



RF Transformer

TC1-1T-152X+

50 Ω 5 to 1500 MHz Ratio 1:1

THE BIG DEAL

- Super wideband, 5 to 1500 MHz
- Low insertion loss, 1.5 dB typ., 5 to 1500 MHz
- Amplitude unbalance, ±0.2 dB typ.
- Good input return loss, 14 dB typ., 5 to 1500 MHz
- Low phase unbalance, ±1.5° typ.
- Common mode rejection, 30 dB typ. 1000 MHz



Generic photo used for illustration purposes only

CASE STYLE: AT1521

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our website for methodologies and qualifications

APPLICATIONS

- VHF/UHF transmitters
- Cellular
- GPS
- Communication

PRODUCT OVERVIEW

Mini-Circuits' TC1-1T-152X+ is a surface-mount transmission line transformer (with bias center tap) covering a very wide frequency range from 5 to 1500 MHz. The transformer provides low insertion loss with excellent phase and amplitude performance. Featuring core and wire construction on a 5-lead unit measures 0.15 x 0.15 x 0.16 inch.

KEY FEATURES

| Feature | Advantages |
|------------------------------------|--|
| Wideband, 5 to 1500 MHz | Super wide frequency range covers bandwidth requirements for many broadband applications. |
| Low insertion loss, 1.5 dB typ. | This unit provides excellent signal transmission from input to output with consistent performance across its entire frequency range. |
| Good Phase and Amplitude Unbalance | Provides good CMRR. |
| DC current 200 mA | Supply DC current from center tap. |



BALANCED TO UNBALANCED



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ELECTRICAL SPECIFICATIONS AT +25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Units |
|-----------------------|-----------------|------|------|------|--------|
| Impedance Ratio | | | 1 | | |
| Frequency Range | | 5 | — | 1500 | MHz |
| Insertion Loss* | 5-870 | — | 1.0 | 1.6 | dB |
| | 870-1000 | — | 1.2 | 1.7 | |
| | 1000-1500 | — | 1.8 | 2.5 | |
| Amplitude Unbalance | 5-870 | — | 0.1 | 0.7 | dB |
| | 870-1000 | — | 0.3 | 0.9 | |
| | 1000-1500 | — | 0.5 | 1.8 | |
| Phase Unbalance | 5-870 | — | 1.0 | 6 | Degree |
| | 870-1000 | — | 2.0 | 8 | |
| | 1000-1500 | — | 3.0 | 10 | |
| Common mode rejection | 5-1000 | 22 | 33 | — | dB |
| | 1000-1500 | 20 | 28 | — | |
| Input Return Loss | 5-870 | — | 15 | — | dB |
| | 870-1000 | — | 12 | — | |

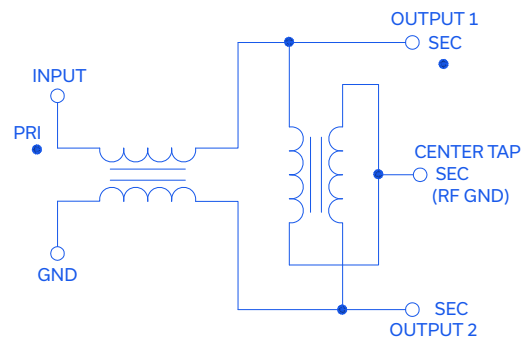
* Insertion Loss is referenced to mid-band loss, 0.7 dB typ.

MAXIMUM RATINGS

| Parameter | Ratings |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power | 0.5W |
| DC Current | 200mA |

Permanent damage may occur if any of these limits are exceeded.

CONFIGURATION M1





BALANCED TO UNBALANCED



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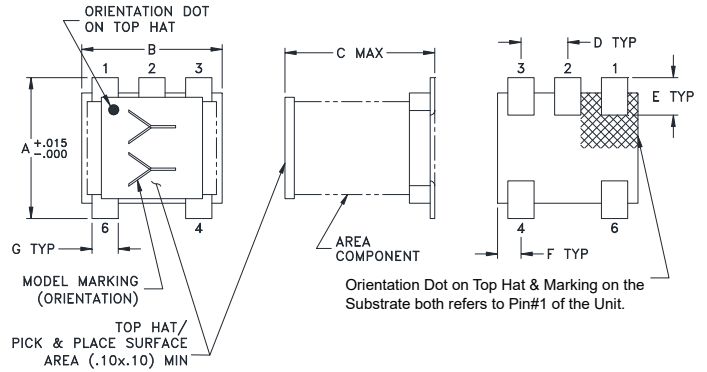
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PIN CONNECTIONS

