



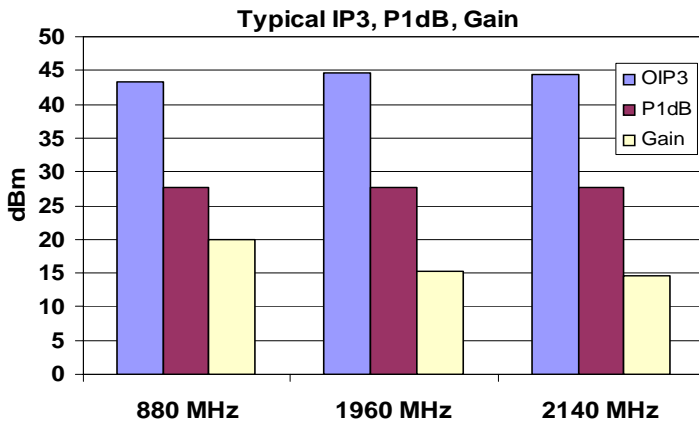
## Product Description

Sirenza Microdevices' SXB-4089 amplifier is a high efficiency InGaP/ GaAs Heterojunction Bipolar Transistor (HBT) MMIC housed in low-cost, surface-mountable plastic package.

These amplifiers are specially designed for use as driver devices for infrastructure equipment in the 400-2500 MHz cellular, ISM, WLL, PCS, W-CDMA applications.

Its high linearity makes it an ideal choice for multi-carrier as well as digital applications.

The matte tin finish on Sirenza's lead-free package utilizes a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. This package is also manufactured with green molding compounds that contain no antimony trioxide nor halogenated fire retardants.



## SXB-4089

## SXB-4089Z



### 400-2500 MHz ½ W Medium Power InGaP/GaAs HBT Amplifier with Active Bias



### Product Features

- On-chip Active Bias Control, Single 5V Supply
- High Output 3rd Order Intercept: +45 dBm typ.
- High P1dB : +28 dBm typ.
- High Gain: +20 dB at 880 MHz
- Low Rth: 25°C/W typ.
- Robust 2000V ESD, Class 2

### Applications

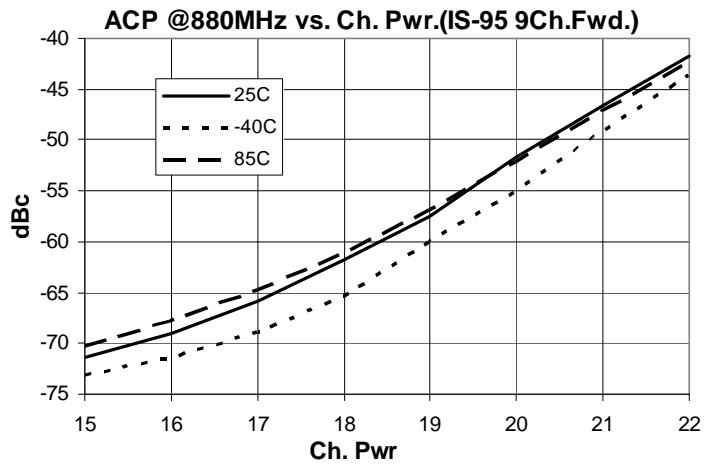
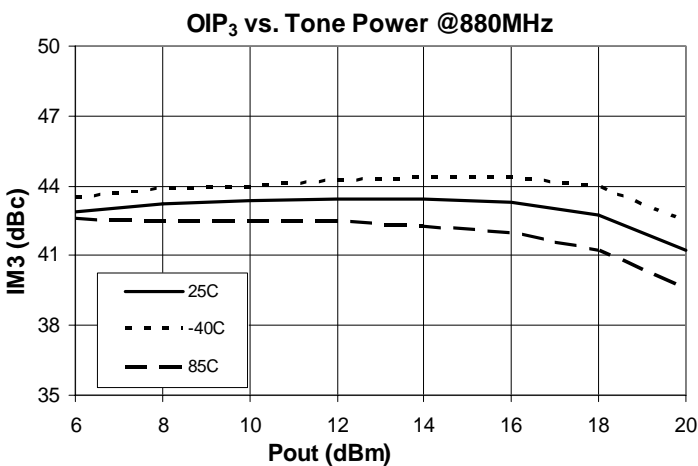
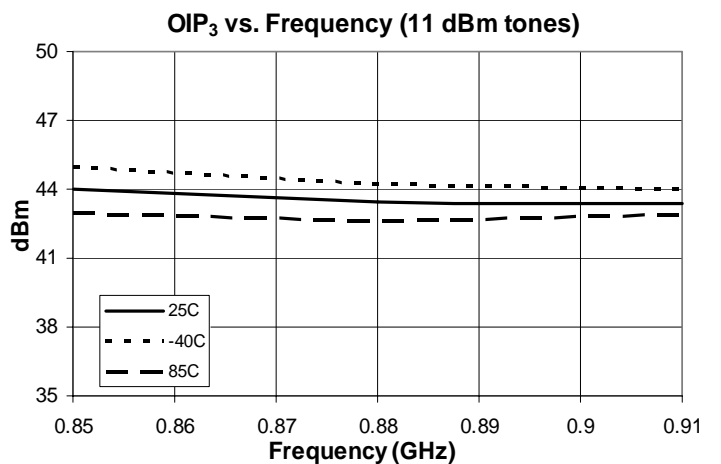
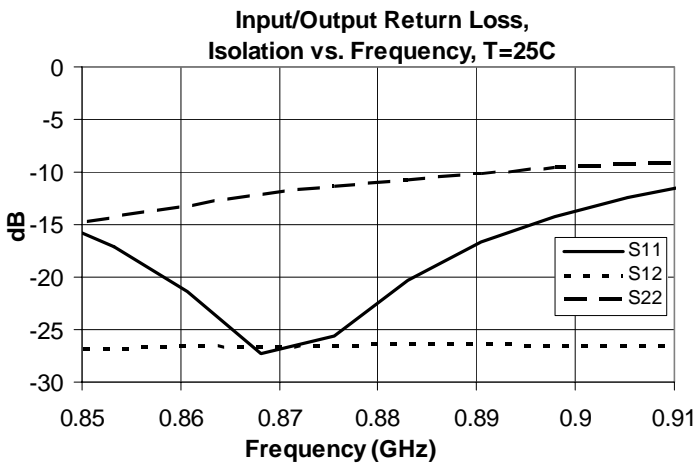
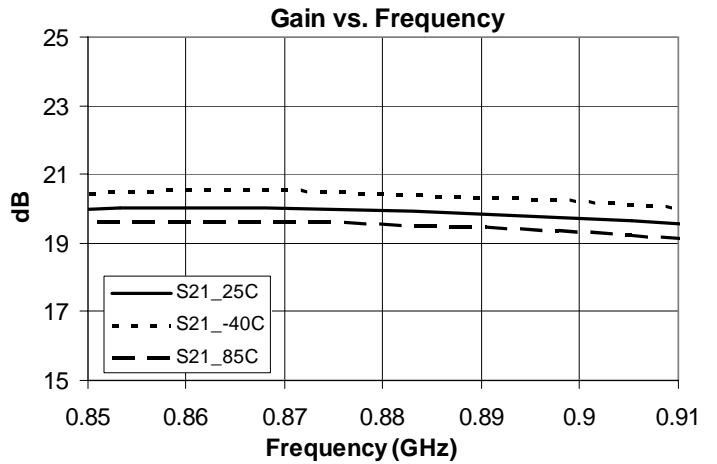
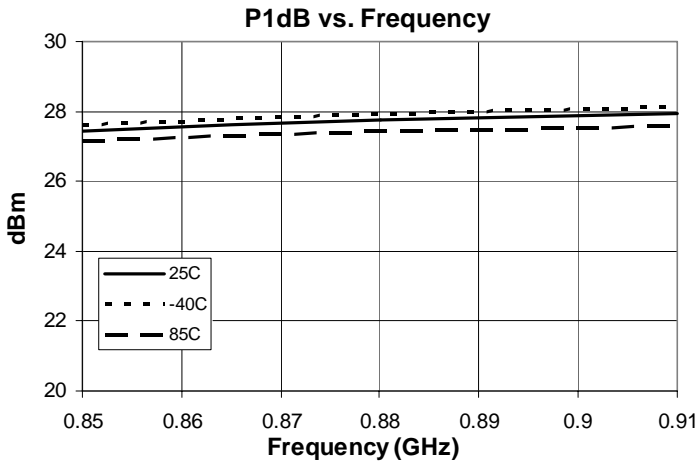
- W-CDMA, PCS, Cellular Systems
- Multi-Carrier Applications

