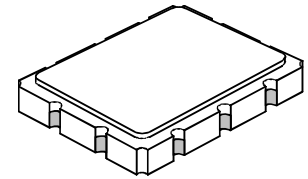




SF1115A

199 MHz SAW Filter



SM9171-10

- **Designed for GSM BTS Receiver IF Applications**
- **Compatible with National Semiconductor Chip Set**
- **Very Flexible Impedance Matching**
- **Unbalanced or Balanced Input or Output**
- **9.1 x 7.1 mm Version of the SF1115A-1**
- **Complies with Directive 2002/95/EC (RoHS)**



Absolute Maximum Ratings

| Rating | Value | Units |
|---|----------------|-------|
| Maximum Incident Power in Passband | +15 | dBm |
| Max. DC voltage between any 2 terminals | 30 | VDC |
| Storage Temperature Range | -40 to +85 | °C |
| Suitable for lead-free soldering - Max. Soldering Profile | 260°C for 30 s | |

Electrical Characteristics

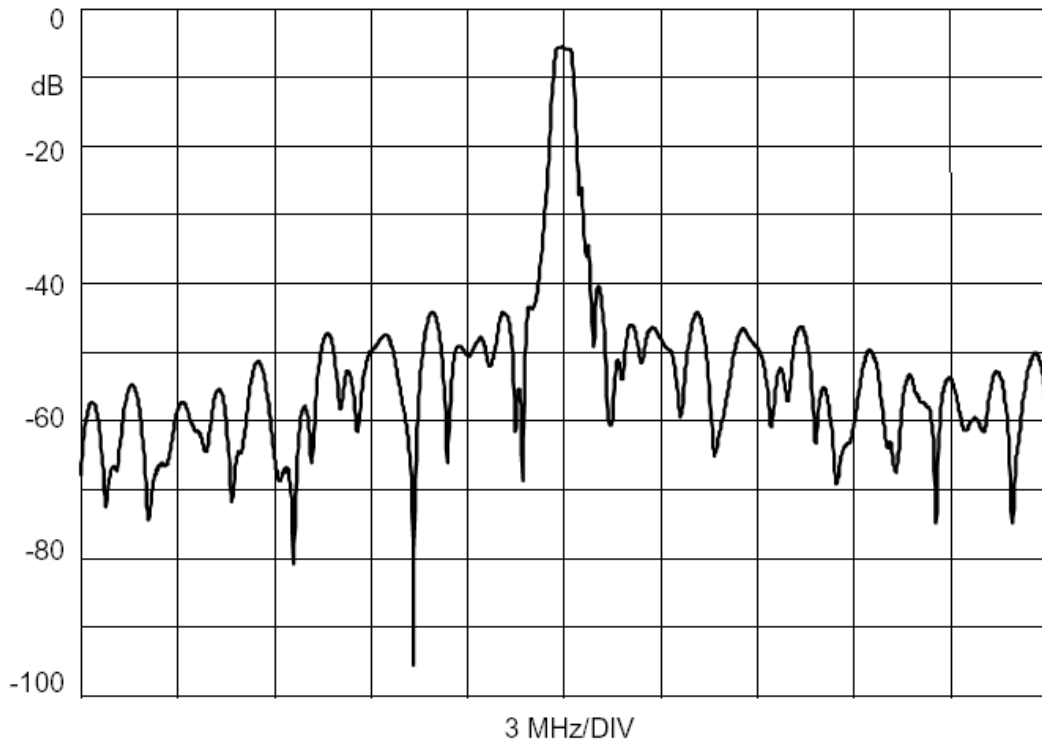
| Characteristic | Sym | Notes | Min | Typ | Max | Units |
|---|---|---------|-----------|-------|-----|---------------------|
| Nominal Center Frequency | f_c | 1 | 199.000 | | | MHz |
| Passband | Insertion Loss at f_c 1 db Passband | IL | | | 7.0 | dB |
| | | BW_1 | ± 100 | | | kHz |
| | Amplitude Ripple over $f_c \pm 100$ kHz | | 1, 2 | | 0.5 | dB _{p-p} |
| | Group Delay Variation over $f_c \pm 100$ kHz | GDV | | | 500 | ns _{p-p} |
| Rejection | Room Temperature $f_c + 800$ to $f_c + 400$ kHz | 1, 2, 3 | 10 | | | dB |
| | Room Temperature $f_c - 800$ to $f_c - 400$ kHz | | 10 | | | |
| | $f_c - 800$ to $f_c - 600$ and $f_c + 600$ to $f_c + 800$ kHz | | 20 | | | |
| | $f_c - 30$ MHz to $f_c - 800$ kHz | | 30 | | | |
| | $f_c + 800$ kHz to $f_c + 17$ MHz | | 30 | | | |
| | $f_c - 80$ MHz to $f_c - 30$ MHz | | 35 | | | |
| | $f_c + 17$ MHz to $f_c + 80$ MHz | 35 | | | | |
| Operating Temperature Range | T_A | 1 | -35 | | +85 | °C |
| Frequency Temperature Coefficient | FTC | 1 | | 0.032 | | ppm/°C ² |
| Impedance Matching to 50Ω Unbalanced | External L-C | | | | | |
| Impedance Matching to 200Ω Balanced | External L-C | | | | | |
| Impedance Matching to 50Ω Input / 400Ω Output | External L-C | | | | | |
| Case Style | SMP9171-10 9.1 x 7.1 mm Nominal Footprint | | | | | |
| Lid Symbolization (YY = year, WW = week) | RFM SF1115A YYWW | | | | | |

