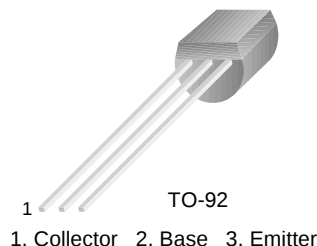


# BC237/238/239

## Switching and Amplifier Applications

- Low Noise: BC239



## NPN Epitaxial Silicon Transistor

### Absolute Maximum Ratings $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol    | Parameter                                           | Value     | Units            |
|-----------|-----------------------------------------------------|-----------|------------------|
| $V_{CES}$ | Collector-Emitter Voltage<br>: BC237<br>: BC238/239 | 50        | V                |
|           |                                                     | 30        | V                |
| $V_{CEO}$ | Collector-Emitter Voltage<br>: BC237<br>: BC238/239 | 45        | V                |
|           |                                                     | 25        | V                |
| $V_{EBO}$ | Emitter-Base Voltage<br>: BC237<br>: BC238/239      | 6         | V                |
|           |                                                     | 5         | V                |
| $I_C$     | Collector Current (DC)                              | 100       | mA               |
| $P_C$     | Collector Power Dissipation                         | 500       | mW               |
| $T_J$     | Junction Temperature                                | 150       | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature                                 | -55 ~ 150 | $^\circ\text{C}$ |

### Electrical Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol               | Parameter                                                     | Test Condition                                                                                                                                                        | Min. | Typ. | Max. | Units |
|----------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|-------|
| $BV_{CEO}$           | Collector-Emitter Breakdown Voltage<br>: BC237<br>: BC238/239 | $I_C=2\text{mA}, I_B=0$                                                                                                                                               | 45   |      |      | V     |
|                      |                                                               |                                                                                                                                                                       | 25   |      |      | V     |
| $BV_{EBO}$           | Emitter Base Breakdown Voltage<br>: BC237<br>: BC238/239      | $I_E=1\mu\text{A}, I_C=0$                                                                                                                                             | 6    |      |      | V     |
|                      |                                                               |                                                                                                                                                                       | 5    |      |      | V     |
| $I_{CES}$            | Collector Cut-off Current<br>: BC237<br>: BC238/239           | $V_{CE}=50\text{V}, V_{BE}=0$<br>$V_{CE}=30\text{V}, V_{BE}=0$                                                                                                        |      | 0.2  | 15   | nA    |
|                      |                                                               |                                                                                                                                                                       |      | 0.2  | 15   | nA    |
| $h_{FE}$             | DC Current Gain                                               | $V_{CE}=5\text{V}, I_C=2\text{mA}$                                                                                                                                    | 120  |      | 800  |       |
| $V_{CE}(\text{sat})$ | Collector-Emitter Saturation Voltage                          | $I_C=10\text{mA}, I_B=0.5\text{mA}$                                                                                                                                   |      | 0.07 | 0.2  | V     |
|                      |                                                               | $I_C=100\text{mA}, I_B=5\text{mA}$                                                                                                                                    |      | 0.2  | 0.6  | V     |
| $V_{BE}(\text{sat})$ | Collector-Base Saturation Voltage                             | $I_C=10\text{mA}, I_B=0.5\text{mA}$                                                                                                                                   |      | 0.73 | 0.83 | V     |
|                      |                                                               | $I_C=100\text{mA}, I_B=5\text{mA}$                                                                                                                                    |      | 0.87 | 1.05 | V     |
| $V_{BE}(\text{on})$  | Base-Emitter On Voltage                                       | $V_{CE}=5\text{V}, I_C=2\text{mA}$                                                                                                                                    | 0.55 | 0.62 | 0.7  | V     |
| $f_T$                | Current Gain Bandwidth Product                                | $V_{CE}=3\text{V}, I_C=0.5\text{mA}, f=100\text{MHz}$                                                                                                                 |      | 85   |      | MHz   |
|                      |                                                               | $V_{CE}=5\text{V}, I_C=10\text{mA}, f=100\text{MHz}$                                                                                                                  | 150  | 250  |      | MHz   |
| $C_{ob}$             | Output Capacitance                                            | $V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$                                                                                                                             |      | 3.5  | 6    | pF    |
| $C_{ib}$             | Input Base Capacitance                                        | $V_{EB}=0.5\text{V}, I_C=0, f=1\text{MHz}$                                                                                                                            |      | 8    |      | pF    |
| NF                   | Noise Figure<br>: BC237/238<br>: BC239<br>: BC239             | $V_{CE}=5\text{V}, I_C=0.2\text{mA},$<br>$f=1\text{KHz } R_G=2\text{K}\Omega$<br>$V_{CE}=5\text{V}, I_C=0.2\text{mA}$<br>$R_G=2\text{K}\Omega, f=30\sim 15\text{KHz}$ |      | 2    | 10   | dB    |
|                      |                                                               |                                                                                                                                                                       |      |      | 4    | dB    |
|                      |                                                               |                                                                                                                                                                       |      |      | 4    | dB    |
|                      |                                                               |                                                                                                                                                                       |      |      | 4    | dB    |

### $h_{FE}$ Classification

| Classification | A         | B         | C         |
|----------------|-----------|-----------|-----------|
| $h_{FE}$       | 120 ~ 220 | 180 ~ 460 | 380 ~ 800 |

