MICROWAVE AND MILLIMETER-WAVE CONVERSION PRODUCTS

Quality Assurance

• MIXERS
• IMAGE REJECTION MIXERS
• MODULATORS
• MULTIPLIERS
• CUSTOM PRODUCTS
QUALITY ASSURANCE

MITEQ believes that quality must be built into all of the products that we manufacture. As such, we take extreme care in maintaining a complete and detailed product assurance program. Our product quality is structured to and operates within the precepts of ISO 9001 and to MIL-I-45208. This, in turn, allows us to meet the rigorous requirements generated by our customers in the aerospace, military, and commercial sectors. Internal procedures are used to relate all functions affecting quality, from initial design through final acceptance. These procedures detail the responsibilities and functions necessary to maintain effective controls and to provide a means for evaluating quality disciplines during all phases of a job’s performance.

Beginning with the audit of the customer’s contract, our Quality Assurance Department will review and evaluate the contract and all of the specifications applicable to the job. Quality requirements and characteristics are highlighted and adequate plans are implemented to ensure the incorporation of all aspects pertaining to overall product quality. Quality assurance activities will be coordinated with engineering, manufacturing, and procurement during all phases of an order to ensure the transmittal of complete quality information to all manufacturing centers and inspection stations in a manner consistent with schedule requirements.

MITEQ, through our Quality Assurance and Purchasing Departments, is responsible for the quality of all purchased items. Procurement sources will be selected and approved, based upon the supplier’s quality history records, facility and quality system surveys, or coordinated industry records. Approved sources will be required to maintain a quality program that is commensurate with the requirements of the items being purchased and in compliance with the contract.

Copies of MITEQ’s Quality Manual and Workmanship Standard, that define the methods used for both quality and process control, are available upon request.

TEST EQUIPMENT

MITEQ maintains a complete inventory of the latest state-of-the-art mechanical, electrical, and manufacturing test equipment. Equipment calibration and maintenance is performed and is traceable to the requirements of MIL-STD-45662A.
For the past 35 years, MITEQ has supplied thousands of different models of microwave mixers to the industry. Reliability calculations have been performed in accordance with MIL-HDBK-217F for ground benign equipment at 25°C. From these calculations MITEQ has concluded that these mixers are extremely reliable.

<table>
<thead>
<tr>
<th>Model Series</th>
<th>Description</th>
<th>Environment</th>
<th>Temperature</th>
<th>TYP. MTBF</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB</td>
<td>Double-Balance Mixer</td>
<td>Ground Fixed (GF_F)</td>
<td>+40 deg C</td>
<td>4,700,000 HRS.</td>
</tr>
<tr>
<td>DM</td>
<td>Double-Balance Mixer</td>
<td>Ground Fixed (GF_F)</td>
<td>+40 deg C</td>
<td>4,200,000 HRS</td>
</tr>
<tr>
<td>TB</td>
<td>Triple-Balance Mixer</td>
<td>Ground Fixed (GF_F)</td>
<td>+40 deg C</td>
<td>4,775,000 HRS.</td>
</tr>
<tr>
<td>IR</td>
<td>Image Reject Mixer</td>
<td>Ground Fixed (GF_F)</td>
<td>+40 deg C</td>
<td>2,005,550 HRS.</td>
</tr>
<tr>
<td>SSM</td>
<td>Single-Sideband Modulator</td>
<td>Ground Fixed (GF_F)</td>
<td>+40 deg C</td>
<td>2,005,550 HRS.</td>
</tr>
<tr>
<td>SDM</td>
<td>QPSK Modulator</td>
<td>Ground Fixed (GF_F)</td>
<td>+40 deg C</td>
<td>2,005,550 HRS.</td>
</tr>
<tr>
<td>DB</td>
<td>Double-Balance Mixer</td>
<td>Airborne Uninhabited Fighter (A_UF)</td>
<td>+85 deg C</td>
<td>400,000 HRS.</td>
</tr>
<tr>
<td>DM</td>
<td>Double-Balance Mixer</td>
<td>Airborne Uninhabited Fighter (A_UF)</td>
<td>+85 deg C</td>
<td>370,000 HRS.</td>
</tr>
<tr>
<td>TB</td>
<td>Triple-Balance Mixer</td>
<td>Airborne Uninhabited Fighter (A_UF)</td>
<td>+85 deg C</td>
<td>420,000 HRS.</td>
</tr>
<tr>
<td>IR</td>
<td>Image Reject Mixer</td>
<td>Airborne Uninhabited Fighter (A_UF)</td>
<td>+85 deg C</td>
<td>175,000 HRS.</td>
</tr>
<tr>
<td>SSM</td>
<td>Single-Sideband Modulator</td>
<td>Airborne Uninhabited Fighter (A_UF)</td>
<td>+85 deg C</td>
<td>175,000 HRS.</td>
</tr>
<tr>
<td>SDM</td>
<td>QPSK</td>
<td>Airborne Uninhabited Fighter (A_UF)</td>
<td>+85 deg C</td>
<td>175,000 HRS.</td>
</tr>
</tbody>
</table>
The following diagrams depict the process flow for both our commercial and high-reliability mixers:

**COMMERCIAL GRADE MIXERS**

1. PURCHASE OR MANUFACTURE PARTS
2. INSPECT PARTS
3. INVENTORY
4. KIT PARTS
5. CLEAN CHASSIS AND SUBSTRATES
6. ATTACH SUBSTRATES TO HOUSING
7. MARK HOUSING
8. SOLVENT CLEAN HOUSING
9. INSPECT SUBSTRATE ATTACHMENT
10. ATTACH COMPONENTS
11. CLEAN
12. ELECTRICAL ALIGNMENT & PRELIMINARY TEST DATA
13. PRE-CAP INSPECTION
14. SEAL MODULES
15. FINAL ELECTRICAL TEST @ 25°C
16. ASSEMBLE DATA PACKAGE REQUIRED FOR SHIPMENT
17. EXTERNAL VISUAL INSPECTION
18. FINAL INSPECTION DATA VERIFICATION
19. PREPARATION FOR DELIVERY (PACKAGING)
20. SHIPMENT TO CUSTOMER

**HIGH RELIABILITY HERMETICALLY SEALED MIXERS**

1. PURCHASE OR MANUFACTURE PARTS
2. INSPECT PARTS
3. INVENTORY
4. INSPECT PARTS, KIT & ELEMENT EVALUATION DOCUMENTATION
5. CLEAN HOUSING AND SUBSTRATES
6. ATTACH SUBSTRATES TO KOVAR CHASSIS
7. LASER MARK HOUSING (SERIAL NUMBER)
8. SOLVENT CLEAN HOUSING
9. INSPECT SUBSTRATE ATTACHMENT
10. ATTACH COMPONENTS
11. CLEAN UNIT
12. INSPECT COMPONENT ATTACHMENT
13. INSPECT WIRING
14. ELECTRICAL ALIGNMENT & PRELIMINARY TEST DATA
15. PRE-CAP INSPECTION
16. DEVICE SCREENING
17. FINAL ELECTRICAL TEST @ 20°C MINIMUM, OPTIONAL AT TEMP EXTREME
18. ASSEMBLE DATA PACKAGE REQUIRED FOR SHIPMENT
19. EXTERNAL VISUAL INSPECTION
20. FINAL INSPECTION DATA VERIFICATION
21. PREPARATION FOR DELIVERY (PACKAGING)
22. SHIPMENT TO CUSTOMER

**LEGEND**

- **Manufacturing Process**
- **Quality Control Function**
- **Test Function**

**MITEQ PROCESS**

- 116076
- 120897

**OTHER REQUIREMENTS**

- FOR MIL-PRF-38534 CLASS K RADIOPHRACTIC INSPECTION REQUIRED ALSO
- FOR MIL-PRF-38534 CLASS K 100% WIRE BOND PULL REQUIRED
- IF REQUIRED BY CONTRACT
MITEQ maintains an assortment of its own environmental testing equipment to further ensure product quality and facilitate the testing of our products. Our environmental lab is capable of testing the following:

- Mechanical shock
- Vibration
- Burn-in
- Temperature cycling
- Thermal shock
- Gross leak
- Fine leak

The optional device screening shown here is as per MIL-PRF-38534E Table C-1X Class H and MITEQ Traveler.

### GENERAL SPECIFICATIONS

MITEQ's standard mixers have been designed to meet the following environmental conditions:

- Operating temperature: -54 to +85°C
- Storage temperature: -65 to +125°C
- Humidity: 95% relative humidity, noncondensing

Vibration: 7 g’s rms, 50-5000 CPS, per MIL-STD-810B, Method 514, Procedure 5

Data curves are at 25°C. There will be some variation in the typical data shown as a function of temperature