Notes:

1. Unless noted otherwise, all specifications apply over the operating temperature range with filter soldered to the specified demonstration board with impedance matching to 50 Ω and measured with 50 Ω network analyzer.
2. Unless noted otherwise, all frequency specifications are referenced to the nominal center frequency, f_c .
3. Rejection is measured as attenuation below the minimum IL point in the passband. Rejection in final user application is dependent on PCB layout and external impedance matching design. See Application Note No. 42 for details.
4. The turnover temperature, T_o , is the temperature of maximum (or turnover) frequency, f_o . The nominal frequency at any case temperature, T_c , may be calculated from: $f = f_o [1 - FTC(T_o - T_c)^2]$.
5. The design, manufacturing process, and specifications of this filter are subject to change.
6. Either Port 1 or Port 2 may be used for either input or output in the design. However, impedances and impedance matching may vary between Port 1 and Port 2, so that the filter must always be installed in one direction per the circuit design.
7. US and international patents may apply.
8. Electrostatic Sensitive Device. Observe precautions for handling.

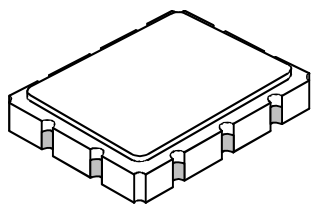
Electrical Connections

| Connection | Terminals |
|-------------------|------------|
| Port 1 Hot | 10 |
| Port 1 Gnd Return | 1 |
| Port 2 Hot | 5 |
| Port 2 Gnd Return | 6 |
| Case Ground | All others |



SM9171-10 Case

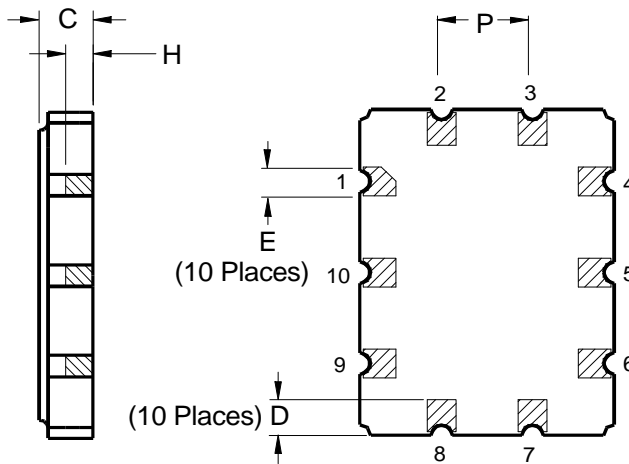
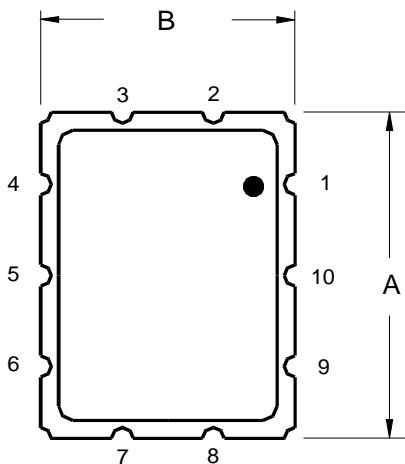
10-Terminal Ceramic Surface-Mount Case 9.1 x 7.1 mm Nominal Footprint