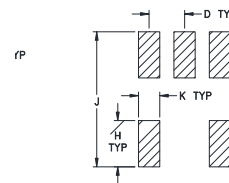
| | |
|---------------|---|
| PRIMARY DOT | 6 |
| PRIMARY | 4 |
| SECONDARY DOT | 1 |
| SECONDARY | 3 |
| SECONDARY CT | 2 |

OUTLINE DRAWING



Top-hat total thickness: .013 inches MAX.

PCB Land Pattern



Suggested Layout,
Tolerance to be within ± 0.002

PRODUCT MARKING: WH

OUTLINE DIMENSIONS (Inch mm)

| A | B | C | D | E | F | G | H | J | K |
|------|------|------|------|------|------|------|------|------|------|
| .150 | .150 | .160 | .050 | .040 | .025 | .028 | .065 | .190 | .030 |
| 3.81 | 3.81 | 4.06 | 1.27 | 1.02 | 0.64 | 0.71 | 1.65 | 4.83 | 0.76 |

Weight: 0.15 grams

TAPE & REEL INFORMATION: F17





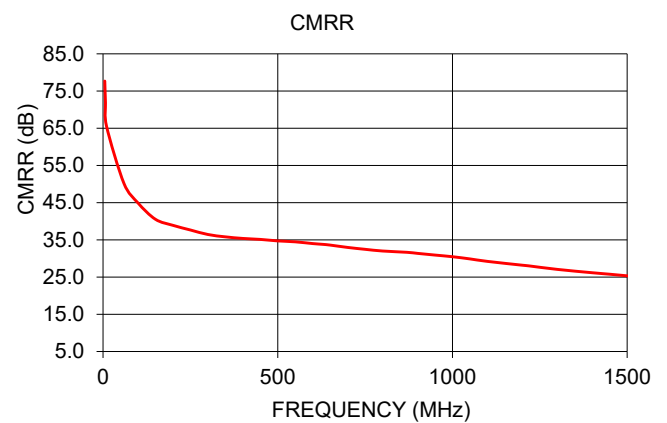
RF Transformer

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TYPICAL PERFORMANCE DATA AT 25°C

| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) | Amplitude Unbalance (dB) | Phase Unbalance (deg) | CMRR (dB) |
|-----------------|---------------------|------------------|--------------------------|-----------------------|-----------|
| 5 | 0.79 | 21.59 | 0.00 | 0.00 | 77.68 |
| 10 | 0.71 | 24.37 | 0.00 | 0.06 | 65.55 |
| 100 | 0.73 | 24.80 | 0.02 | 0.64 | 44.93 |
| 200 | 0.77 | 21.92 | 0.05 | 1.25 | 38.91 |
| 400 | 0.87 | 17.73 | 0.11 | 1.80 | 35.39 |
| 600 | 0.98 | 15.25 | 0.04 | 2.27 | 34.01 |
| 800 | 1.14 | 13.56 | 0.05 | 2.86 | 32.01 |
| 1000 | 1.32 | 12.43 | 0.24 | 3.05 | 30.47 |
| 1200 | 1.54 | 11.48 | 0.47 | 3.23 | 28.19 |
| 1400 | 1.79 | 10.65 | 0.70 | 3.24 | 26.17 |
| 1500 | 1.92 | 10.27 | 0.81 | 3.16 | 25.34 |



- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
 - B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
 - C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard. Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

