Title: 10.0 MHz-SC Space Crystal Oscillator

P/N: 500-19933
Rev: A
Date: 04-24-14
Drawn: REF: OCXO-1

Tolerances: (except as noted) Dimensions are in inches
0.XX Dec: ±0.030"
0.XXX Dec: ±0.010"
FSCM: 62821

1. Item 1: PART NUMBER MP-628-317, METAL PROCESSING CO., INC.
   (FSCM 04046).

2. Item 2: PART NUMBER 212-5115F, SOUTHWEST MICROWAVE (FSCM 66049).

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Austin, Texas

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### GENERAL REQUIREMENTS

- **Material, Design and Construction**: MIL-PRF-55310
- **Parts and Materials List**: EEE-INST-002, JANTX Semiconductors, ER passives and 883B ICs, when available.
- **Crystal**: 10 MHz, premium Q, Z-swept, synthetic quartz
- **Outgassing**: TML<1% and CVCM <0.1% per SP-R-002A
- **Traceability**: Semiconductor and passive lot and date code tracking
- **De-rating**: per EEE-INST-002, (JPL-D-8545, alternative)
- **Soldering**: J-STD-001 class 3
- **Case**: Nickel-plated aluminum housing
- **Finish**: Electroless nickel per MIL-C-26074

### ELECTRICAL PERFORMANCE

- **RF Output Frequency**: 10 MHz, sine wave
- **Frequency Accuracy (initial)**: ±2 x 10⁻⁷ at +25°C
- **Frequency Stability**: ±5 x 10⁻⁸ for -10°C to +50°C (ref +25°C)
- **Aging Rate (after 90 days operating)**
  - 1 day: ±5 x 10⁻¹⁰
  - 1 month: ±5 x 10⁻⁹
- **RF Output Power**: +13 dBm ±1.5 dB into 50Ω
- **RF Output 2nd Harmonic**: -30 dBc
- **RF Output Sub-harmonics**: ≤-40 dBc
- **RF Output Spurious**: ≤-100 dBc, 100 KHz to 1 GHz
- **Phase Noise (Static)**:
  - 10 MHz
  - 1 Hz: -100 dBc/Hz
  - 10 Hz: -130 dBc/Hz
  - 100 Hz: -150 dBc/Hz
  - 1 KHz: -155 dBc/Hz
  - 10 KHz: -155 dBc/Hz
- **Supply voltage**: ±15 VDC ±5%
- **Warm-up power**: ≤5 watts
- **Warm-up time**: ≤20 minutes at ambient pressure ≤5 x 10⁻⁵ torr
- **Input power**: ≤2.5 watts steady state at ambient pressure ≤5 x 10⁻⁵ torr

### ENVIRONMENTAL CONDITIONS

- **Operating temperature**: -10°C to +50°C
- **Storage temperature**: -40°C to +105°C
- **Ambient pressure**: Atmospheric (760 torr), Vacuum (≤5 x 10⁻⁵ torr)

### MECHANICAL SPECIFICATIONS

- **Size**: 2.25” x 2.25” x 1.0” (57.1 x 57.1 x 25.4 mm)
- **Weight**: ≤300 grams
- **Physical**: Pressure relief holes

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**Model Definitions**

**EM (Engineering Model)**
- Design and Construction similar in appearance and identical in form, fit, and function to FM. Developed using best commercial practice, including some commercial parts and materials. EM shall be subjected only to electrical tests, with some environmental testing performed.

**FM (Flight Model)**
- Fabricated to meet all design, construction, and test requirements reference MIL-PRF-55310, Class 1, Product level S. FM shall be subjected to the entire compliment of electrical and environmental acceptance tests listed.
  - Flight Model Space Level, Parts EEE-INST-002, Level 1,2,3
  - MIL-PRF-3098 Level 2 Crystals, Tested to Table 2, Qual Table 3 by similarity
  - MIL-PRF-19500 / MIL-STD-750 Semiconductors, JANTXV with PIN D, JANTX with PIN D and DPA (5 ea)

**Qualification Testing**
- For (1) sample unit, when specified

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Austin, Texas

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**Tolerances (except as noted)**

- **Dimensions are in inches**: 0.XX Dec: ±0.030", 0.XXX Dec: ±0.010", FSCM: 62821
QUALIFICATION TESTS (Non-flight model, only)

Group I (1 samples)  Visual, Electrical Tests*
Burn-in (operational) 240 hours minimum at +50°C
Group II (1 samples)
Aging 30 Days

Group III Subgroup 1 (1 sample)
Random Vibration 11.95 Grms, MIL-STD-202, method 214 I-D, 50 to 2000 Hz, 5 min per axis

Group III Subgroup 2 (1 sample)
Ambient Pressure MIL-STD-202, Method 105, at <5 x 10⁻⁶ torr

Group III Subgroup 3 (1 sample)
Resistance to Soldering Heat MIL-STD-202, Method 210, Condition A

Group III Subgroup 4 (1 sample)
Terminal Strength MIL-STD-202, Method 211, Condition C, Not applicable for pins <0.25"
Solderability MIL-STD-202, Method 208
Resistance to Solvents MIL-STD-202, Method 209
Not applicable when marking is electro-etched

Electrical Tests*
Radiographics MIL-STD-202, method 209

ACCEPTANCE TESTS (Flight Model)

Electrical Tests*  MIL-STD-202, Method 107, Condition A,
Thermal Shock  5 Cycles, -55°C to +85°C
Random Vibration (non-operational) 7.56 Grms overall, 50 to 2000 Method 214 I-B,
Aging Rate Projected after 30 days operating
Electrical Tests*  MIL-STD-202, method 209

*ELECTRICAL TESTS
Tested at ambient pressure ≤5 x 10⁻⁵ torr and at -10, +25, and +50°C unless otherwise noted
Warm-Up Power (-10°C only)
Warm-Up Time (-10°C only)
Input Power
Cold Start (-10°C)
Hot Start (+50°C)
RF Output Power
RF Output Harmonics
RF Output Spurious
Frequency Accuracy (+25°C only)
Frequency Stability
Phase Noise - Static (+25°C only, 760 torr)

ANALYSES
Thermal Analysis, Component Stress Analysis

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