

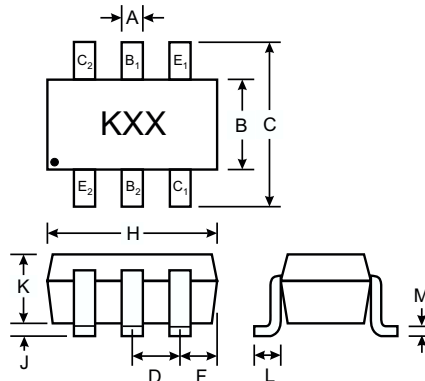
COMPLEMENTARY NPN / PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR

Features

- Complementary Pair
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- One 2222A-Type NPN, One 2907A-Type PNP
- Ideal for Low Power Amplification and Switching

Mechanical Data

- Case: SOT-363, Molded Plastic
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram Marking: K27
- Weight: 0.006 grams (approx.)



| SOT-363 | | |
|----------------------|--------------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Nominal | |
| F | 0.30 | 0.40 |
| H | 1.80 | 2.20 |
| J | — | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.25 |
| All Dimensions in mm | | |

Note: E1, B1, and C1 = PNP2907A Section,
E2, B2, and C2 = NPN2222A Section.
Type marking indicates orientation.

Maximum Ratings, NPN2222A Section

@ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | NPN2222A | Unit |
|--|-----------------|-------------|------------------|
| Collector-Base Voltage | V_{CBO} | 75 | V |
| Collector-Emitter Voltage | V_{CEO} | 40 | V |
| Emitter-Base Voltage | V_{EBO} | 6.0 | V |
| Collector Current - Continuous (Note 1) | I_C | 600 | mA |
| Power Dissipation (Note 1) | P_d | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 625 | K/W |
| Operating and Storage and Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Maximum Ratings, PNP2907A Section

@ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | PNP2907A | Unit |
|--|-----------------|-------------|------------------|
| Collector-Base Voltage | V_{CBO} | -60 | V |
| Collector-Emitter Voltage | V_{CEO} | -60 | V |
| Emitter-Base Voltage | V_{EBO} | -5.0 | V |
| Collector Current - Continuous (Note 1) | I_C | -600 | mA |
| Power Dissipation (Note 1) | P_d | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 625 | K/W |
| Operating and Storage and Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

- Note:
1. Valid provided that terminals are kept at ambient temperature.
 2. Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

Electrical Characteristics, NPN2222A Section

 @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|--------------------------------------|---------------|---|-----------------------------------|---------------------|---|
| OFF CHARACTERISTICS (Note 2) | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 75 | — | V | $I_C = 10\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 40 | — | V | $I_C = 10\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 6.0 | — | V | $I_E = 10\mu\text{A}, I_C = 0$ |
| Collector Cutoff Current | I_{CBO} | — | 10 | nA μA | $V_{CB} = 60\text{V}, I_E = 0$ $V_{CB} = 60\text{V}, I_E = 0, T_A = 150^\circ\text{C}$ |
| Collector Cutoff Current | I_{CEX} | — | 10 | nA | $V_{CE} = 60\text{V}, V_{EB(OFF)} = 3.0\text{V}$ |
| Emitter Cutoff Current | I_{EBO} | — | 10 | nA | $V_{EB} = 3.0\text{V}, I_C = 0$ |
| Base Cutoff Current | I_{BL} | — | 20 | nA | $V_{CE} = 60\text{V}, V_{EB(OFF)} = 3.0\text{V}$ |
| ON CHARACTERISTICS (Note 2) | | | | | |
| DC Current Gain | h_{FE} | 35 50 75 100 40 50 35 | — — — 300 — — — | — | $I_C = 100\mu\text{A}, V_{CE} = 10\text{V}$ $I_C = 1.0\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ $I_C = 150\text{mA}, V_{CE} = 10\text{V}$ $I_C = 500\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}, T_A = -55^\circ\text{C}$ $I_C = 150\text{mA}, V_{CE} = 1.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | 0.3 1.0 | V | $I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$ |
| Base- Emitter Saturation Voltage | $V_{BE(SAT)}$ | 0.6 — | 1.2 2.0 | V | $I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | |
| Output Capacitance | C_{obo} | — | 8 | pF | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Input Capacitance | C_{ibo} | — | 25 | pF | $V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$ |
| Current Gain-Bandwidth Product | f_T | 300 | — | MHz | $V_{CE} = 20\text{V}, I_C = 20\text{mA},$ $f = 100\text{MHz}$ |
| Noise Figure | NF | — | 4.0 | dB | $V_{CE} = 10\text{V}, I_C = 100\mu\text{A},$ $R_S = 1.0\text{k}\Omega, f = 1.0\text{kHz}$ |
| SWITCHING CHARACTERISTICS | | | | | |
| Delay Time | t_d | — | 10 | ns | $V_{CC} = 30\text{V}, I_C = 150\text{mA},$ $V_{BE(off)} = -0.5\text{V}, I_{B1} = 15\text{mA}$ |
| Rise Time | t_r | — | 25 | ns | |