| Symbol               | Parameters  | Units | Frequency                       | Min.         | Typ.                    | Max.       |
|----------------------|---|-------|---------------------------------|--------------|-------------------------|------------|
| P <sub>1dB</sub>     | Output Power at 1 dB Compression  | dBm   | 880 MHz<br>1960 MHz<br>2140 MHz | 26           | 27.5<br>27.5<br>27.5    |            |
| S <sub>21</sub>      | Small Signal Gain   | dBm   | 880 MHz<br>1960 MHz<br>2140 MHz | 18<br>12.5   | 20<br>15<br>14          | 22<br>15.5 |
| S <sub>11</sub>      | Input VSWR  |       | 880 MHz<br>1960 MHz<br>2140 MHz |              | 1.3:1<br>1.3:1<br>1.3:1 | 2.0:1      |
| OIP3                 | Output Third Order Intercept Point (P <sub>out</sub> /Tone = +11 dBm, Tone spacing = 1 MHz) | dBm   | 880 MHz<br>1960 MHz<br>2140 MHz | 41.5<br>42.5 | 43.5<br>44.5<br>44.5    |            |
| NF                   | Noise Figure  | dB    | 880 MHz<br>1960 MHz<br>2140 MHz |              | 5.6<br>3.3<br>3.3       |            |
| V <sub>CC</sub>      | Device Operating Voltage  | V     |                                 | 4.75         | 5                       | 5.25       |
| I <sub>D</sub>       | Device Operating Current  | mA    |                                 | 235          | 265                     | 295        |
| R <sub>TH, j-l</sub> | Thermal Resistance (junction - lead)  | °C/W  |                                 |              | 25.3                    |            |

