 1 MHz) | $C_{cbo}$ | | 2.5 | | pF |
| Noise Figure<br>($I_C$ = 200 µAdc, $V_{CE}$ = 5 Vdc, $R_S$ = 2 KΩ,<br>f = 30 Hz – 15 KHz) | NF | | 0.6 | 2.5 | dB |

Note 1: $I_B$ is value for which $I_C$ = 11 mA at $V_{CE}$ = 1 V

Note 2: Pulse test = 300 µs – Duty cycle = 2%