RF Transformer

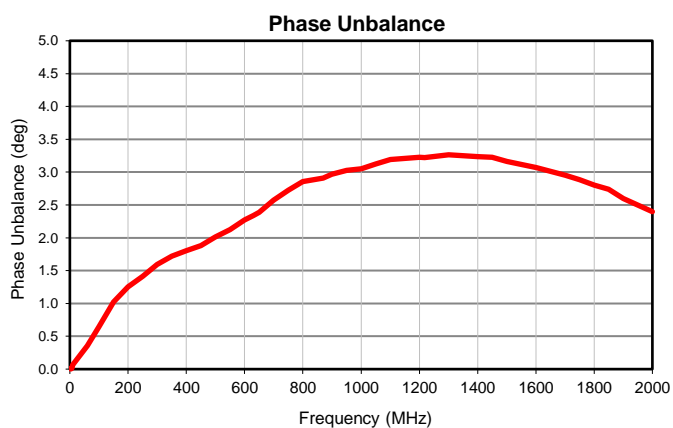
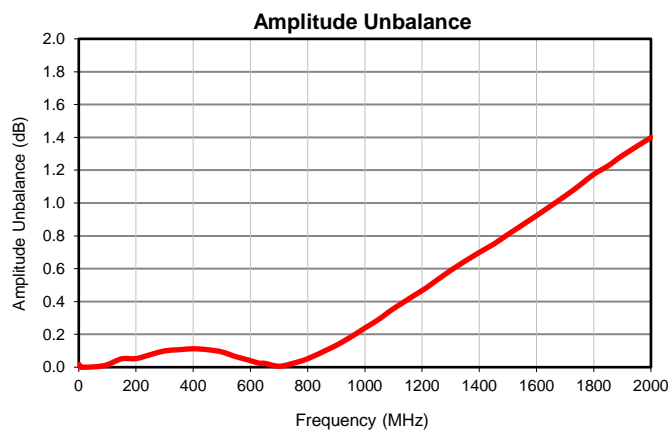
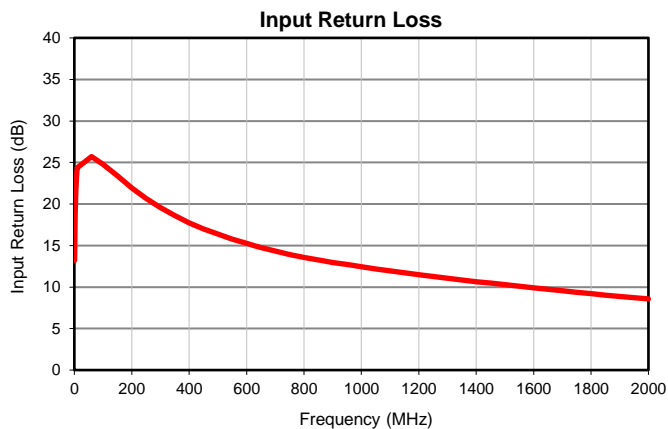
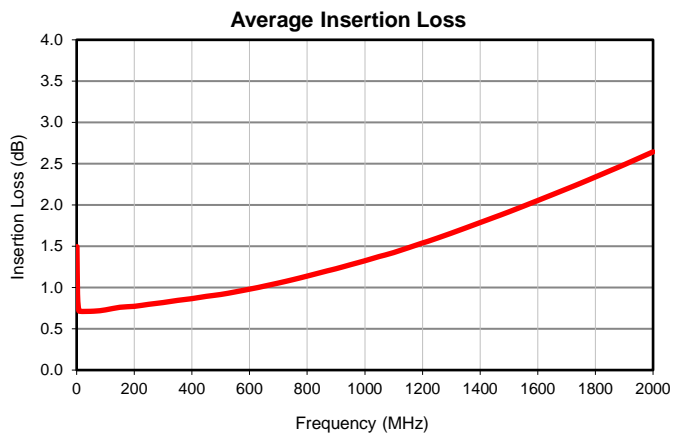
TC1-1T-152X+