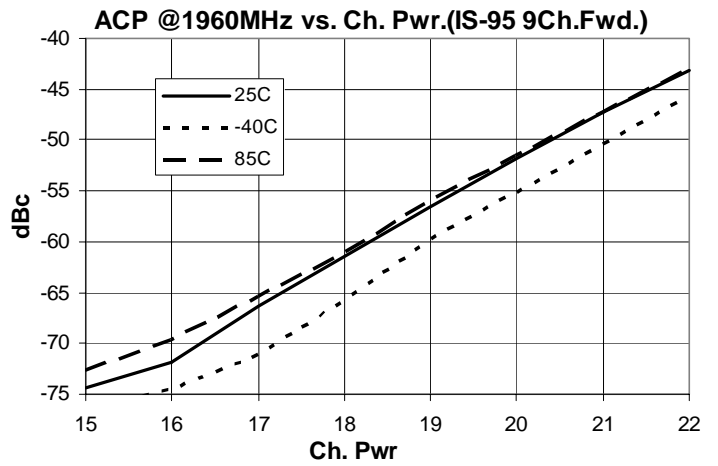
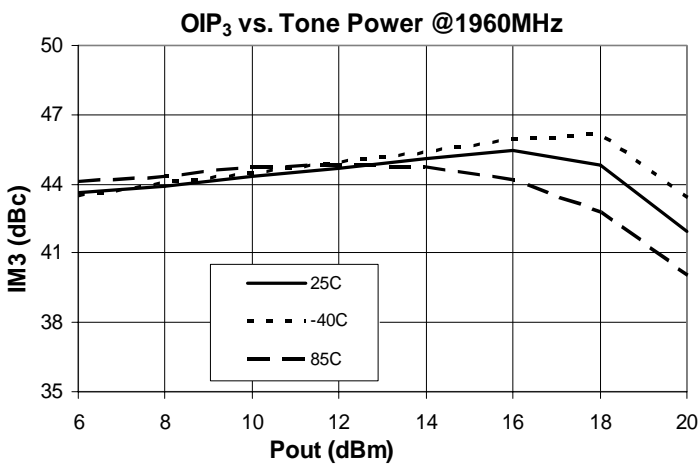
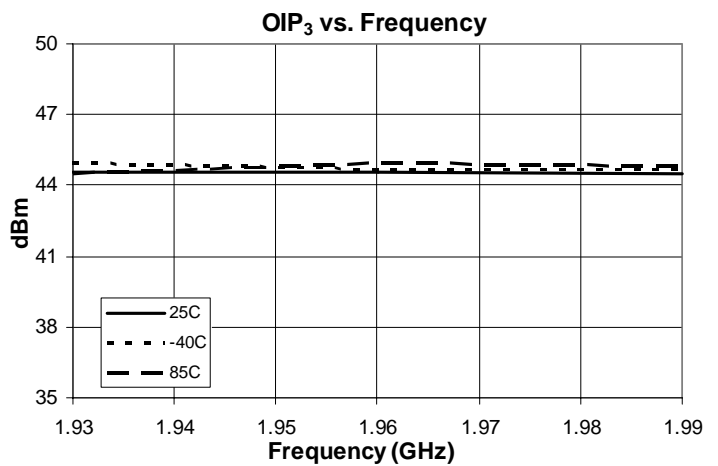
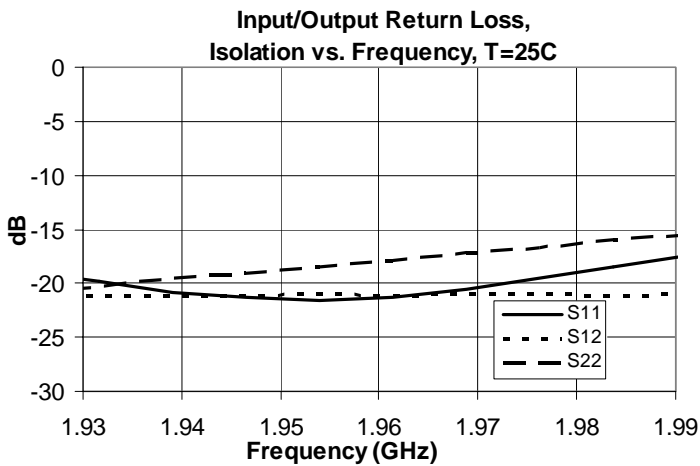
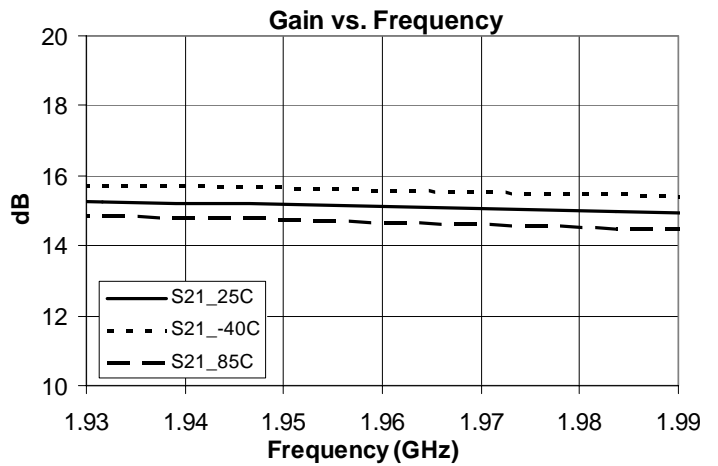
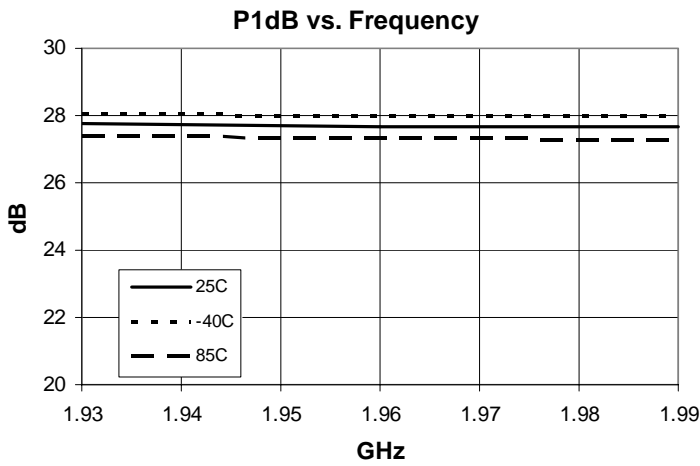
**Test Conditions:** T<sub>a</sub> = 25°C Z<sub>O</sub> = 50 Ohms  
Measured in Application Circuit

