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# FFB2227A / FMB2227A

## NPN & PNP General-Purpose Amplifier

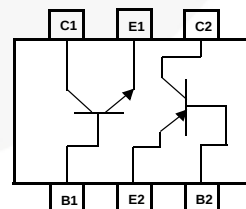
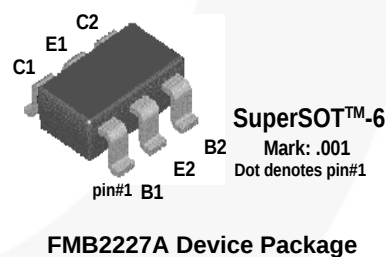
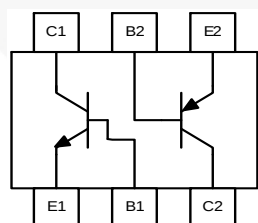
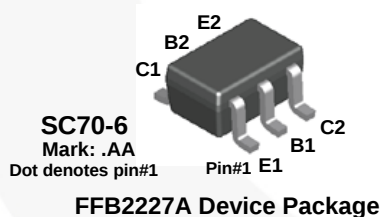
### Description

This complementary device is a medium-power amplifier and switch, requiring collector currents up to 500 mA. Sourced from Process 19 and 63. See FFB2222A (NPN) and FFB2907A (PNP) for characteristics.

### Ordering Information

| Part Number | Top Mark | Package | Packing Method |
|-------------|----------|---------|----------------|
| FFB2227A    | AA       | SC70 6L | Tape and Reel  |
| FMB2227A    | 001      | SSOT 6L | Tape and Reel  |

### Block Diagram



| TRANSISTOR TYPE |    |    |     |
|-----------------|----|----|-----|
| C1              | B1 | E1 | NPN |
| C2              | B2 | E2 | PNP |

Figure 1. Block Diagram

## Absolute Maximum Ratings<sup>(1)</sup>

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol         | Parameter                                        | Value        | Units            |
|----------------|--------------------------------------------------|--------------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 30           | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | 60           | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | 5            | V                |
| $I_C$          | Collector Current - Continuous                   | 500          | mA               |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | - 55 to +150 | $^\circ\text{C}$ |

### Notes:

1. These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty cycle operations.
3. All voltages (V) and currents (A) are negative polarity for PNP transistors.
4. These Ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

## Thermal Characteristics<sup>(2)</sup>

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol          | Parameter                               | Maximum  |          | Units                |
|-----------------|-----------------------------------------|----------|----------|----------------------|
|                 |                                         | FFB2227A | FMB2227A |                      |
| $P_D$           | Total Device Dissipation                | 300      | 700      | mW                   |
|                 | Derate Above $25^\circ\text{C}$         | 2.4      | 5.6      | mW/ $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 415      | 180      | $^\circ\text{C/W}$   |