Typical Performance Data

| FREQUENCY (MHz) | AVERAGE INSERTION LOSS (dB) | INPUT RETURN LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE (deg.) |
|-----------------|-----------------------------|------------------------|--------------------------|------------------------|
| 1 | 1.49 | 13.23 | 0.02 | 0.01 |
| 3 | 0.92 | 19.01 | 0.00 | 0.00 |
| 5 | 0.79 | 21.59 | 0.00 | 0.00 |
| 7 | 0.74 | 23.07 | 0.00 | 0.01 |
| 10 | 0.71 | 24.37 | 0.00 | 0.06 |
| 60 | 0.71 | 25.71 | 0.00 | 0.36 |
| 100 | 0.73 | 24.80 | 0.02 | 0.64 |
| 150 | 0.76 | 23.39 | 0.05 | 1.02 |
| 200 | 0.77 | 21.92 | 0.05 | 1.25 |
| 250 | 0.80 | 20.66 | 0.08 | 1.41 |
| 300 | 0.82 | 19.56 | 0.10 | 1.60 |
| 350 | 0.84 | 18.59 | 0.11 | 1.72 |
| 400 | 0.87 | 17.73 | 0.11 | 1.80 |
| 450 | 0.89 | 17.01 | 0.11 | 1.88 |
| 500 | 0.92 | 16.37 | 0.09 | 2.01 |
| 550 | 0.95 | 15.77 | 0.06 | 2.12 |
| 600 | 0.98 | 15.25 | 0.04 | 2.27 |
| 630 | 1.00 | 14.95 | 0.02 | 2.34 |
| 650 | 1.02 | 14.75 | 0.02 | 2.39 |
| 700 | 1.05 | 14.32 | 0.01 | 2.57 |
| 750 | 1.10 | 13.93 | 0.02 | 2.72 |
| 800 | 1.14 | 13.56 | 0.05 | 2.86 |
| 870 | 1.20 | 13.13 | 0.11 | 2.91 |
| 900 | 1.23 | 12.95 | 0.13 | 2.97 |
| 950 | 1.28 | 12.70 | 0.18 | 3.03 |
| 1000 | 1.32 | 12.43 | 0.24 | 3.05 |
| 1050 | 1.38 | 12.18 | 0.29 | 3.12 |
| 1100 | 1.42 | 11.94 | 0.36 | 3.19 |
| 1200 | 1.54 | 11.48 | 0.47 | 3.23 |
| 1218 | 1.56 | 11.40 | 0.49 | 3.22 |
| 1300 | 1.66 | 11.07 | 0.59 | 3.26 |
| 1400 | 1.79 | 10.65 | 0.70 | 3.24 |
| 1450 | 1.85 | 10.46 | 0.75 | 3.22 |
| 1500 | 1.92 | 10.27 | 0.81 | 3.16 |
| 1600 | 2.05 | 9.90 | 0.92 | 3.07 |
| 1700 | 2.19 | 9.55 | 1.04 | 2.95 |
| 1750 | 2.27 | 9.37 | 1.11 | 2.89 |
| 1800 | 2.34 | 9.20 | 1.17 | 2.80 |
| 1850 | 2.41 | 9.03 | 1.23 | 2.74 |
| 1900 | 2.49 | 8.87 | 1.29 | 2.60 |
| 2000 | 2.64 | 8.57 | 1.40 | 2.40 |

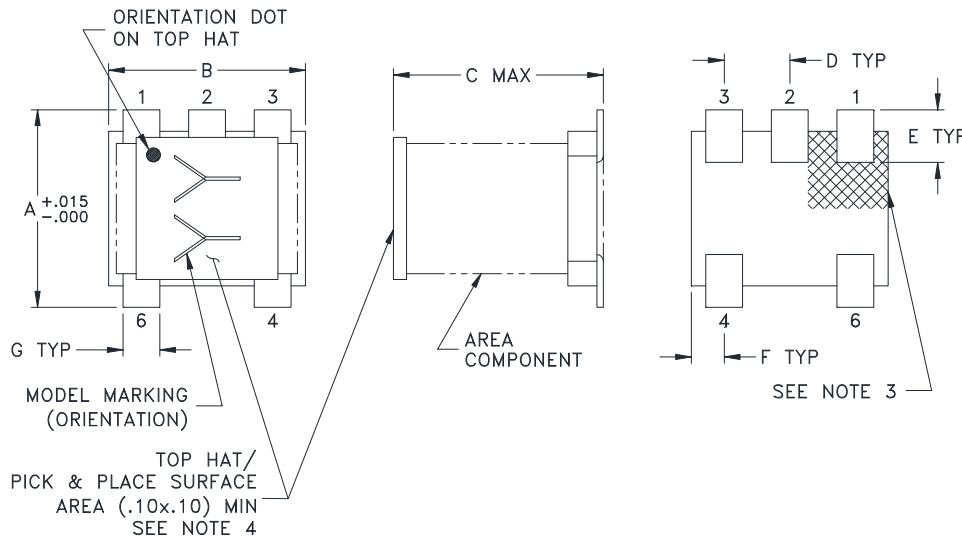


Typical Performance Data

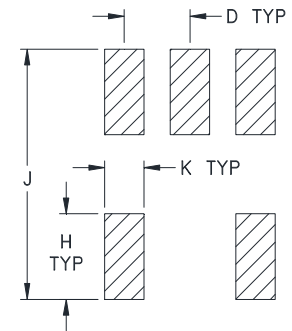


Outline Dimensions

AT1521



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

| CASE # | A | B | C | D | E | F | G | H | J | K | WT. GRAMS |
|--------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|----------------|----------------|---------------|-----------|
| AT1521 | .150 (3.81) | .150 (3.81) | .160 (4.06) | .050 (1.27) | .040 (1.02) | .025 (.64) | .028 (.71) | .065 (1.65) | .190 (4.83) | .030 (.76) | .15 |

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

1. Case material: Plastic.
2. Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
3. Orientation Dot on Top Hat & Marking on the Substrate both refers to Pin #1 of the Unit.
4. Top-Hat total thickness: .013 inches MAX.