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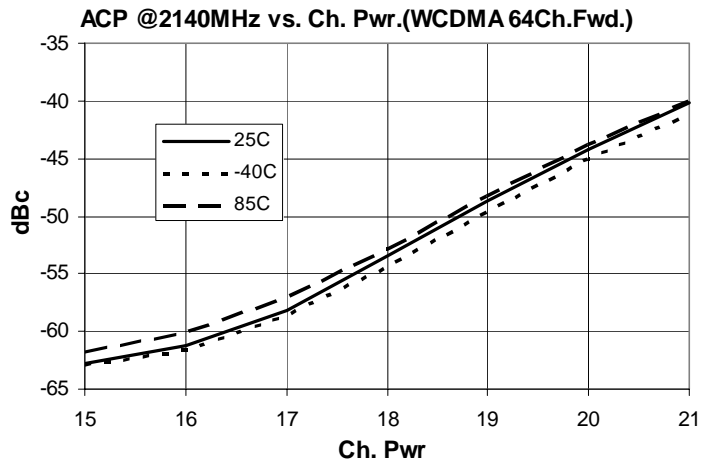
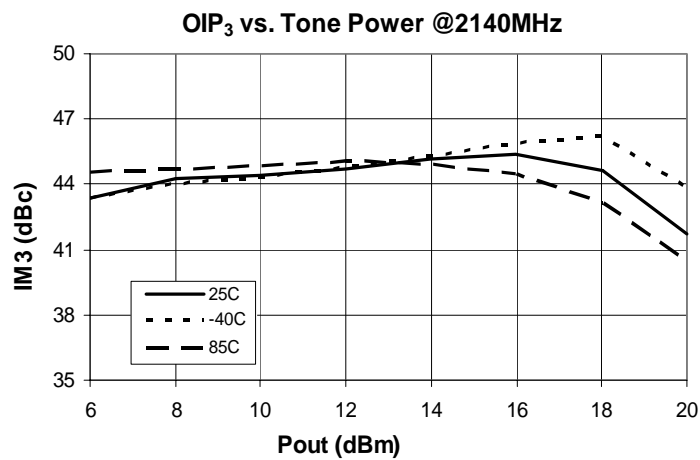
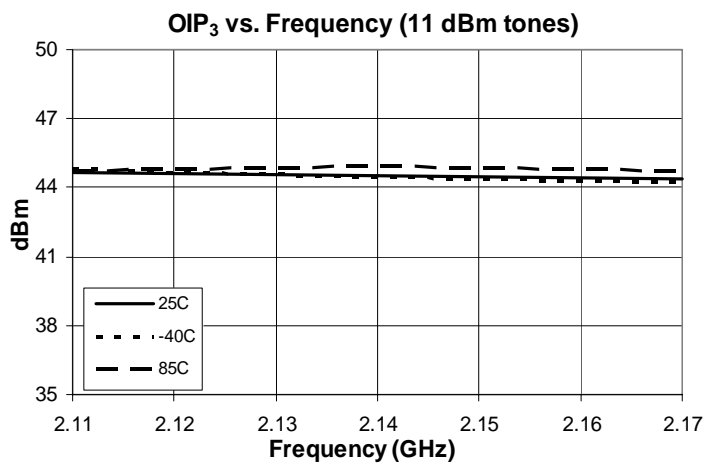
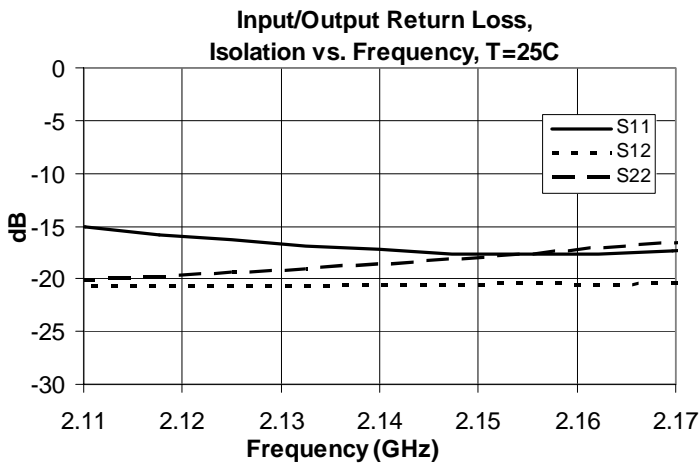
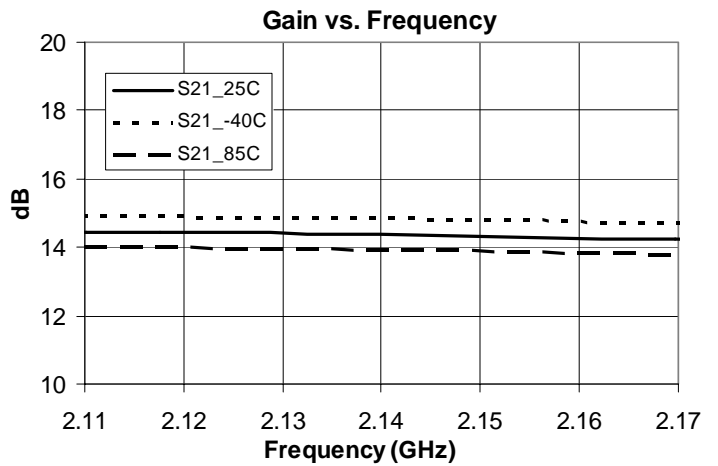
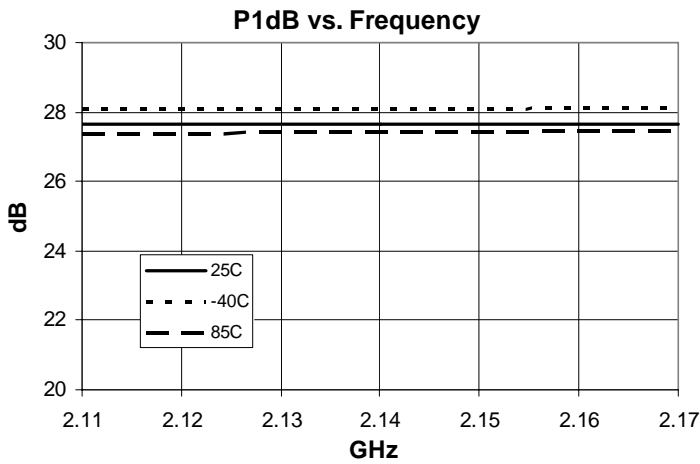
880 MHz Application Circuit Data,  $V_{CC}=5V$ ,  $I_D=270mA$