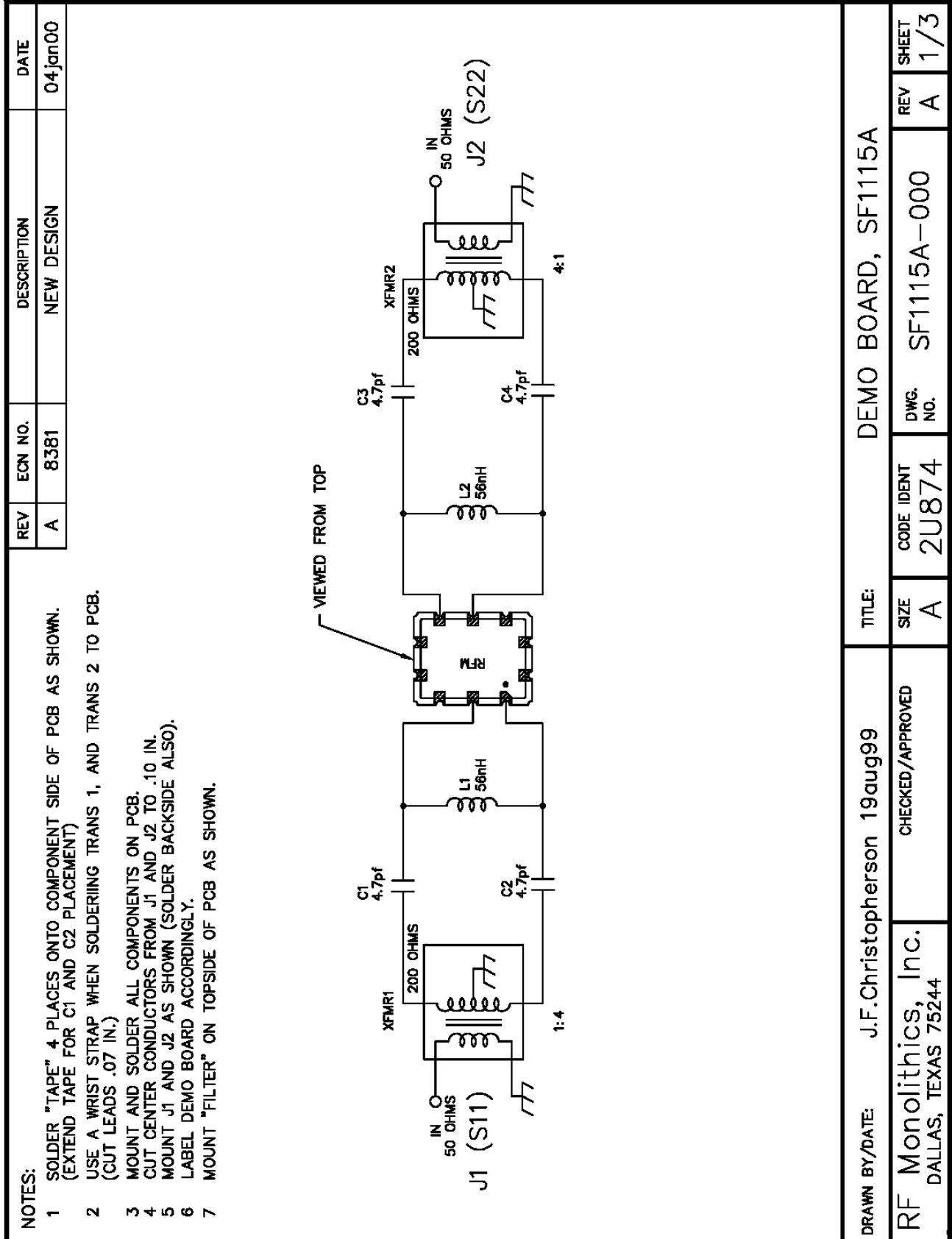


| Case Dimensions | | | | | | |
|-----------------|------|------|------|--------|-------|-------|
| Dimension | mm | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A | 8.86 | 9.09 | 9.40 | 0.349 | 0.358 | 0.370 |
| B | 6.88 | 7.11 | 7.40 | 0.271 | 0.280 | 0.291 |
| C | | 1.91 | 2.00 | | 0.075 | 0.079 |
| D | | 0.99 | | | 0.039 | |
| E | | 0.79 | | | 0.031 | |
| H | | 1.0 | | | 0.039 | |
| P | | 2.54 | | | 0.100 | |

| Materials | |
|------------------------|--|
| Solder Pad Termination | Au plating 30 - 60 μinches (76.2-152 μm) over 80-200 μinches (203-508 μm) Ni. |
| Lid | Fe-Ni-Co Alloy Electroless Nickel Plate (8-11% Phosphorus) 100-200 μinches Thick |
| Body | Al ₂ O ₃ Ceramic |
| Pb Free | |

| Electrical Connections | | |
|------------------------|------------------|------------------|
| Connection | | Terminals |
| Port 1 | Input or Return | 6 |
| | Return or Input | 5 |
| Port 2 | Output or Return | 1 |
| | Return or Output | 10 |
| Ground | | All others |
| Single Ended Operation | | Return is ground |
| Differential Operation | | Return is hot |