## Typical Characteristics

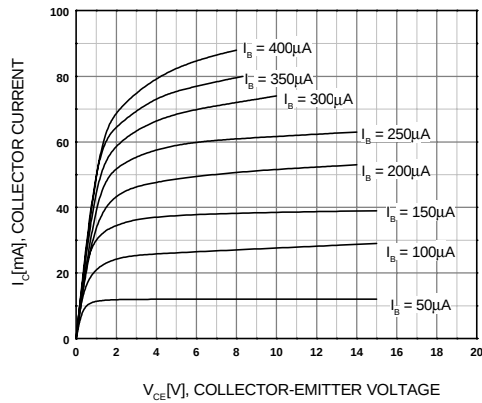


Figure 1. Static Characteristic

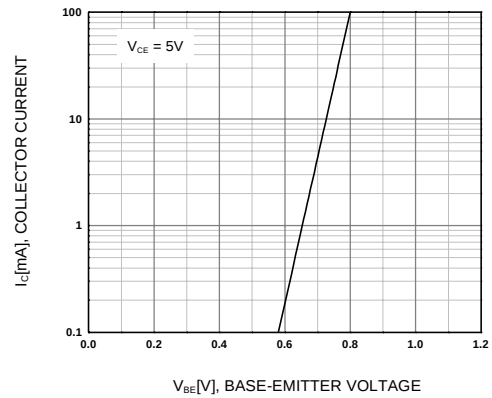


Figure 2. Transfer Characteristic

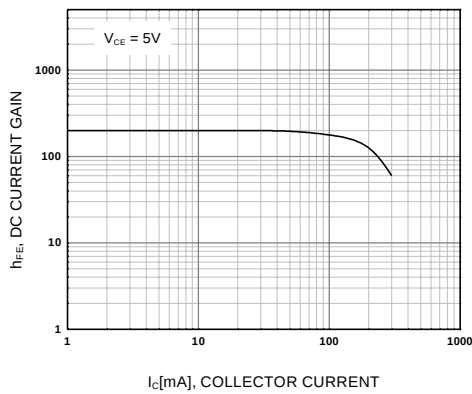


Figure 3. DC current Gain

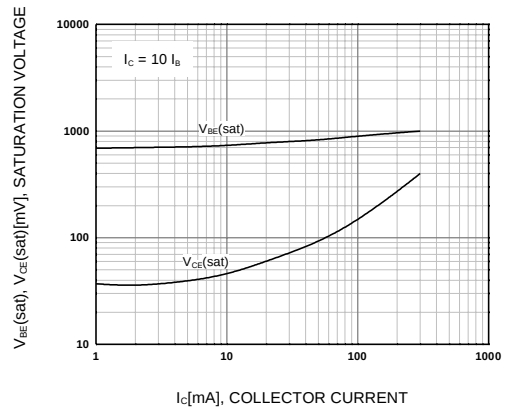


Figure 4. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

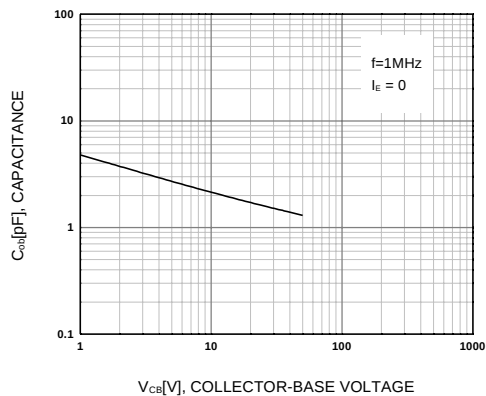


Figure 5. Output Capacitance

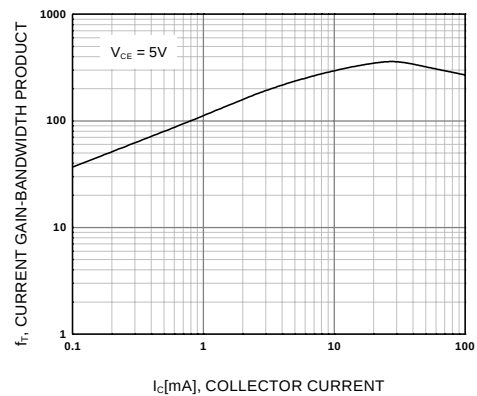


Figure 6. Current Gain Bandwidth Product

# Package Dimensions

## TO-92



Dimensions in Millimeters

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| Bottomless <sup>™</sup>                          | FAST <sup>®</sup>               | LittleFET <sup>™</sup>         | Power247 <sup>™</sup>           | SuperSOT <sup>™</sup> -3    |
| CoolFET <sup>™</sup>                             | FAST <sup>™</sup>               | MicroFET <sup>™</sup>          | PowerTrench <sup>®</sup>        | SuperSOT <sup>™</sup> -6    |
| CROSSVOLT <sup>™</sup>                           | FRFET <sup>™</sup>              | MicroPak <sup>™</sup>          | QFET <sup>™</sup>               | SuperSOT <sup>™</sup> -8    |
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| EcoSPARK <sup>™</sup>                            | GTO <sup>™</sup>                | MSX <sup>™</sup>               | QT Optoelectronics <sup>™</sup> | TinyLogic <sup>™</sup>      |
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| The Power Franchise <sup>™</sup>                 |                                 | OPTOLOGIC <sup>®</sup>         | SILENT SWITCHER <sup>®</sup>    | VCX <sup>™</sup>            |
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