1960 MHz Application Circuit Data,  $V_{CC}=5V$ ,  $I_D=270mA$



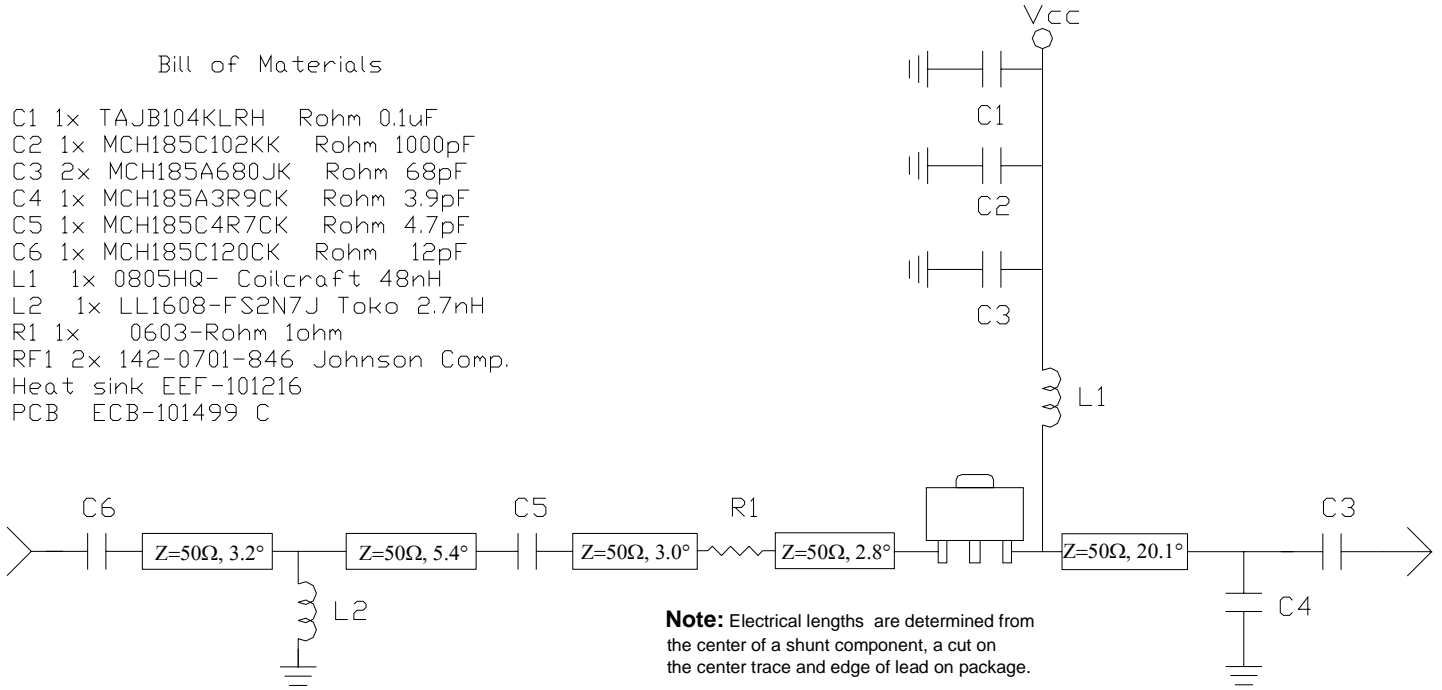
2140 MHz Application Circuit Data,  $V_{CC}=5V$ ,  $I_D=270mA$



**Application Schematic for 880 MHz**

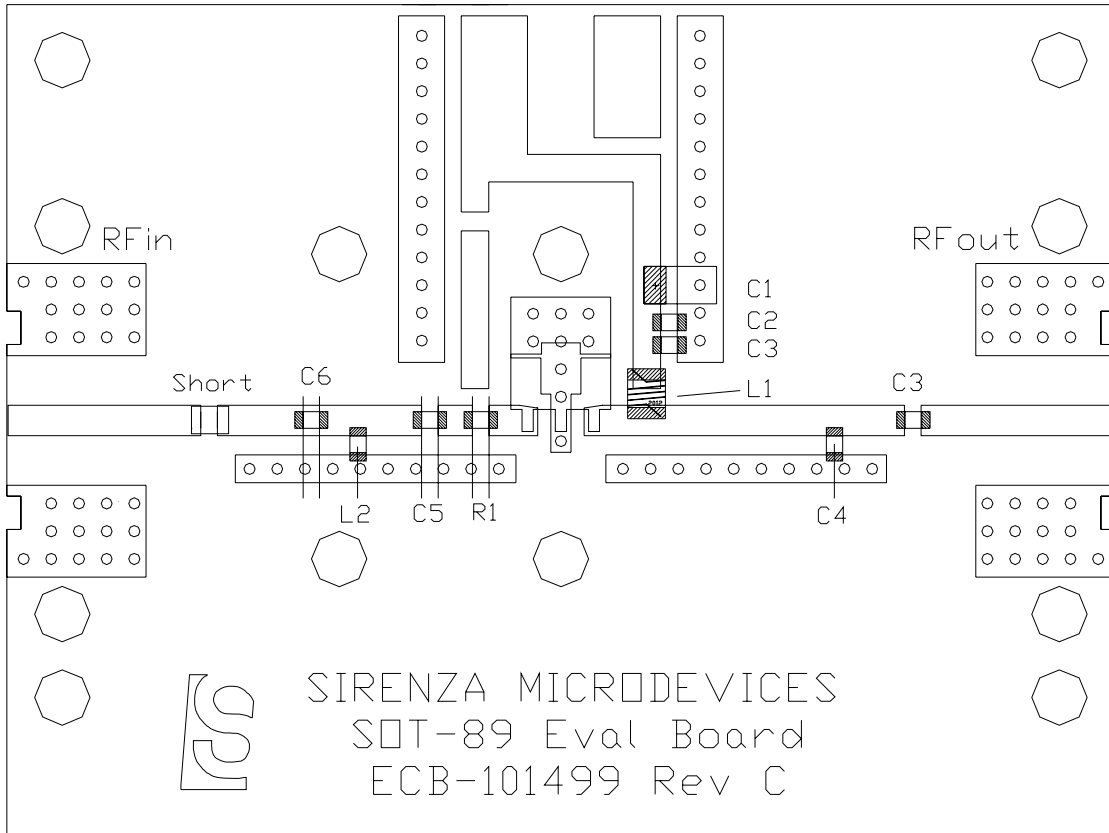
Bill of Materials

- C1 1x TAJB104KLRH Rohm 0.1uF
- C2 1x MCH185C102KK Rohm 1000pF
- C3 2x MCH185A680JK Rohm 68pF
- C4 1x MCH185A3R9CK Rohm 3.9pF
- C5 1x MCH185C4R7CK Rohm 4.7pF
- C6 1x MCH185C120CK Rohm 12pF
- L1 1x 0805HQ- Coilcraft 48nH
- L2 1x LL1608-FS2N7J Toko 2.7nH
- R1 1x 0603-Rohm 1ohm
- RF1 2x 142-0701-846 Johnson Comp.
- Heat sink EEF-101216
- PCB ECB-101499 C



**Note:** Electrical lengths are determined from the center of a shunt component, a cut on the center trace and edge of lead on package.