DRAWN BY/DATE: J.F.Christopherson 19aug99

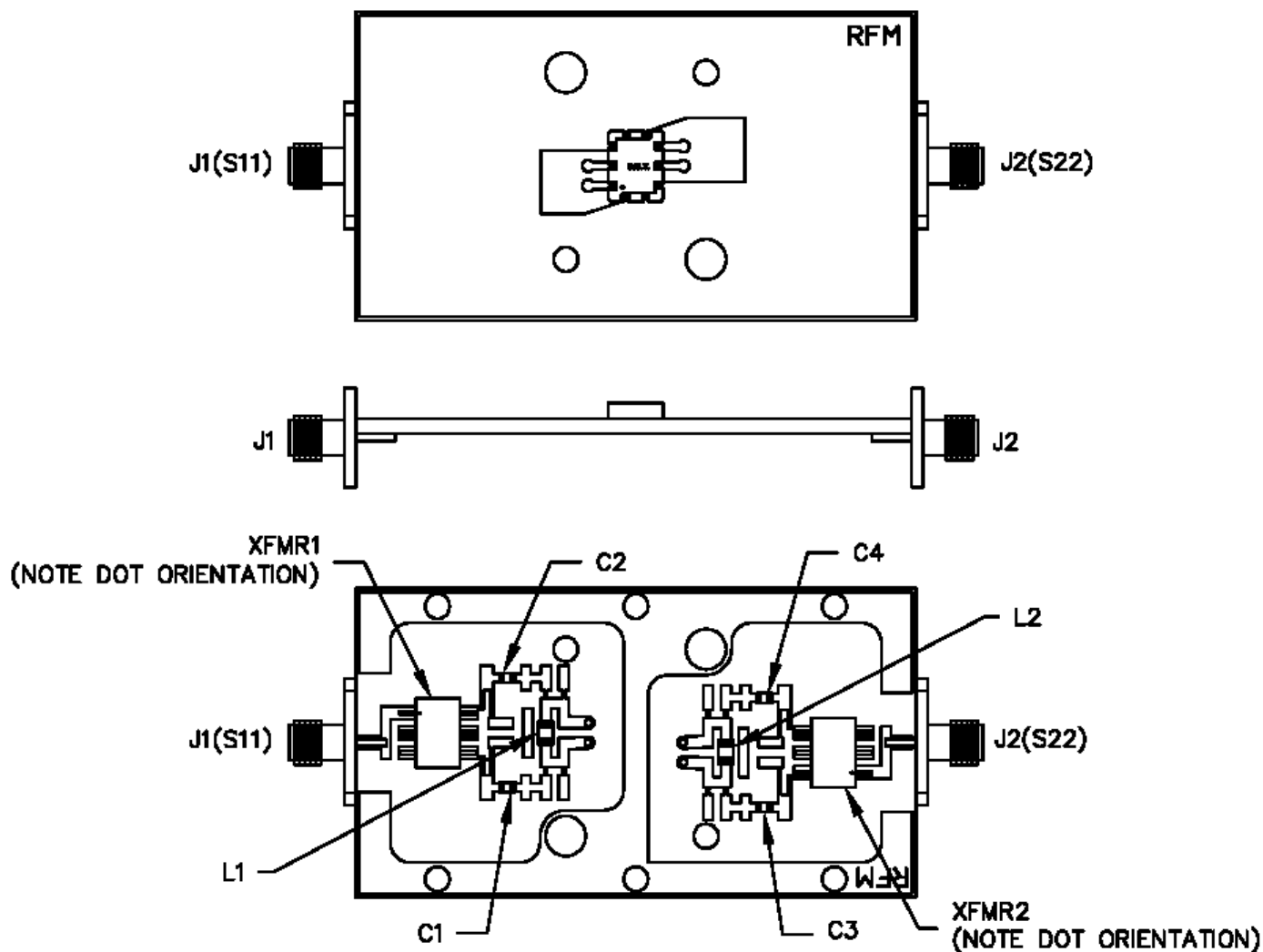
TITLE: DEMO BOARD, SF1115A

RF Monolithics, Inc.
DALLAS, TEXAS 75244

SIZE A
CHECKED/APPROVED

DWG. NO. SF1115A-000

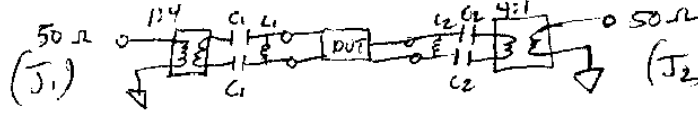
REV A
SHEET 1/3



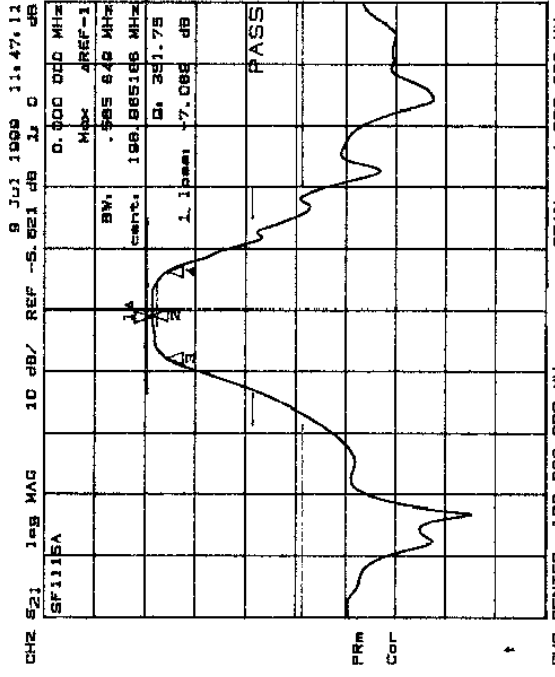
SAW Matching Components

| Reference Designator | Value | Additional Information |
|----------------------|--------|----------------------------------|
| C1 | 4.7 pF | 0805 Presido ± 0.25pF |
| C2 | 4.7 pF | 0805 Presido ± 0.25pF |
| L1 | 270 nH | 1008 Coilcraft Q=65 @ 350MHz 10% |
| L2 | 330 nH | 1008 Coilcraft Q=65 @ 350MHz 10% |
| C3 | 18 pF | 0805 Presido ± 0.25pF |
| C4 | 18 pF | 0805 Presido ± 0.25pF |
| xfmr1 | 1:4 | ADT 4-1UT, 300-600MHz |
| xfmr2 | 4:1 | ADT 4-1UT, 300-600MHz |