P.O. Box 350186, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

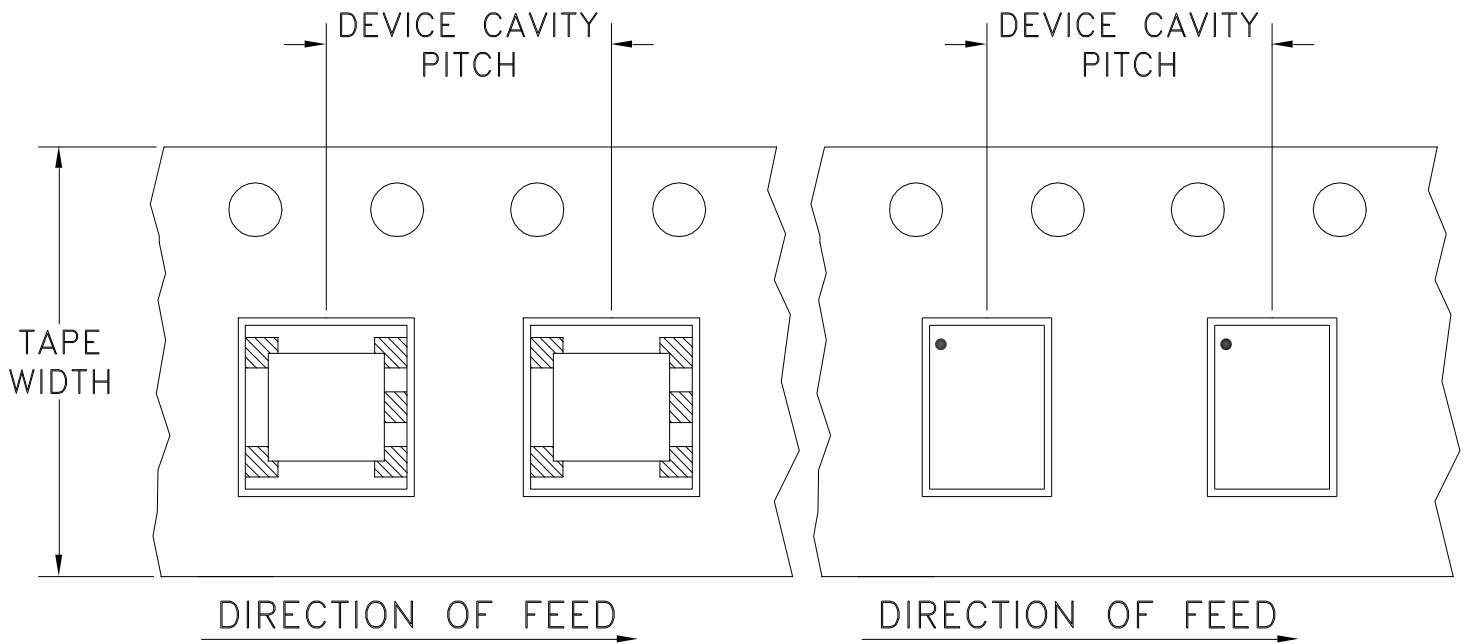


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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F17

DEVICE ORIENTATION IN T&R



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel | |
|----------------|-------------------------|-------------------|-------------------------------------|------|
| 12 | 8 | 7 | Small quantity standards (see note) | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | 13 | Standard | 1000 |
| 2000 | | | | |

Note: Please Consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



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RF/IF MICROWAVE COMPONENTS



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification | Test/Inspection Condition | Reference/Spec |
|--------------------------------|---|--|
| Operating Temperature | -40° to 85°C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| Humidity | 90 to 95% RH, 240 hours, 50°C | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1 |
| Solderability | 10X Magnification | J-STD-002, 95% Coverage |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36) | MIL-STD-202, Method 204, Condition D |
| Mechanical Shock | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215 |