

# NPN & PNP General-Purpose Amplifier

## FMB3946

### Description

This complementary device is designed for use as a general-purpose amplifier and switch. The useful dynamic range extends to 100 mA as a switch and 100 MHz as an amplifier.

### ABSOLUTE MAXIMUM RATINGS (Note 1)

(T<sub>A</sub> = 25°C, unless otherwise noted)

| Symbol                            | Parameter                              | Value       | Unit |
|-----------------------------------|----------------------------------------|-------------|------|
| V <sub>CEO</sub>                  | Collector–Emitter Voltage              | 40          | V    |
| V <sub>CBO</sub>                  | Collector–Base Voltage                 | 40          | V    |
| V <sub>EBO</sub>                  | Emitter–Base Voltage                   | 5.0         | V    |
| I <sub>C</sub>                    | Collector Current – Continuous         | 200         | mA   |
| T <sub>J</sub> , T <sub>STG</sub> | Junction and Storage Temperature Range | –55 to +150 | °C   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

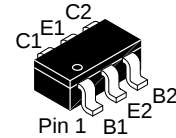
- These ratings are based on a maximum junction temperature of 150°C.
- These are steady-state limits. onsemi should be consulted on applications involving pulsed or low-duty cycle operations.
- All voltages (V) and currents (A) are negative polarity for PNP transistors.
- These ratings are limiting values above which serviceability of any semiconductor advice may be impaired.

### THERMAL CHARACTERISTICS (Note 5)

(T<sub>A</sub> = 25°C, unless otherwise noted)

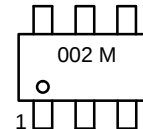
| Symbol           | Parameter                               | Max | Unit  |
|------------------|-----------------------------------------|-----|-------|
| P <sub>D</sub>   | Power Dissipation                       | 700 | mW    |
|                  | Derate Above 25°C                       | 5.6 | mW/°C |
| R <sub>θJA</sub> | Thermal Resistance, Junction-to-Ambient | 180 | °C/W  |

- PCB 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.



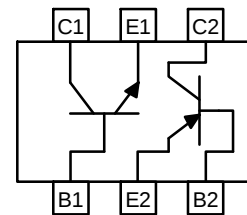
TSOT23 6-Lead  
CASE 419BL

### MARKING DIAGRAM



002 = Specific Device Code  
M = Date Code

### INTERNAL CONNECTION



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

### ORDERING INFORMATION

| Device  | Package            | Shipping <sup>†</sup> |
|---------|--------------------|-----------------------|
| FMB3946 | TSOT23-6 (Pb-Free) | 3000 / Tape & Reel    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# FMB3946

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted) (Note 6)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|--------|-----------|----------------|-----|-----|-----|------|
|--------|-----------|----------------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|               |                                     |                                        |     |   |    |    |
|---------------|-------------------------------------|----------------------------------------|-----|---|----|----|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage | $I_C = 10\text{ mA}, I_B = 0$          | 40  | – | –  | V  |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage    | $I_C = 10\text{ }\mu\text{A}, I_E = 0$ | 40  | – | –  | V  |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage      | $I_E = 10\text{ }\mu\text{A}, I_C = 0$ | 5.0 | – | –  | V  |
| $I_{CBO}$     | Collector Cut-Off Current           | $V_{CB} = 30\text{ V}, I_E = 0$        | –   | – | 50 | nA |
| $I_{EBO}$     | Emitter Cut-Off Current             | $V_{EB} = 4.0\text{ V}, I_C = 0$       | –   | – | 50 | nA |

### ON CHARACTERISTICS

|               |                                      |                                                       |     |   |      |   |
|---------------|--------------------------------------|-------------------------------------------------------|-----|---|------|---|
| $h_{FE}$      | DC Current Gain                      | $I_C = 100\text{ }\mu\text{A}, V_{CE} = 1.0\text{ V}$ | 40  | – | –    |   |
|               |                                      | $I_C = 1.0\text{ mA}, V_{CE} = 1.0\text{ V}$          | 70  | – | –    |   |
|               |                                      | $I_C = 10\text{ mA}, V_{CE} = 1.0\text{ V}$           | 100 | – | 300  |   |
|               |                                      | $I_C = 50\text{ mA}, V_{CE} = 1.0\text{ V}$           | 60  | – | –    |   |
|               |                                      | $I_C = 100\text{ mA}, V_{CE} = 1.0\text{ V}$          | 30  | – | –    |   |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 10\text{ mA}, I_B = 1.0\text{ mA}$             | –   | – | 0.25 | V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage      | $I_C = 10\text{ mA}, I_B = 1.0\text{ mA}$             | –   | – | 0.9  | V |