### Note:

2. PCB board size: FR-4 76 x 114 x 0.6T mm<sup>3</sup> (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

**Electrical Characteristics<sup>(3)</sup>**Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol                              | Parameter                                           | Test Conditions                                                                                    | Min. | Typ. | Max. | Units |
|-------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------|------|------|------|-------|
| <b>OFF CHARACTERISTICS</b>          |                                                     |                                                                                                    |      |      |      |       |
| $V_{(BR)CEO}$                       | Collector-Emitter Breakdown Voltage <sup>(4)</sup>  | $I_C = 10\text{ mA}, I_B = 0$                                                                      | 30   |      |      | V     |
| $V_{(BR)CBO}$                       | Collector-Base Breakdown Voltage                    | $I_C = 10\text{ }\mu\text{A}, I_E = 0$                                                             | 60   |      |      | V     |
| $V_{(BR)EBO}$                       | Emitter-Base Breakdown Voltage                      | $I_E = 10\text{ }\mu\text{A}, I_C = 0$                                                             | 5    |      |      | V     |
| $I_{CBO}$                           | Collector Cut-Off Current                           | $V_{CB} = 50\text{ V}, I_E = 0$                                                                    |      |      | 30   | nA    |
| $I_{EBO}$                           | Emitter Cut-Off Current                             | $V_{EB} = 3.0\text{ V}, I_C = 0$                                                                   |      |      | 30   | nA    |
| <b>ON CHARACTERISTICS</b>           |                                                     |                                                                                                    |      |      |      |       |
| $h_{FE}$                            | DC Current Gain                                     | $I_C = 1.0\text{ mA}, V_{CE} = 10\text{ V}$                                                        | 50   |      |      |       |
|                                     |                                                     | $I_C = 10\text{ mA}, V_{CE} = 10\text{ V}$                                                         | 75   |      |      |       |
|                                     |                                                     | $I_C = 150\text{ mA}, V_{CE} = 10\text{ V}^{(4)}$                                                  | 100  |      |      |       |
|                                     |                                                     | $I_C = 300\text{ mA}, V_{CE} = 10\text{ V}^{(4)}$                                                  | 30   |      |      |       |
| $V_{CE(sat)}$                       | Collector-Emitter Saturation Voltage <sup>(4)</sup> | $I_C = 150\text{ mA}, I_B = 15\text{ mA}$                                                          |      |      | 0.4  | V     |
|                                     |                                                     | $I_C = 300\text{ mA}, I_B = 30\text{ mA}$                                                          |      |      | 1.4  | V     |
| $V_{BE(sat)}$                       | Base-Emitter Saturation Voltage <sup>(4)</sup>      | $I_C = 150\text{ mA}, I_B = 15\text{ mA}$                                                          |      |      | 1.3  | V     |
| <b>SMALL SIGNAL CHARACTERISTICS</b> |                                                     |                                                                                                    |      |      |      |       |
| $f_T$                               | Current Gain - Bandwidth Product                    | $I_C = 50\text{ mA}, V_{CE} = 20\text{ V}, f = 100\text{ MHz}$                                     |      | 250  |      | MHz   |
| $C_{obo}$                           | Output Capacitance                                  | $V_{CB} = 10\text{ V}, I_E = 0, f = 100\text{ kHz}$                                                |      | 4.0  |      | pF    |
| $C_{ibo}$                           | Input Capacitance                                   | $V_{EB} = 2.0\text{ V}, I_C = 0, f = 100\text{ kHz}$                                               |      | 12   |      | pF    |
| NF                                  | Noise Figure                                        | $I_C = 100\text{ }\mu\text{A}, V_{CE} = 10\text{ V}, R_S = 1.0\text{ k}\Omega, f = 1.0\text{ kHz}$ |      | 2.0  |      | dB    |
| <b>SWITCHING CHARACTERISTICS</b>    |                                                     |                                                                                                    |      |      |      |       |
| $t_{on}$                            | Turn-on Time                                        | $V_{CC} = 30\text{ V}, I_C = 150\text{ mA}, I_{B1} = 15\text{ mA}$                                 |      | 30   |      | ns    |
| $t_d$                               | Delay Time                                          |                                                                                                    |      | 8.0  |      | ns    |
| $t_r$                               | Rise Time                                           |                                                                                                    |      | 20   |      | ns    |
| $t_{off}$                           | Turn-off Time                                       | $V_{CC} = 6.0\text{ V}, I_C = 150\text{ mA}, I_{B1} = I_{B2} = 15\text{ mA}$                       |      | 80   |      | ns    |
| $t_s$                               | Storage Time                                        |                                                                                                    |      | 60   |      | ns    |
| $t_f$                               | Fall Time                                           |                                                                                                    |      | 20   |      | ns    |