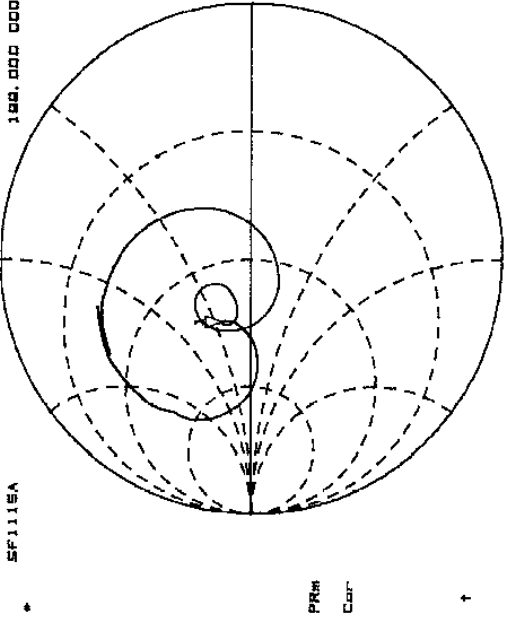
SF1115A-000
 VAFs 94
 Balanced
 Tuned
 tested at SDU
 7-9-99
 New Alum
 Duno.



C62-47pf
 L102-50nH

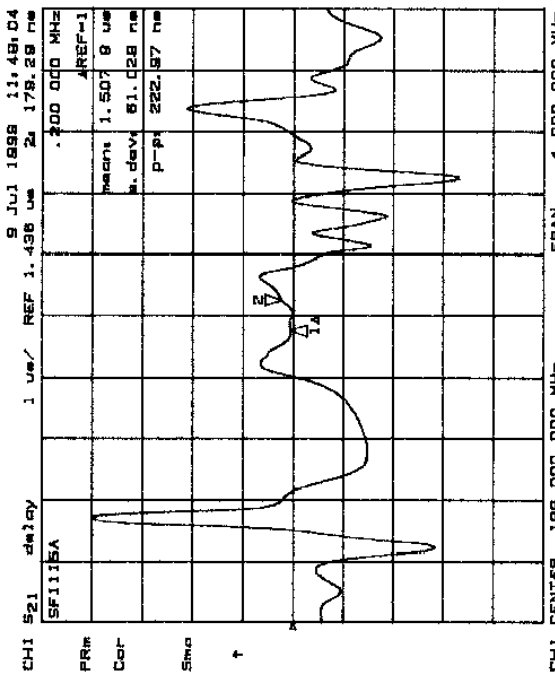


9 Jul 1999 11:47:11
 REF -5.221 dB
 10 dB MAG
 SF1115A
 0.000 000 MHz
 Mhz AREF-1
 BW: .585 848 MHz
 cent: 199.000 000 MHz
 0.351.75
 1.1beam 17.088 dB
 PASS
 CH2 CENTER 199.000 000 MHz
 SPAN 4.000 000 MHz

