



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Description

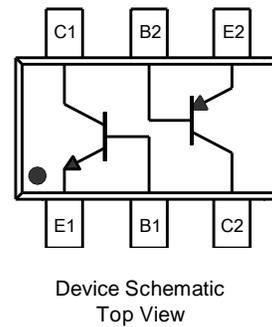
This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of Automotive Applications.

Features

- Two Internally Isolated NPN/PNP Transistors in One Package
- Ideal for Medium Power Amplification and Switching
- Ultra-small Surface Mount Package

Mechanical Data

- Package: SOT363
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.006 grams (Approximate)



Absolute Maximum Ratings: NPN, NK-BC847B Type(Q₁) (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CB0} | 50 | V |
| Collector-Emitter Voltage | V _{CE0} | 45 | V |
| Emitter-Base Voltage | V _{EB0} | 6 | V |
| Collector Current | I _C | 100 | mA |
| Peak Collector Current | I _{CM} | 200 | mA |
| Peak Emitter Current | I _{EM} | 200 | mA |

Absolute Maximum Ratings: PNP, NK-BC857B Type(Q₂) (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CB0} | -50 | V |
| Collector-Emitter Voltage | V _{CE0} | -45 | V |
| Emitter-Base Voltage | V _{EB0} | -6 | V |
| Collector Current | I _C | -100 | mA |
| Peak Collector Current | I _{CM} | -200 | mA |
| Peak Emitter Current | I _{EM} | -200 | mA |

Thermal Characteristics – Total Device (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6) Total Device | P _D | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 625 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -65 to +150 | °C |

Note: 5. For a device mounted on minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR-4 PCB; the device is measured under still air conditions whilst operating in a steady-state.

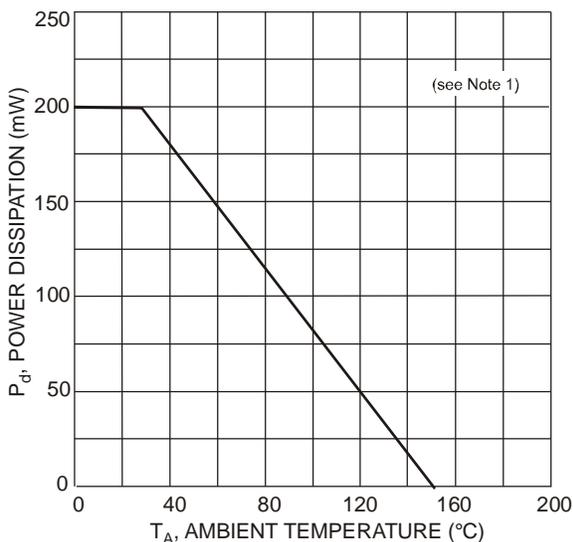
Thermal Characteristics – Total Device


Fig. 1, Power Derating Curve (Total Device)

Electrical Characteristics. NPN, NK-BC847B Type (Q₁) (@T_A = +25°C, unless otherwise specified.)

| Characteristic (Note 6) | Symbol | Min | Typ | Max | Unit | Test Condition |
|--------------------------------------|----------------------|-----|------------|------------|----------|--|
| Collector-Base Breakdown Voltage | BV _{CBO} | 50 | — | — | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 45 | — | — | V | I _C = 10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 6 | — | — | V | I _E = 100μA |
| DC Current Gain | h _{FE} | 200 | 290 | 450 | — | V _{CE} = 5V, I _C = 2mA |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | — | 90 200 | 250 600 | mV | I _C = 10mA, I _B = 0.5mA I _C = 100mA, I _B = 5mA |
| Base-Emitter Saturation Voltage | V _{BE(sat)} | — | 700 900 | — | mV | I _C = 10mA, I _B = 0.5mA I _C = 100mA, I _B = 5mA |
| Base-Emitter Voltage | V _{BE(on)} | 580 | 660 | 700 770 | mV | V _{CE} = 5V, I _C = 2mA V _{CE} = 5V, I _C = 10mA |
| Collector-Cutoff Current | I _{CBO} | — | — | 15 5 | nA μA | V _{CB} = 30V V _{CB} = 30V, T _A = +150°C |
| Gain Bandwidth Product | f _T | 100 | 300 | — | MHz | V _{CE} = 5V, I _C = 10mA, f = 100MHz |
| Collector-Base Capacitance | C _{cbo} | — | 3.5 | 6 | pF | V _{CB} = 10V, f = 1MHz |
| Noise Figure | NF | — | 2 | 10 | dB | V _{CE} = 5V, I _C = 200μA, R _g = 2kΩ, f = 1kHz, Δf = 200Hz |

Note: 6. Short duration pulse test used to minimize self-heating effect.

