

MSK DWG. NO.
1032-11833

REV. A	SHEET 1 OF 6	SCALE NTS	SIZE A
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REVISIONS

REV.	ECO NO.	DESCRIPTION OF UPDATE	APPROVED	DATE
-	RLSD		C. HEISELMAN	09/28/04
A	16865	Add 4.1.9 flow down to subtier	<i>[Signature]</i>	01/21/10



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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLE ± - ± - ± -	DRAFTER	DATE	5 1 6 5 1	TITLE CRYSTAL PROCUREMENT		
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1.0 PURPOSE:

The purpose of this document is to define the vendor requirements of all procured crystals used in M.S. Kennedy hybrid microcircuits.

2.0 APPLICATION:

This procedure shall apply to all crystals as follows:

2.1 Condition A - Elements to be used in "fully" compliant hybrid products as defined in MIL-PRF-38534 (Class H, G, D, E) and are manufactured in compliance with MIL-PRF-3098. Purchase order shall not delete any of the requirements of this specification. MSK element evaluation is not required.

2.2 Condition B - Elements intended to be used in full compliance with MIL-PRF-38534 (Class H, G, D, E) and MIL-PRF-3098 but element evaluation will be the responsibility of the manufacturer as specified on the MSK SCD.

2.3 Condition C - Elements to be used on customer source control drawings or MSK standard product which do not impose MIL-PRF-38534 or MIL-PRF-3098.

2.4 Condition D - Elements to be used in compliance with MIL-PRF-38534 Class K hybrid products and are manufactured in compliance with MIL-PRF-3098. MSK element evaluation is not required.

2.5 Conflicting Requirements:

In the event of conflict between requirements of this specification and other requirements, the following shall apply in order of precedence:

- a. Purchase order
- b. Detail specification control drawing/specification control drawing (SCD)
- c. This specification
- d. Other documents referenced

3.0 DEFINITIONS:

3.1 Element - A constituent of the hybrid microcircuit that contributes directly to its operation.

3.2 Inspection Lot - An inspection lot shall consist of crystals of a single type submitted at one time for inspection to determine compliance with the applicable requirements and acceptable criteria.

3.3 Element Evaluation - As applicable to this specification shall consist of crystal die per MIL-PRF-3098.

3.4 Environmentally Controlled Area - An area which exhibits the following conditions:

3.4.1 Temperature shall be 25°C (+3/-5°C)

3.4.2 Class 8 per ISO 14644-1, -2 (Class 100,000 PER MIL-STD-209) or equivalent.

3.4.3 Humidity - RH 30 to 65%

3.4.4 Positive Pressure .01" water column or greater

3.4.5 Element Storage shall be in a nitrogen atmosphere dry box.

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4.0 REQUIREMENTS:

4.1 General:

- 4.1.1 The vendor shall have a quality system that meets or exceeds the requirements of MIL-I-45208, ISO9001 or AS9100 (or equivalent) and a calibration system that meets MIL-STD-45662, ANSI/NCSL Z540-1, ISO10012-1/ISO10012-2 or equivalent.
- 4.1.2 The vendor shall notify M.S. Kennedy in writing of any Class I (major) change of product or process as defined in MIL-STD-480, MIL-PRF-38534 Configuration Control or MIL-PRF-3098. Major change would consist of changes in materials, design, processing that would affect part number identification, physical change or functional interchangeability.
- 4.1.3 All materials and processes used by crystal mfg will be suitable for polymeric adhesive and/or solder mounting.
- 4.1.4 All electrical tests and visual inspection may be done at the packaged level provided all rejects are removed from the lot.
- 4.1.5 - Condition A crystals shall meet the requirements of para 4.1 and 4.2.
 - Condition B crystals shall meet the requirements of para 4.1 and 4.3.
 - Condition C crystals shall meet the requirements of 4.1.3, 4.1.4, 4.1.6, 4.1.7, and 4.4.
 - Condition D crystals shall meet the requirements of para 4.1 and 4.5.
- 4.1.6 Certificate of compliance shall be signed by a responsible vendor official and shall be enclosed with each shipment with the following minimum information:
 - a. Device type
 - b. Supplier's name and address
 - c. Manufacturer's name (if applicable)
 - d. Device quantity
 - e. Purchase order number
 - f. Applicable MSK drawing number and revision level
 - g. Lot number
- 4.1.7 M.S. Kennedy, MSK's Customer or Regulatory Agency reserves the right to review any vendor program, process and data to assure conformance to the requirements of this specification, the purchase order and the applicable MSK source control drawing.
- 4.1.8 The vendor shall have evidence of a working operator training and certification program. This program shall also include a written description of each process available to the operator.
- 4.1.9 The mfg shall flow down any applicable requirements to the sub-tier supplier.

4.2 Condition A - Requirements for crystals (MIL-PRF-3098 screened and element evaluated).

- 4.2.1 The manufacturer shall perform 100% electrical testing at 25°C to ensure compliance to the manufacturer's electrical data book and/or MSK applicable source control drawing.
- 4.2.2 The manufacturer shall have an accepted internal document for visual inspection to MIL-PRF-3098 with evidence of a trained operator.
- 4.2.3 The manufacturer shall perform 100% visual inspection to an in-house approved control document in an environmentally controlled area (see 3.4).

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4.2.4 Element evaluation shall be performed by the manufacturer on each inspection lot (see 3.2) in accordance with MIL-PRF-3098. Final electrical test shall consist of static and dynamic (as applicable) parameters at an ambient of 25°C. Static tests shall also be tested at maximum operating temperatures (-55°C to 125°C) unless otherwise specified. MSK reserves the right to repeat these tests on the same elements delivered with each lot.