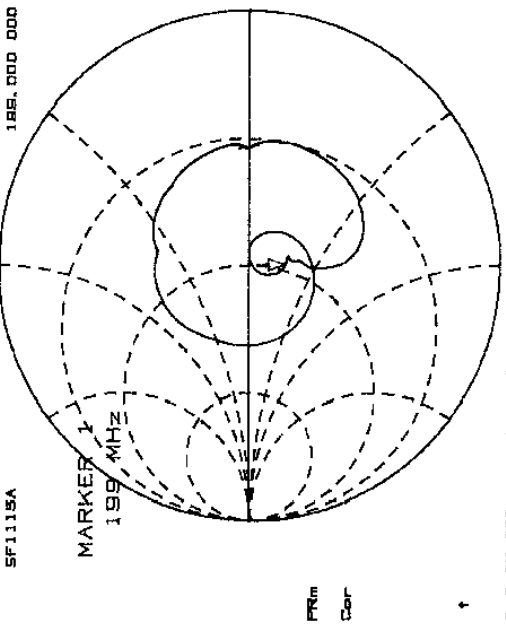


9 Jul 1999 12:21:23
 REF -7.8238 mS
 1 U FS
 SF1115A
 199.000 000 MHz
 SPAN 4.000 000 MHz

SF1115A-000 REV. XI SH.2 p3 of 3

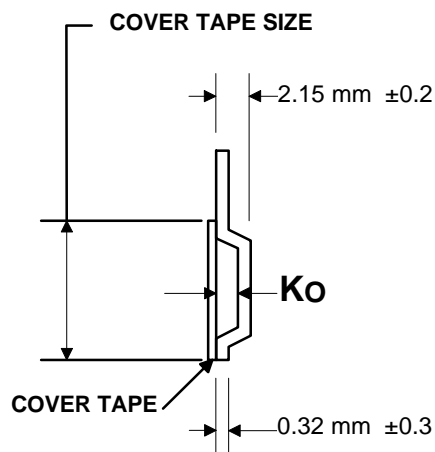
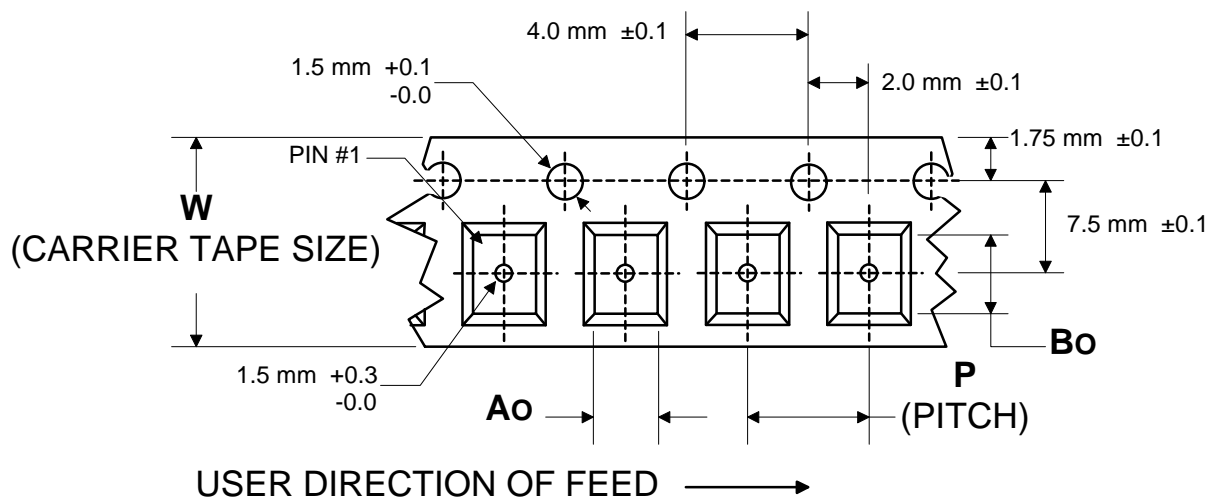


9 Jul 1998 11:48:04
 REF 1.436 ue
 1 ue/
 SF1115A
 .200 000 MHz
 Mhz AREF-1
 BW: 1.507 8 ue
 cent: 199.000 000 MHz
 0.351.75
 1.1beam 17.088 dB
 CH1 CENTER 199.000 000 MHz
 SPAN 4.000 000 MHz



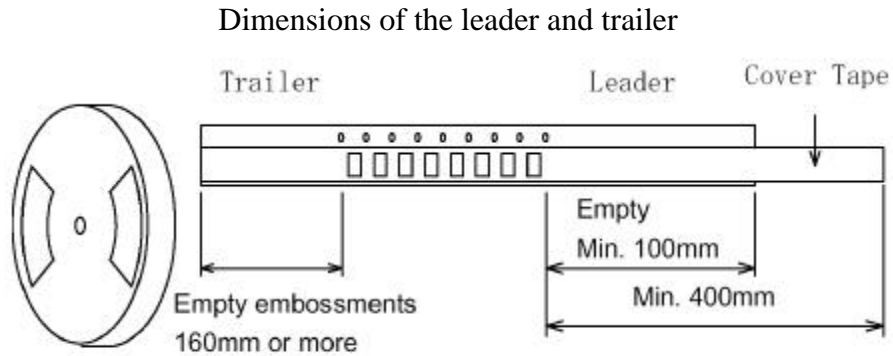
9 Jul 1998 11:50:54
 REF 05.061 mS
 1 U FS
 SF1115A
 199.000 000 MHz
 SPAN 4.000 000 MHz

COMPONENT ORIENTATION and DIMENSIONS



| Carrier Tape Dimensions | | |
|-------------------------|---------|------|
| Ao | 7.55 mm | ±0.1 |
| Bo | 9.59 mm | ±0.1 |
| Ko | 2.30 mm | ±0.1 |
| Pitch | 12.0 mm | ±0.1 |
| W | 16.0 mm | ±0.3 |

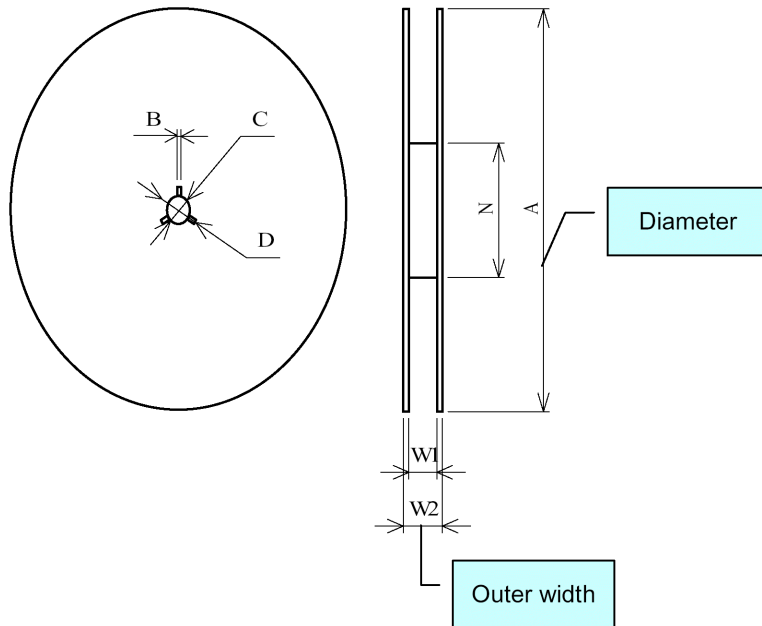
Leader and Trailer specifications (Based upon EIA-481)