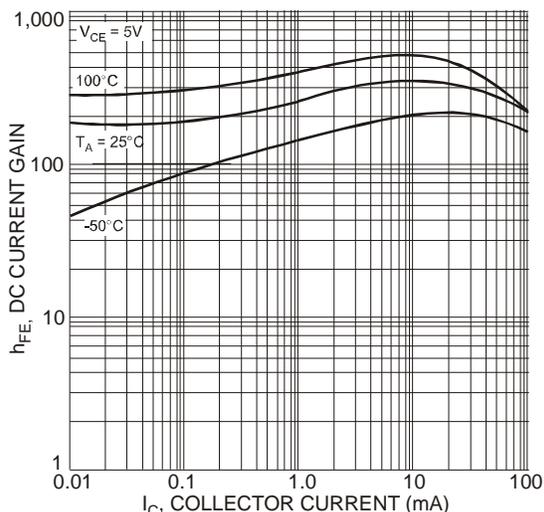


Figure 2. Typical DC Current Gain vs. Collector Current (NK-BC847B Type)

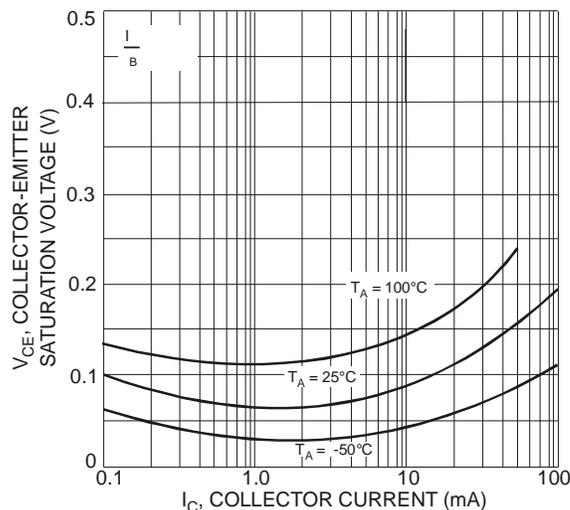


Figure 3. Typical Collector-Emitter Saturation Voltage vs. Collector Current (NK-BC847B Type)

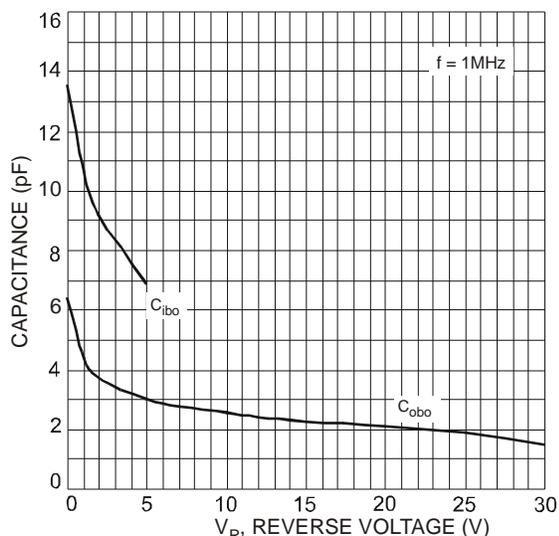


Figure 4. Typical Capacitance Characteristics (NK-BC847B Type)

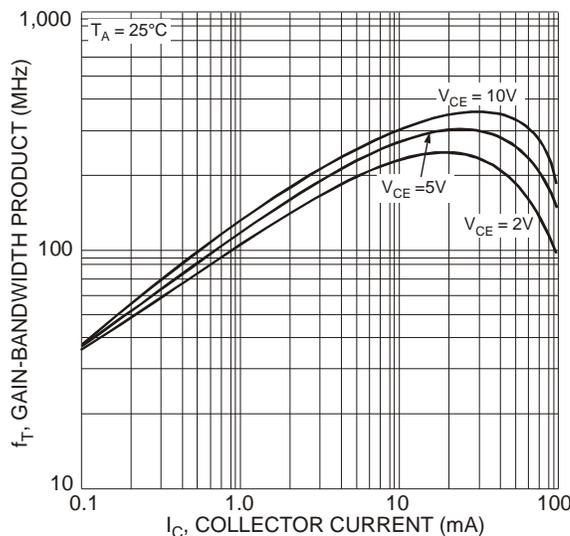


Figure 5. Typical Gain-Bandwidth Product vs. Collector Current (NK-BC847B Type)