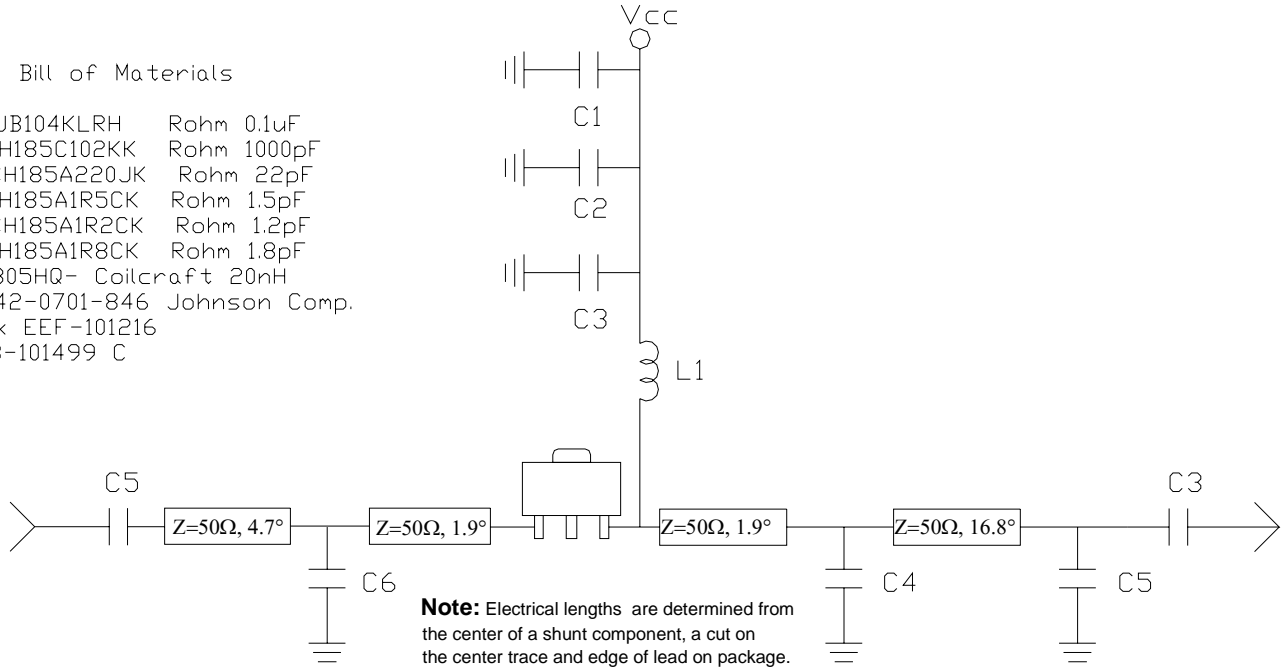
**Evaluation Board Layout for 880 MHz**



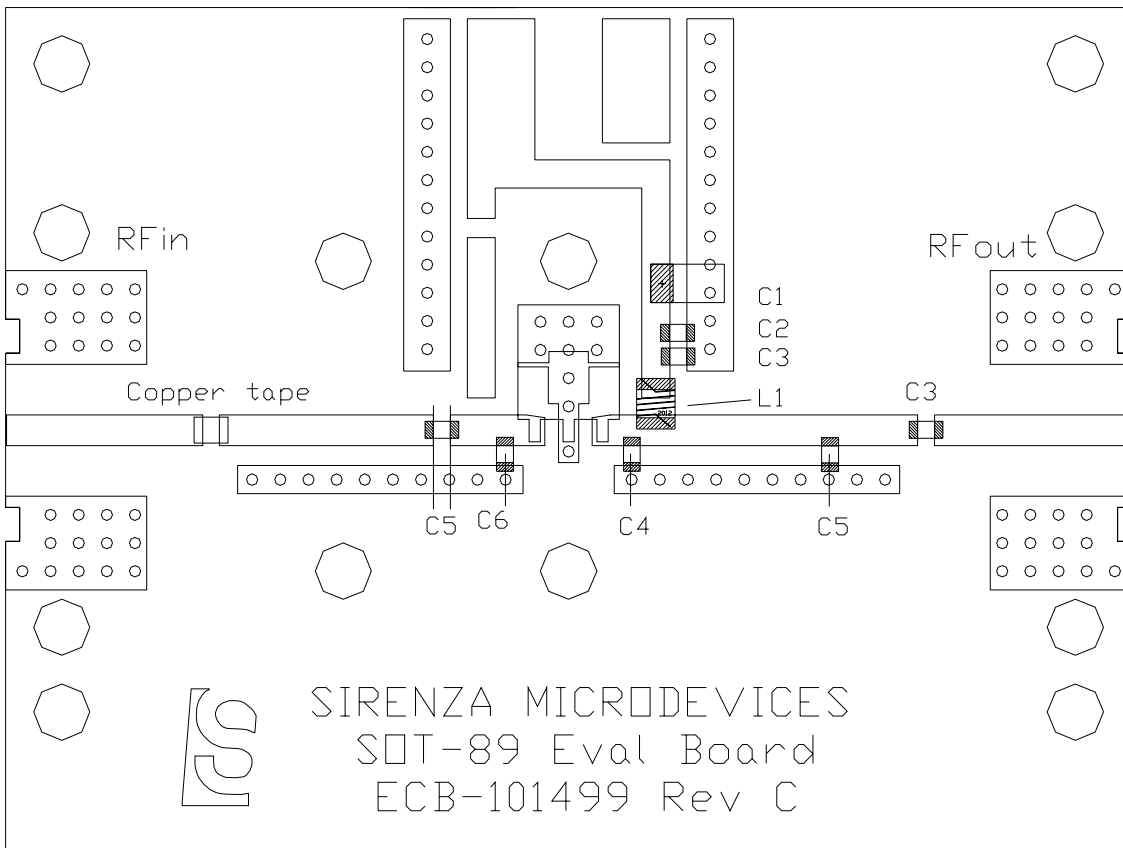
**Application Schematic for 1960 MHz**

Bill of Materials

|                      |    |              |               |        |
|----------------------|----|--------------|---------------|--------|
| C1                   | 1x | TAJB104KLRH  | Rohm          | 0.1uF  |
| C2                   | 1x | MCH185C102KK | Rohm          | 1000pF |
| C3                   | 2x | MCH185A220JK | Rohm          | 22pF   |