| 7 Inch Reel Quantity 500 | | | | | | | | | | | | | | |
|--------------------------|-----|----------|----|----|----|--------------|------|------------|---|------|----------------|----------|----------------|-----|
| Symbol | A | | N | | C | | D | | B | | W ₁ | | W ₂ | |
| Dimension | 178 | +0 -4 | 60 | ±1 | 13 | +0.5 -0.2 | 20.2 | +1.5 -0 | 2 | ±0.5 | 16.4 | +2 -0 | 22.4 | MAX |

| 13 Inch Reel Quantity 2000 | | | | | | | | | | | | | | |
|----------------------------|-----|----------|-----|----|----|--------------|------|------------|---|------|----------------|----------|----------------|-----|
| Symbol | A | | N | | C | | D | | B | | W ₁ | | W ₂ | |
| Dimension | 330 | +0 -4 | 100 | ±2 | 13 | +0.5 -0.2 | 20.2 | +1.5 -0 | 2 | ±0.5 | 16.4 | +2 -0 | 22.4 | MAX |

Dimensional drawing of the reel



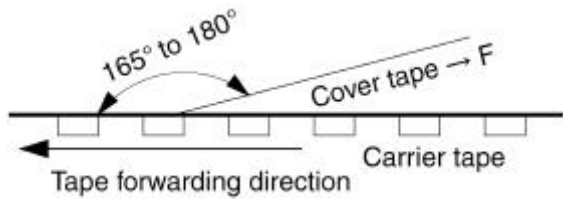
Additional items

(1) Cover tape peeling strength

The cover tape shall be adhered evenly to the carrier tape along both sides in the pulling direction.

The cover tape peeling strength shall be as follows for an angle between the cover tape and the pulling direction of 165° to 180° (see the figure) and a peeling speed of 300mm/min. ± 10 mm/min.

[EIA-481] 0.1N to 1.3N for a tape width of 12 to 56mm



Fixing method

1. Insert the tip of the carrier tape into the groove.
2. Fix the tip of the cover tape with adhesive tape.

Tape material

(1) Carrier tape [anti-charging treatment: carbon used] Surface resistivity: 1×10^8 or less
Material: Polystyrene or Polycarbonate

(2) Cover tape material: Polyester (anti-charging treated) Surface resistivity: 1×10^{12} or less
 $t = 50$ to $100\mu\text{m}$ width = 13.3mm

Warranty periods

Cover tape peeling strength and mounting performance of stored components.

2-1. Cover tape peeling strength: One year after delivery (Peeling strength: 0.1N to 1.3N)

Number of missing components

There shall not be two or more consecutive missing components. Also, the maximum number of missing components shall be the larger of one piece or 0.1%.

Storage environment

Keep the product on which taping has been performed to a temperature below 40°C and a humidity within 80% RH. Do not subject in the direct sun.

Labeling

The following items are labeled on the surface of a reel.
Product Part Number, Date Code, Quantity

Reel labels shall follow the format shown below. The long side of the label must measure between 2.75 and 4.0 inches (68 to 100 mm). The short side of the label must measure between 1.5 and 2 inches (38 to 80 mm). Bar codes must conform to AIAG standard B10.

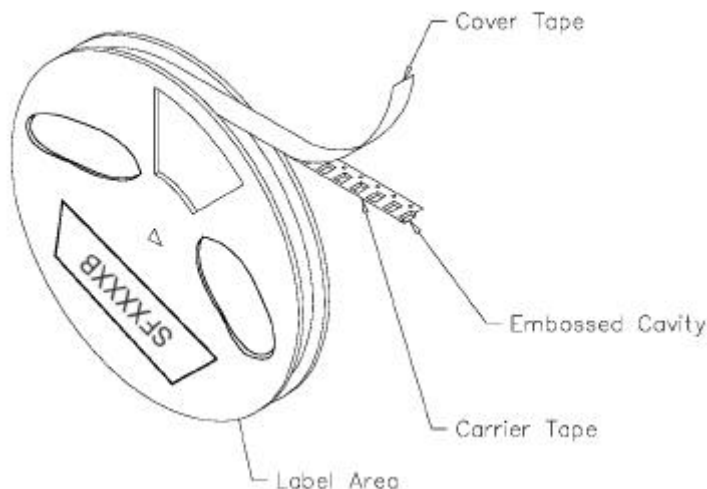
Information that is on the label:

- Device Type: RFM part number
- Code: RFM designated part ID or part date code
- Reel ID: Manufacturing reel identification
- Reel Qty: Quantity of parts on the reel
- Work Order: Manufacturing work order number
- Date: Date product was loaded on tape and reel.
- Company Identification: R. F. Monolithics, Inc.
- *Q. C.: Area for QA stamps, other information is required
- Country of assembly