### SMALL-SIGNAL CHARACTERISTICS

|           |                                |                                                                |   |     |   |     |
|-----------|--------------------------------|----------------------------------------------------------------|---|-----|---|-----|
| $f_T$     | Current Gain-Bandwidth Product | $I_C = 10\text{ mA}, V_{CE} = 20\text{ V}, f = 100\text{ MHz}$ | – | 200 | – | MHz |
| $C_{obo}$ | Output Capacitance             | $V_{CB} = 5.0\text{ V}, f = 100\text{ kHz}$                    | – | 4.5 | – | pF  |
| $C_{ibo}$ | Input Capacitance              | $V_{CB} = 0.5\text{ V}, f = 100\text{ kHz}$                    | – | 10  | – | pF  |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

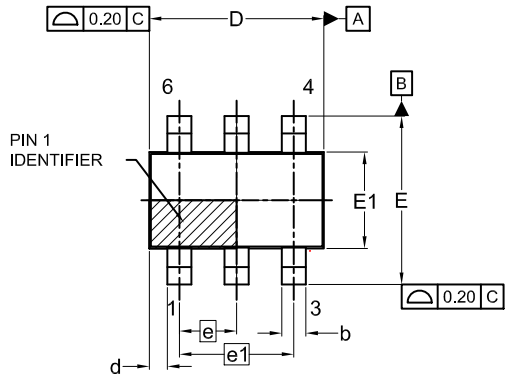
6. All voltages (V) and currents (A) are negative polarity for PNP transistors.



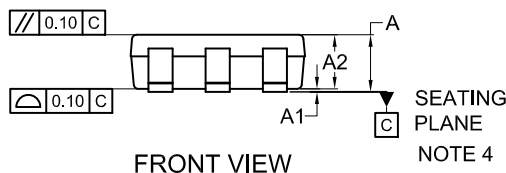
SCALE 2:1

**TSOT23 6-Lead**  
**CASE 419BL**  
**ISSUE A**

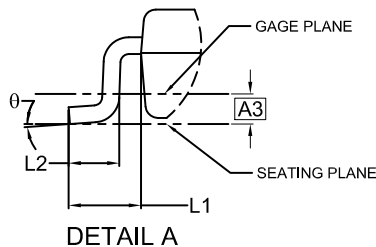
DATE 31 AUG 2020



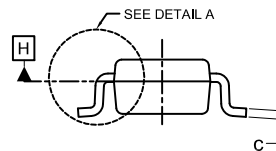
TOP VIEW



FRONT VIEW

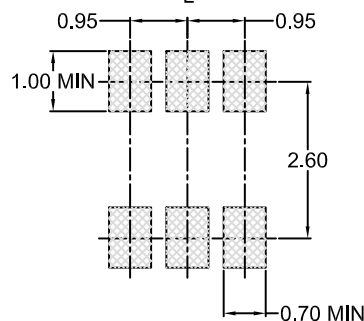


DETAIL A



SIDE VIEW

SYMM

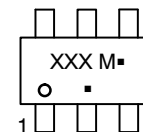

**LAND PATTERN**  
**RECOMMENDATION**

\*FOR ADDITIONAL INFORMATION ON OUR  
PB-FREE STRATEGY AND SOLDERING DETAILS,  
PLEASE DOWNLOAD THE ON SEMICONDUCTOR  
SOLDERING AND MOUNTING TECHNIQUES  
REFERENCE MANUAL, SOLDERM/D.

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.25MM PER END. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
4. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.90        | 1.00 | 1.10 |
| A1  | 0.00        | 0.05 | 0.10 |
| A2  | 0.70        | 0.85 | 1.00 |
| A3  | 0.25 BSC    |      |      |
| b   | 0.25        | 0.38 | 0.50 |
| c   | 0.10        | 0.18 | 0.26 |
| D   | 2.80        | 2.95 | 3.10 |
| d   | 0.30 REF    |      |      |
| E   | 2.50        | 2.75 | 3.00 |
| E1  | 1.30        | 1.50 | 1.70 |
| e   | 0.95 BSC    |      |      |
| e1  | 1.90 BSC    |      |      |
| L1  | 0.60 REF    |      |      |
| L2  | 0.20        | 0.40 | 0.60 |
| Θ   | 0°          | —    | 10°  |

**GENERIC**  
**MARKING DIAGRAM\***


XXX = Specific Device Code

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                         |                      |                                                                                                                                                                                  |
|-------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>TSOT23 6-Lead</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

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