- Note:
- Valid provided that terminals are kept at ambient temperature.
 - Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

Electrical Characteristics, PNP2907A Section

 @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|--------------------------------------|---------------|-------------------------------|-------------------------|---------------------|--|
| OFF CHARACTERISTICS (Note 2) | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | -60 | — | V | $I_C = -10\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | -60 | — | V | $I_C = -10\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | -5.0 | — | V | $I_E = -10\mu\text{A}, I_C = 0$ |
| Collector Cutoff Current | I_{CBO} | — | -10 | nA μA | $V_{CB} = -50\text{V}, I_E = 0$ $V_{CB} = -50\text{V}, I_E = 0, T_A = 125^\circ\text{C}$ |
| Collector Cutoff Current | I_{CEX} | — | -50 | nA | $V_{CE} = -30\text{V}, V_{EB(OFF)} = -0.5\text{V}$ |
| Base Cutoff Current | I_{BL} | — | -50 | nA | $V_{CE} = -30\text{V}, V_{EB(OFF)} = -0.5\text{V}$ |
| ON CHARACTERISTICS (Note 2) | | | | | |
| DC Current Gain | h_{FE} | 75 100 100 100 50 | — — — 300 — | — | $I_C = -100\mu\text{A}, V_{CE} = -10\text{V}$ $I_C = -1.0\text{mA}, V_{CE} = -10\text{V}$ $I_C = -10\text{mA}, V_{CE} = -10\text{V}$ $I_C = -150\text{mA}, V_{CE} = -10\text{V}$ $I_C = -500\text{mA}, V_{CE} = -10\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | -0.4 -1.6 | V | $I_C = -150\text{mA}, I_B = -15\text{mA}$ $I_C = -500\text{mA}, I_B = -50\text{mA}$ |
| Base- Emitter Saturation Voltage | $V_{BE(SAT)}$ | — | -1.3 -2.6 | V | $I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | |
| Output Capacitance | C_{obo} | — | 8.0 | pF | $V_{CB} = -10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Input Capacitance | C_{ibo} | — | 30 | pF | $V_{EB} = -2.0\text{V}, f = 1.0\text{MHz}, I_C = 0$ |
| Current Gain-Bandwidth Product | f_T | 200 | — | MHz | $V_{CE} = -20\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$ |
| SWITCHING CHARACTERISTICS | | | | | |
| Turn-On Time | t_{on} | — | 45 | ns | $I_C = -150\text{mA}, V_{CC} = -30\text{V}, I_{B1} = -15\text{mA}$ |
| Delay Time | t_d | — | 10 | ns | $V_{CC} = -30\text{V}, I_C = -150\text{mA}, I_{B1} = -15\text{mA}$ |
| Rise Time | t_r | — | 40 | ns | |

- Note:
- Valid provided that terminals are kept at ambient temperature.
 - Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

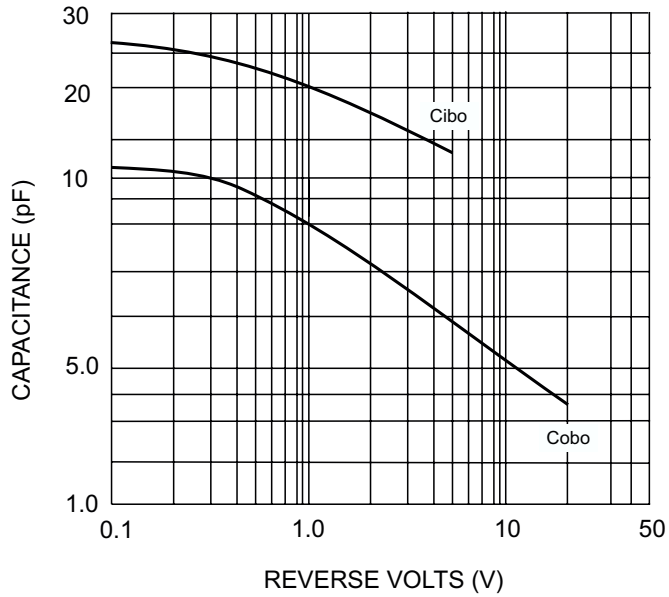


Fig. 1 (2222A) Capacitances (Typical)