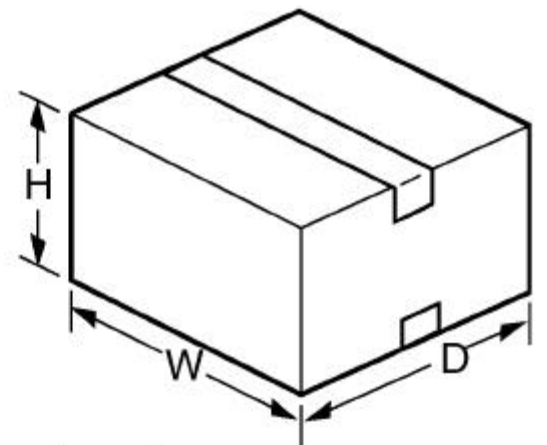
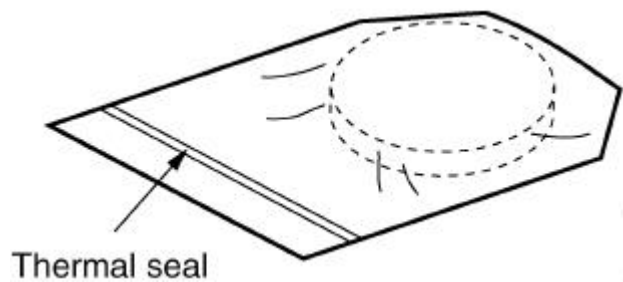
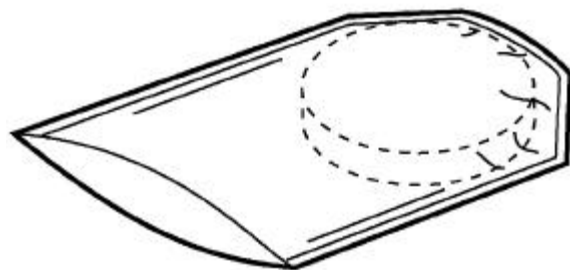
Examples of acceptable reel labels

Location of label on reel is shown below. Reel labels must be placed entirely on plastic, without covering open sections of the reel. Design of reel must satisfy this requirement. Pin #1 must be located on the side opposite the reel label.



Package for Shipment

| | Quantity Per Reel | Number Reels Per Carton | External Carton Dimensions | Reel Weight | Shipping Carton Weight | Total Weight |
|--------------|-------------------|-------------------------|---|-------------|------------------------|--------------|
| 7 Inch Reel | 500 | 4 | 254 x 254 x 127 mm 10 x 10 x 5 inches | 896 g | 448 g | 1344 g |
| | 500 | 10 | 254 x 254 x 203 mm 10 x 10 x 8 inches | 2240 g | 448 g | 2688 g |
| | Quantity Per Reel | Number Reels Per Carton | External Carton Dimensions | Reel Weight | Shipping Carton Weight | Total Weight |
| 13 Inch Reel | 2000 | 2 | 356 x 356 x 102 mm 14 x 14 x 4 inches | 1288 g | 448 g | 1736 g |
| | 2000 | 4 | 356 x 356 x 178 mm 14 x 14 x 7 inches | 2576 g | 448 g | 3024 g |
| | 2000 | 8 | 356 x 356 x 356 mm 14 x 14 x 14 inches | 5152 g | 448 g | 5600 g |



Shipment package

Sealing tape

| RFM Qualification and Reliability Test | | | | |
|--|-------------------------------------|---|--|---|
| Test | | Standard | Test Parameters | Pass / Fail Criteria |
| 1 | Life at Elevated Temperature | MIL-STD-202 Method 108 Condition C | 1,000 Hours 125°C Unbiased | Within Electrical & Hermetic Spec. (Note 1) |
| 2 | Temperature Cycling | JESD22 Method JA-104 Air-to-Air | -55 xCto +125 xC 20 min. Dwell 1,000 cycles | |
| 3 | Vibration, Variable Frequency | MIL-STD-883 Method 2007 Condition B | 50g Max. 4 Cycles, 3 Axis 20 Hz to 2 kHz to 20 Hz | |
| 4 | Mechanical Shock | MIL-STD-883 Method 2002 Condition B | 1,500g Max. 5 Shocks ±3 Axis | |
| 5 | Destructive Bond Strength | MIL-STD-883 Method 2011 Condition C | Wire Bond Pull Strength | 2.0 grams (After Seal) |
| 6 | Die Shear Strength | MIL-STD-883 Method 2019 | Shear Strength | 0.6 kg (Strength/area limit in development) |
| 7 | Solderability (Note 2) | J-STD-002 Method B | 8 hr. steam age 245 x C solder temperature 5 second dwell | >95% wetted surface |
| 8 | Physical Dimensions | JESD22 Method JB-100 | Critical Dimensions | Within specifications |
| 9 | Temperature Characteristics | RFM Procedure | Frequency over Temperature | Within specifications |
| 10 | Terminal Strength (Note 2) | MIL-STD-833 Method 2004 Condition A & D | Cond. A-Lead Tension Cond. B -Pad Adhesionr 24 | 8 oz. - 30 sec. Visual Requirements & meets Hermetic Spec. |
| 11 | Resistance to Solvents | MIL-STD-883 Method 2015 | Solvents a, b, d | Visual Requirements |
| 12 | Steady State Life | MIL-STD-883 Method 1005 | 1,000 Hours Max. Operating Temperature Rated Voltage | Within Electrical & Hermetic Spec. (Note 1) |
| 13 | Internal Water-Vapor Content | MIL-STD-883 Method 1018 | | < 5,001 PPM |
| 14 | Constant Acceleration | MIL-STD-883 Method 2001 Y1 Direction | 30,000g | Within Electrical & Hermetic Spec. (Note 1) |
| 15 | Substrate Attach Strength | MIL-STD-883 Method 2027 | Tensile Strength of Die Attachment | Custom per Device |