Electrical Characteristics: PNP, NK-BC857B Type (Q₂) (@T_A = +25°C unless otherwise specified.)

| Characteristic (Note 7) | Symbol | Min | Typ | Max | Unit | Test Condition |
|--------------------------------------|----------------------|------|--------------|--------------|----------|---|
| Collector-Base Breakdown Voltage | BV _{CB0} | -50 | — | — | V | I _C = -100μA |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | -45 | — | — | V | I _C = -10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | -6 | — | — | V | I _E = -100μA |
| DC Current Gain | h _{FE} | 220 | 290 | 475 | — | V _{CE} = -5V, I _C = -2mA |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | — | -75 -250 | -300 -650 | mV | I _C = -10mA, I _B = -0.5mA I _C = -100mA, I _B = -5mA |
| Base-Emitter Saturation Voltage | V _{BE(sat)} | — | -700 -850 | — -950 | mV | I _C = -10mA, I _B = -0.5mA I _C = -100mA, I _B = -5mA |
| Base-Emitter Voltage | V _{BE(on)} | -600 | -650 | -750 -820 | mV | V _{CE} = -5V, I _C = -2mA V _{CE} = -5V, I _C = -10mA |
| Collector-Cutoff Current | I _{CB0} | — | — | -15 -4.0 | nA μA | V _{CB} = -30V V _{CB} = -30V, T _A = +150°C |
| Gain Bandwidth Product | f _T | 100 | 200 | — | MHz | V _{CE} = -5V, I _C = -10mA, f = 100MHz |
| Collector-Base Capacitance | C _{cbo} | — | 3 | 4.5 | pF | V _{CB} = -10V, f = 1MHz |
| Noise Figure | NF | — | — | 10 | dB | V _{CE} = -5V, I _C = -200μA, R _g = 2kΩ, f = 1kHz, Δf = 200Hz |

Note: 7. Short duration pulse test used to minimize self-heating effect.

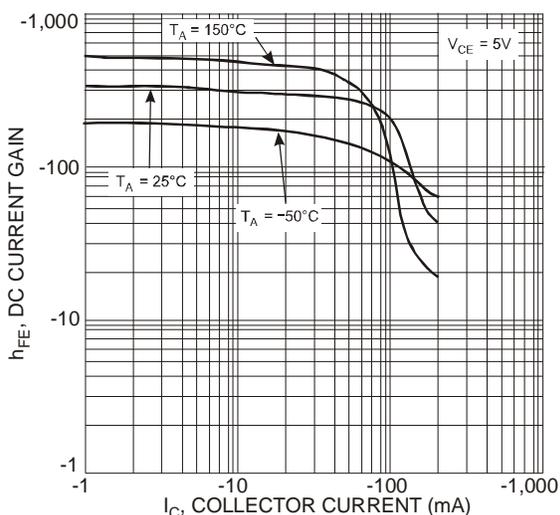


Figure 6. Typical DC Current Gain vs. Collector Current (NK-BC857B Type)

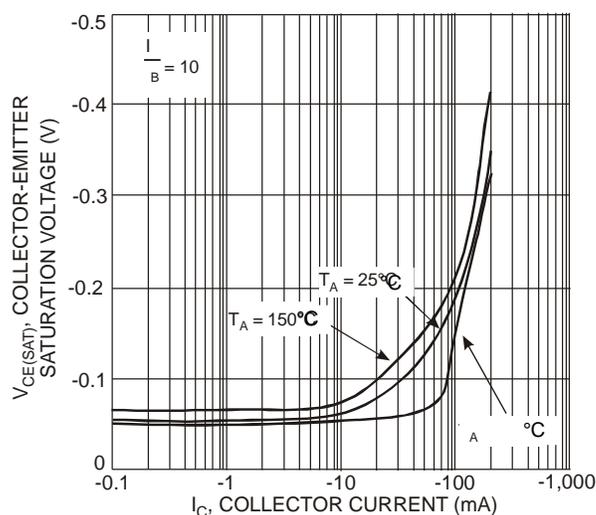


Figure 7. Typical Collector-Emitter Saturation Voltage vs. Collector Current (NK-BC857B Type)