| C4                   | 1x | MCH185A1R5CK | Rohm          | 1.5pF  |
| C5                   | 2x | MCH185A1R2CK | Rohm          | 1.2pF  |
| C6                   | 1x | MCH185A1R8CK | Rohm          | 1.8pF  |
| L1                   | 1x | 0805HQ-      | Coilcraft     | 20nH   |
| RF1                  | 2x | 142-0701-846 | Johnson Comp. |        |
| Heat sink EEF-101216 |    |              |               |        |
| PCB ECB-101499 C     |    |              |               |        |



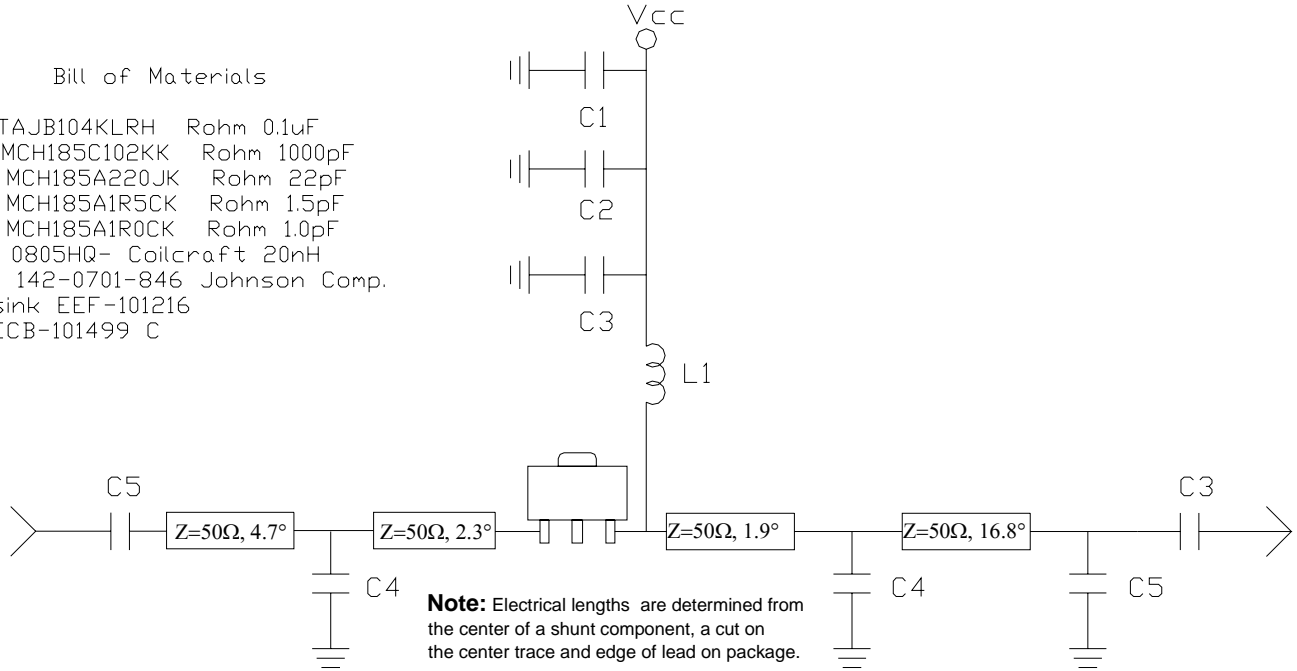
**Evaluation Board Layout for 1960 MHz**