4.2.5 **Delivery Conditions:**

- a. **Packaging** - Crystals shall be packaged in conductive waffle type containers (or similar) then sealed in an electrostatic bag. Crystals shall be separated from all others, physically restrained from vibration and mechanically isolated from shock that could cause damage or degradation to the part.
- b. **Marking** - The crystal type, manufacturer's name, quantity and inspection lot number shall appear on each container. All samples and test data shall be identified by its device type, manufacturer's name and inspection lot number. Markings shall be sufficient for inspection lot traceability (See 3.2).
- c. **Required Documentation** - Crystal performance data to be submitted with the inspection lot:
 - 1. Attributes Data (Screening Data)
 - 2. Test Data
 - 3. Element Evaluation Data
- d. A **Certificate of Compliance** as defined in paragraph 4.1.6 signed by the responsible vendor official shall be enclosed with each element shipment lot.

4.3 **Condition B** - Requirements for all crystals (MIL-PRF-3098 screened and element evaluated).

- 4.3.1 The manufacturer shall have an accepted internal document for Visual Inspection to MIL-PRF-3098 as applicable to ensure compliance. The manufacturer shall perform visual inspection to an in-house sample plan in an environmentally controlled area (see 3.4) and ensure compliance to all mechanical specifications.
- 4.3.2 Testing and Element Evaluation of crystals shall be in accordance with the MSK SCD.
- 4.3.3 Delivery conditions shall be in accordance with 4.2.5 (a) packaging, (b) marking, (c) required documentation, (d) certificate of compliance.

4.4 **Condition C** - Crystals procured for SCD & Standard Product.

- 4.4.1 The manufacturer shall perform 100% electrical testing at 25°C.
All electrical rejects shall be removed.
Testing or grading for special electrical characteristics will be handled on an individual basis.
- 4.4.2 Devices shall be capable of meeting the visual and mechanical requirements of MIL-PRF-3098.
The contractor shall have a sample inspection performed on each lot (see 4.4.3) to assure conformance.
- 4.4.3 **Lot Control** - Crystals supplied under this specification shall be manufactured in homogenous lots. The homogenous lot shall be defined as a lot of identical crystals manufactured to the same drawing, same drawing revision, same specification and same specification revision in one unchanged process.
- 4.4.4 **Preservation and packaging** - Individual crystals shall be separated from all others, physically restrained from vibration and mechanically isolated from shock that might cause damage or degradation to the part.

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4.4.5 A **Certificate of Compliance** is required for all orders.

4.5 **Condition D** - Requirements for crystals (MIL-PRF-3098 Screened, QCI, Element Evaluated).

4.5.1 The manufacturer shall perform 100% electrical testing at 25°C to ensure compliance to the manufacturer's electrical characteristics and/or MSK applicable source control drawing. For specific applications, an element may require testing over full temperature range. This shall be specified on the MSK source control drawing and will be handled on an individual basis.

4.5.2 The manufacturer shall have an accepted internal document for visual inspection to MIL-PRF-3098 as applicable to ensure compliance.

4.5.3 The manufacturer shall perform 100% visual inspection to an in-house control document in an environmentally controlled areas (see 3.4) and ensure compliance to all mechanical specifications.

4.5.4 Element evaluation shall be performed by the die processor for each inspection lot (see 3.2) in accordance with MIL-PRF-3098. Test samples shall be delivered with each lot.

4.5.5 QCI testing shall have been performed in accordance with MIL-PRF-3098. QCI data shall be available for review.

4.5.6 **Delivery Conditions:**

- a. **Packaging** - Crystals shall be packaged in conductive waffle type containers (or similar) then sealed in an electrostatic bag. Crystals shall be separated from all others, physically restrained from vibration and mechanically isolated from shock that could damage or degradation to the part.
- b. **Marking** - The crystal type, manufacturer's name, quantity and inspection lot number shall appear on each container. Markings shall be sufficient for inspection lot traceability (See 3.2).
- c. **Required Documentation** - Crystal performance data to be submitted with the inspection lot:
 - 1. Attributes data. (Screening Data)
 - 2. Test data
 - 3. Element Evaluation Data
- d. A **Certificate of Compliance** as defined in paragraph 4.1.6 signed by the responsible vendor official shall be enclosed with each element shipment lot.

5.0 **ACCEPT/REJECT CRITERIA:**

- 5.1 Accept all lots which pass the applicable paragraphs of this procedure and the source control drawing.
- 5.2 Reject any device(s) and separate it from the lot which fails an electrical parameter or visual/mechanical criteria.
- 5.3 Reject any inspection lot which does not pass element evaluation.

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6.0 QUALITY ASSURANCE PROVISIONS:

- 6.1 M.S Kennedy reserves the right to perform testing in accordance with paragraph 2.0 and any failure of the material to meet the requirements of this document shall be cause for rejection.
- 6.2 M.S. Kennedy reserves the right to review any vendor's program, process and data to assure conformance to the requirements of this specification, the purchase order and the applicable SCD.

7.0 REFERENCE DOCUMENTS:

- 7.1 MIL-STD-202 test methods for electronic and electrical component parts.
- 7.2 Applicable source control drawing.
- 7.3 M.S. Kennedy purchase order.
- 7.4 MSK internal element evaluation procedure (RIP 005).
- 7.5 DOD-STD-480 military standard, configuration control engineering changes, deviations and waivers.
- 7.6 MIL-I-45208, ISO9001 or AS9100
- 7.7 MIL-PRF-38534
- 7.8 MIL-STD-45662, ANSI/NC SL Z540-1, ISO10012-1/ISO10012-2 or equivalent
- 7.9 ISO14644-1, -2 or equivalent

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