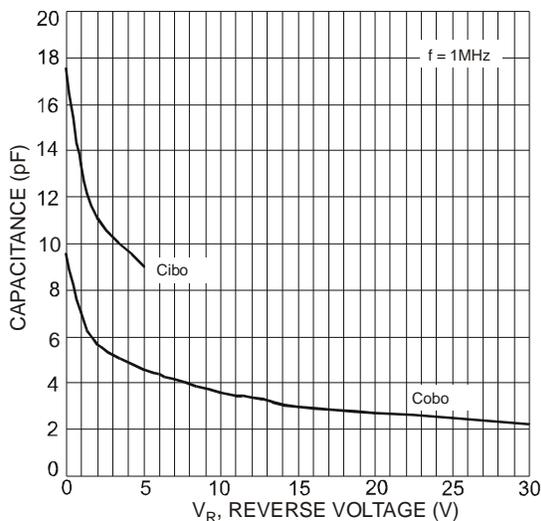


Figure 8. Typical Capacitance Characteristics (NK-BC857B Type)

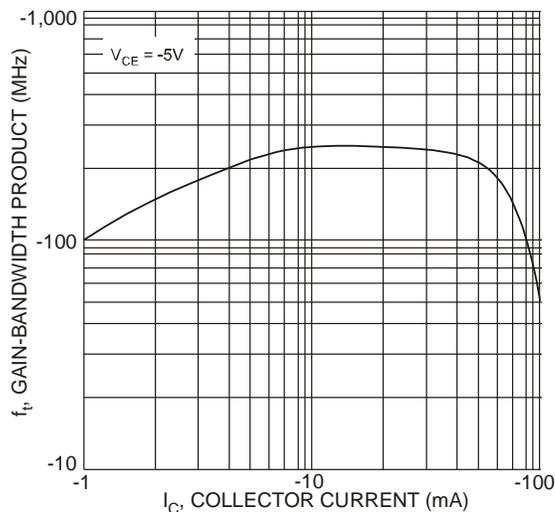
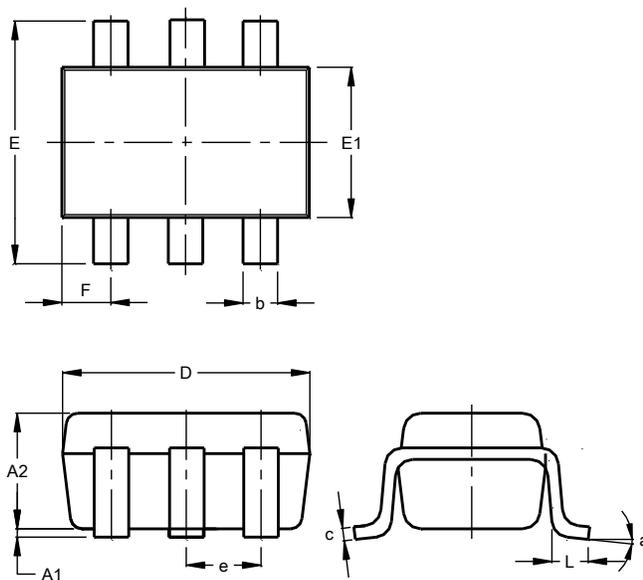


Figure 9. Typical Gain-Bandwidth Product vs. Collector Current (NK-BC857B Type)

Package Outline Dimensions

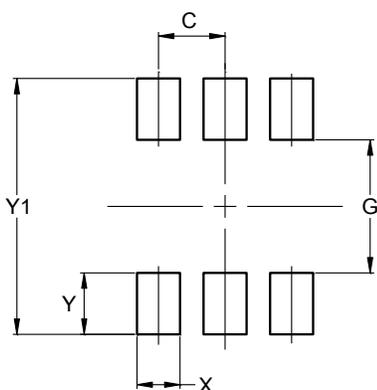
SOT363



| SOT363 | | | |
|----------------------|-----------|------|-------|
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.90 | 1.00 | 1.00 |
| b | 0.10 | 0.30 | 0.25 |
| c | 0.10 | 0.22 | 0.11 |
| D | 1.80 | 2.20 | 2.15 |
| E | 2.00 | 2.20 | 2.10 |
| E1 | 1.15 | 1.35 | 1.30 |
| e | 0.650 BSC | | |
| F | 0.40 | 0.45 | 0.425 |
| L | 0.25 | 0.40 | 0.30 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

SOT363



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 1.300 |
| X | 0.420 |
| Y | 0.600 |
| Y1 | 2.500 |