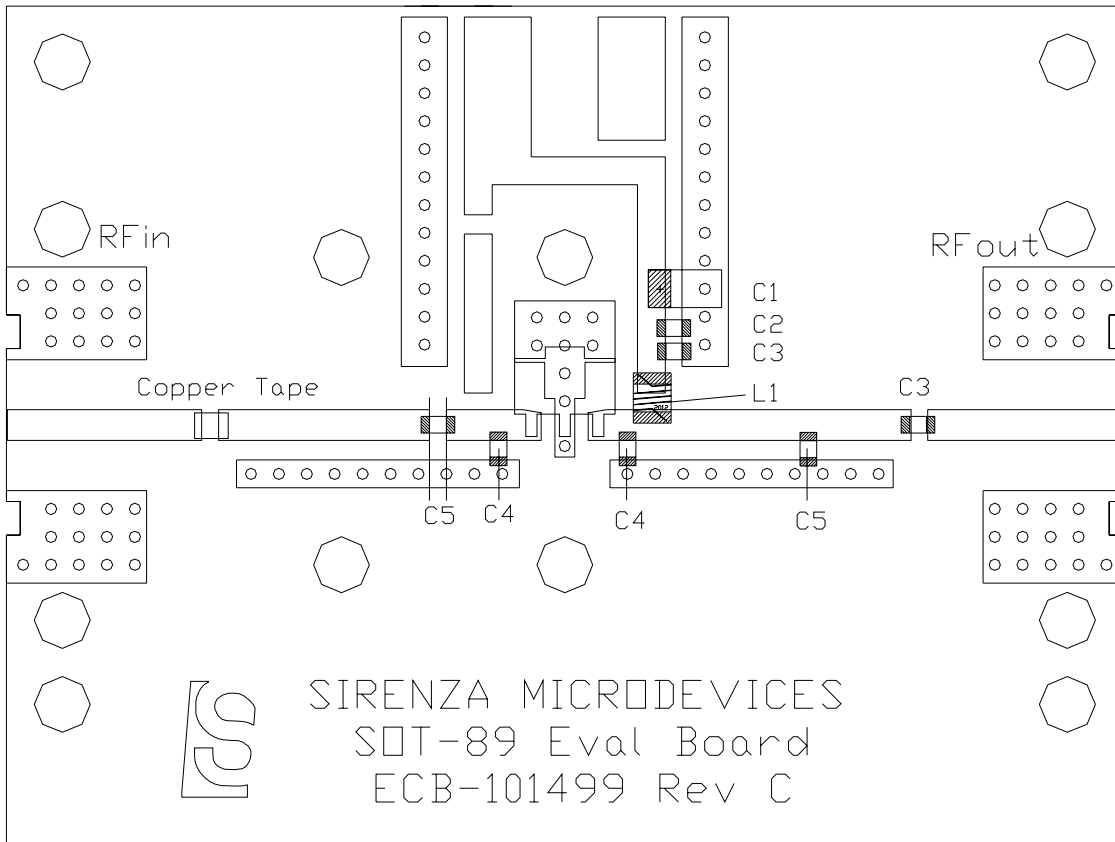
**Application Schematic for 2140 MHz**

Bill of Materials

- C1 1x TAJB104KLRH Rohm 0.1uF
- C2 1x MCH185C102KK Rohm 1000pF
- C3 2x MCH185A220JK Rohm 22pF
- C4 2x MCH185A1R5CK Rohm 1.5pF
- C5 2x MCH185A1R0CK Rohm 1.0pF
- L1 1x 0805HQ- Coilcraft 20nH
- RF1 2x 142-0701-846 Johnson Comp.
- Heat sink EEF-101216
- PCB ECB-101499 C

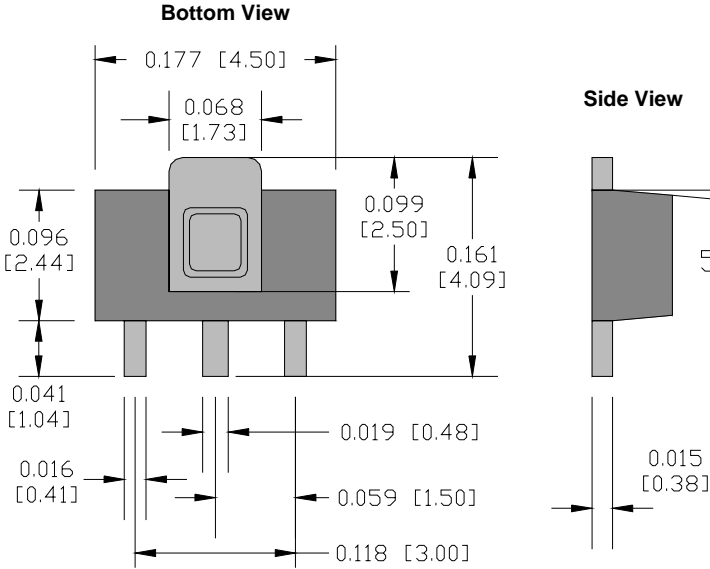


**Evaluation Board Layout for 2140 MHz**



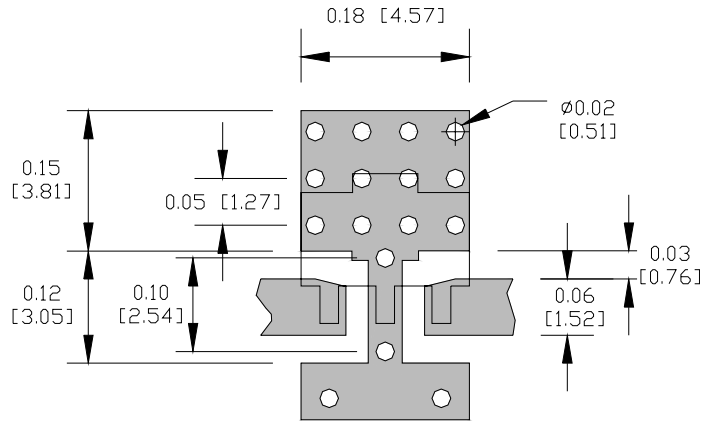
**Nominal Package Dimensions**

Dimensions in inches (millimeters)  
Refer to package drawing posted at [www.sirenza.com](http://www.sirenza.com) for tolerances



**Suggested PCB Pad Layout**

Dimensions in inches [millimeters]



**Part Number Ordering Information**

| Part Number | Reel Size | Devices / Reel |
|-------------|-----------|----------------|
| SXB-4089    | 7"        | 1000           |
| SXB-4089Z   | 7"        | 1000           |

**Absolute Maximum Ratings**

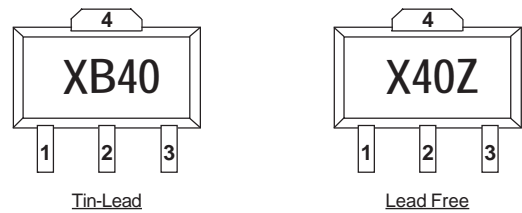
| Parameter                       | Absolute Limit |
|---------------------------------|----------------|
| Max Device Current ( $I_D$ )    | 500 mA         |
| Max Device Voltage ( $V_D$ )    | 6 V            |
| Max. RF Input Power             | 60mW           |
| Max. Dissipated Power           | 2W             |
| Max. Junction Temp. ( $T_J$ )   | +165°C         |
| Operating Temp. Range ( $T_L$ ) | -40°C to +85°C |
| Max. Storage Temp.              | +150°C         |

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH, j-l} \quad T_L = T_{LEAD}$$

**Package Marking**



**ESD: Class 2** (Passes 2000V ESD Pulse)  
Appropriate precautions in handling, packaging and testing devices must be observed.

**MSL (Moisture Sensitivity Level) Rating: Level 1**

| Pin # | Function    | Description   |
|-------|-------------|---|
| 1     | RF IN       | RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.             |
| 2, 4  | GND         | Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible         |
| 3     | RF OUT/BIAS | RF output and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation. |