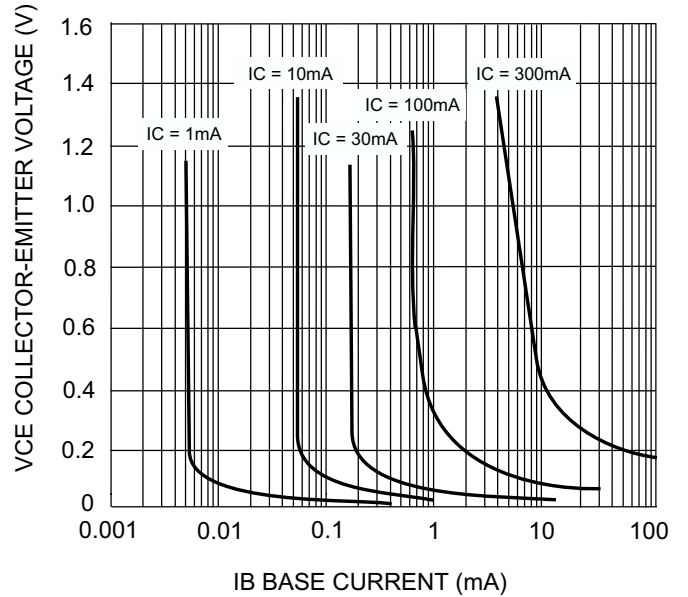


Fig. 4 (2907A) Typical Collector Saturation Region

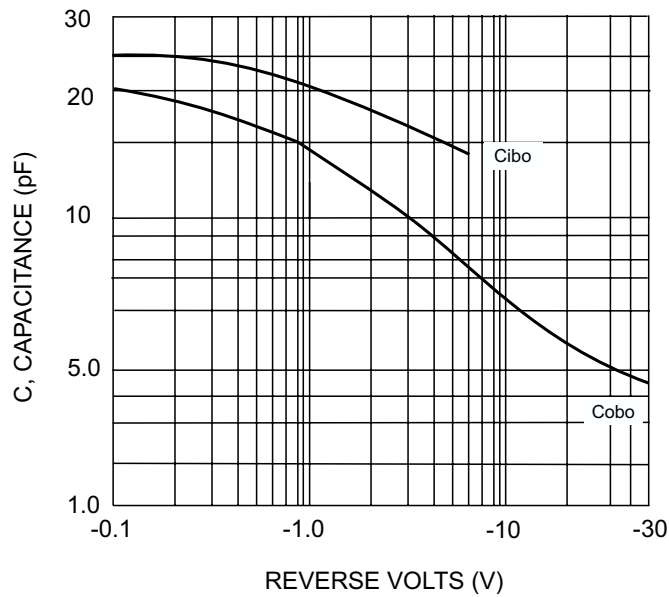


Fig. 3 (2907A) Capacitances (Typical)

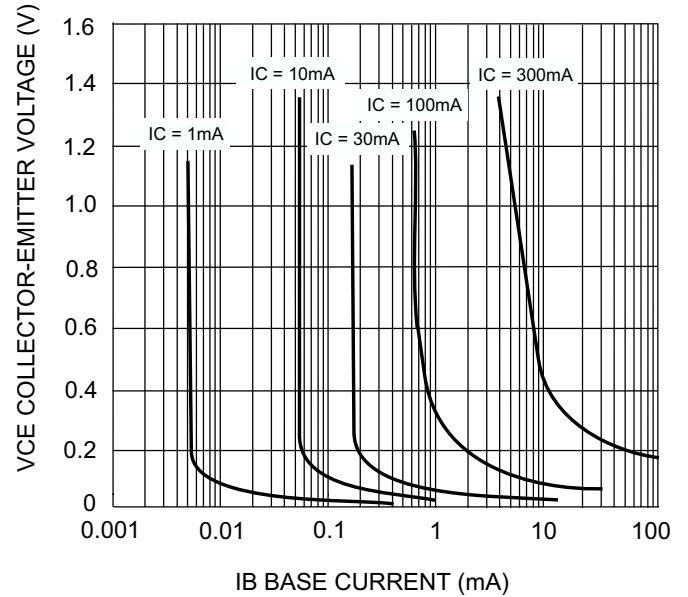


Fig. 4 (2907A) Typical Collector Saturation Region