**Notes:**

3. All voltages (V) and currents (A) are negative polarity for PNP transistors.

4. Pulse test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2.0\%$ .

## Physical Dimensions

## SC70 6L

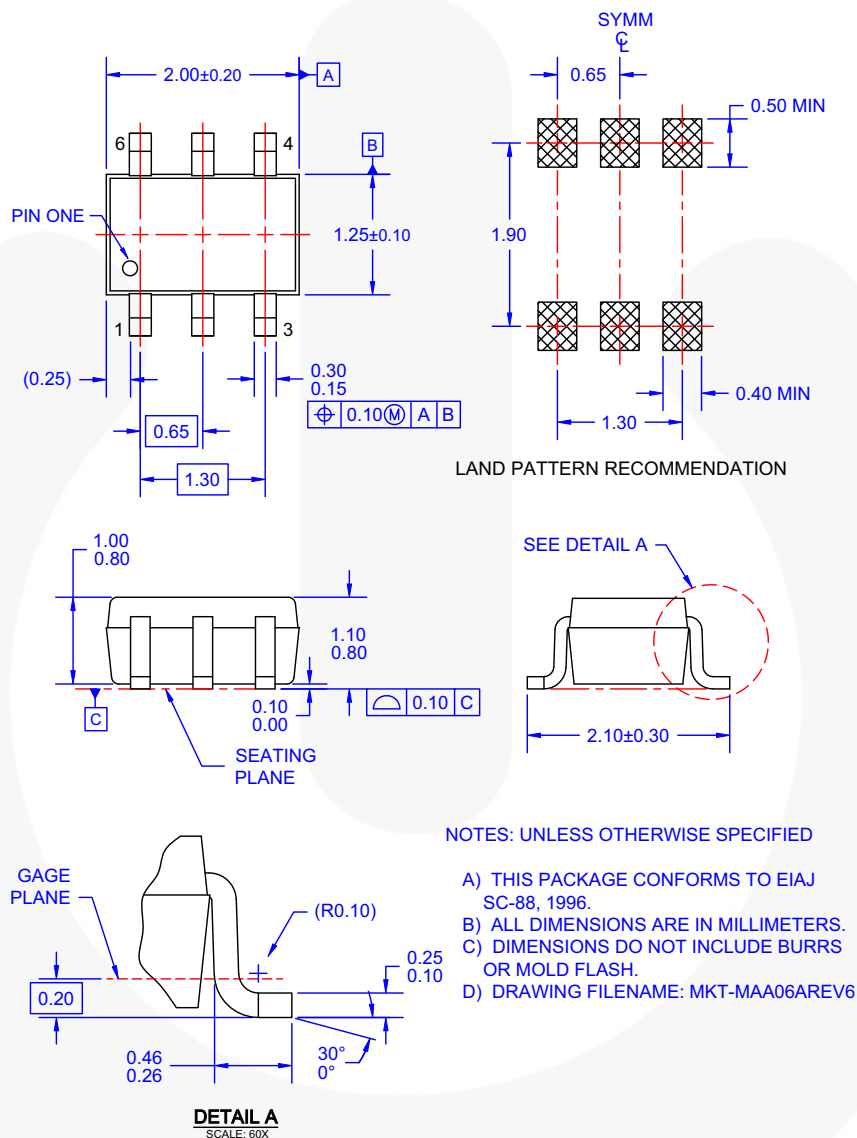


Figure 2. 6-LEAD, SC70, EIAJ SC-88, 1.25 MM WIDE (ACTIVE)

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## Physical Dimensions (Continued)

## SSOT 6L

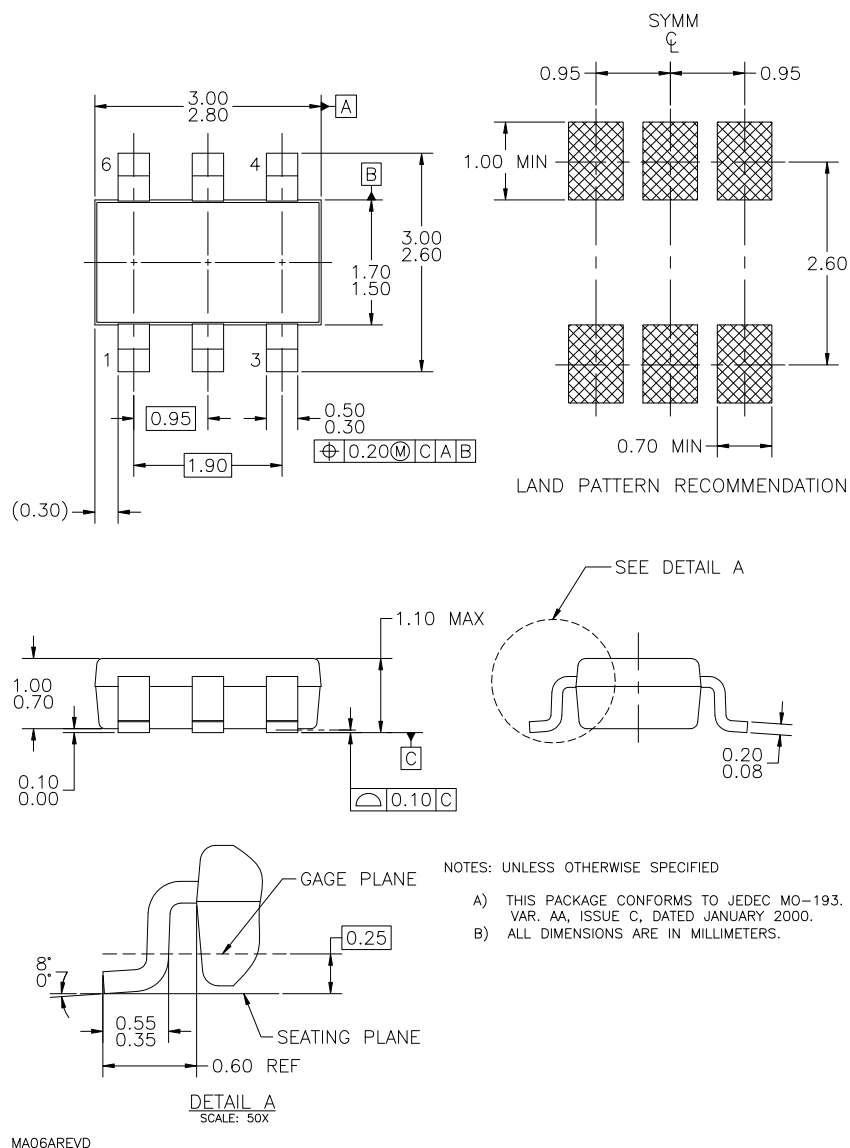


Figure 3. 6-LEAD, SUPER SOT-6, JEDEC MO-193, 1.6 MM WIDE (ACTIVE)

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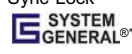
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