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REVISIONS

REV.	RCN NO.	DESCRIPTION OF UPDATE	APPROVED	DATE
E	2155	Per ECO	C. HEISELMAN	02/91
F	3174	Per ECO	C. HEISELMAN	12/08/92
G	5227	Per ECO	C. HEISELMAN	07/10/96
H	8978	Per ECO	C. HEISELMAN	04/03/01
I	9175	Per ECO	C. HEISELMAN	06/13/01
J	9242	Per ECO	C. HEISELMAN	07/12/01
K	11715	Per ECO	C. HEISELMAN	07/11/04
L	13088	Per ECO	C. HEISELMAN	01/09/06
M	16865	Add 4.1.6 flow down to sub tier	C. HEISELMAN	01/21/10
N	19211	Update specifications	C. HEISELMAN	05/18/12
O	20757	Add 4.1.7 Requirements for record retention	C. HEISELMAN	01/03/14
P	176066	Tie in Anaren Doc. #81000, general clarification, remove redundant information now located in 81000.	B. HAHN	02/27/15
R	201812	Update Table I	<i>[Signature]</i>	01/01/18

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DO NOT SCALE DRAWING	APPROVALS		Anaren® MSK PRODUCTS	DISTRIBUTION DATE
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLE ± - ± - ± -	DRAFTER J. VANDEUSEN	DATE 12/11/17	TITLE PROCUREMENT SPECIFICATION FOR PACKAGES/COVERS	
	DRAFTING CHECK <i>N. Kusse</i>	DATE 6-7-18		
	ENGINEERING CHECK <i>D. Van</i>	DATE 6/14/18		
MATERIAL N/A	QUALITY ASSURANCE <i>[Signature]</i>	DATE 6-13-18	DRAWING NO. 1014-0981	REV. R
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1.0 PURPOSE:

This specification establishes the general requirements and quality provisions for procuring packages, lids, covers, baseplates, bonding blocks and lugs, for use in MSK hybrids/MCM's. This dwg is used in conjunction with Anaren Document #81000.

2.0 APPLICABLE DOCUMENTS:

2.1 The following documents of the issue in effect on the date of invitation for bids or request for proposals shall form a part of this specification to the extent specified herein.

Specifications:

Military

MIL-PRF-38535	Integrated Circuits (Microcircuits), general specification for
MIL-PRF-38534	Hybrid microcircuits, general specification for
MIL-DTL-45204	Gold Plating, Electrodeposited (was MIL-G-45204)
MIL-I-45208	Inspection system requirements
MIL-STD-883	Test methods and procedures for microelectronics
MIL-STD-45662 or	Calibration systems requirements
ANSI/NCSL Z540-1, ISO10012-1/ISO10012-2	
MIL-STD-202	Electronic component parts, Test methods
MIL-STD-1276	ASTM standards F-15

Standards

AMS-I-23011	Package material (was MIL-I-23011)
AMS-C-26074	Coatings, Electroless nickel (was MIL-C-26074)
AMS-QQ-N-290	Nickel Plating, Electrodeposited (was QQ-N-290)
JESD STD 9	Specification for Microelectronic Packages and Covers
ISO 9001	International Quality Standard
AS9100	Aerospace Standard

2.2 This procedure shall apply to all packages as follows:

- 2.2.1 **Condition "A"** - Packages to be used in "fully" compliant hybrid products as defined in MIL-PRF-38534. The package supplier shall test to all requirements in Table I, subgroups 1-7 and shall be capable of passing subgroup 8 for each different lot of packages shipped.
- 2.2.2 **Condition "B"** - Packages intended to be used in full compliance with MIL-PRF-38534 but lot acceptance will be the responsibility of MSK. The package supplier shall test to the requirements of Table I, subgroups 1 and 2 and shall be capable of passing all subgroups (1-8) in Table I.
- 2.2.3 **Condition "C"** - Packages to be used on devices which do not impose MIL-PRF-38534. The package supplier shall test to the requirements of Table I, subgroups 1 and 2 to an AQL of 2.5% and shall be capable of passing all subgroups (1-2) in Table I.
- 2.2.4 **Condition "D"** - Covers, lids, baseplates, Bonding Blocks and Lugs to be used in full compliance with MIL-PRF-38534 but lot acceptance will be the responsibility of MSK. The supplier shall test to the requirements of Table I, subgroups 1 and 2 and shall be capable of passing subgroup 6 of Table I. In addition, lugs shall be capable of passing solderability and lead integrity of Table I.

3.0 DEFINITIONS:

For the purpose of this specification, the terms, definitions and symbols of JESD 9, MIL-PRF-38534, MIL-PRF-38535, MIL-STD-883 and those contained herein shall apply and shall be used in the applicable documentation.

- 3.1 **Package** - The term "package" or "packages" in this specification shall be considered identical to cases, headers, parts, or housings.
- 3.2 **Production Lot** - A production lot shall consist of packages, covers, bonding blocks or lugs manufactured on the same production line(s) by means of the same production technique, material, control and design.

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- 3.3 **Inspection Lot** – An inspection lot shall consist of homogeneous materials having the same configurations, manufactured using the same facilities, processes, materials finish and plated within a 6 month time frame (if plating is applicable).
- 3.4 **Pin 1 Indicator** – An index indicator (ie. pin 1) for packages shall be any reference punch, mark, extended terminal, chamfer, tab, notch flat, groove, glass color change, etc., which identifies the first terminal lead position which may be used for sensing during automatic handling.
- 3.5 **Sintering** – The sintering process shall be the annealment of each package in a conventional furnace with a blended nitrogen/hydrogen environment with the requirement that a profile of the furnace be available for review.

4.0 **REQUIREMENTS:**

4.1 **Item Requirements:**

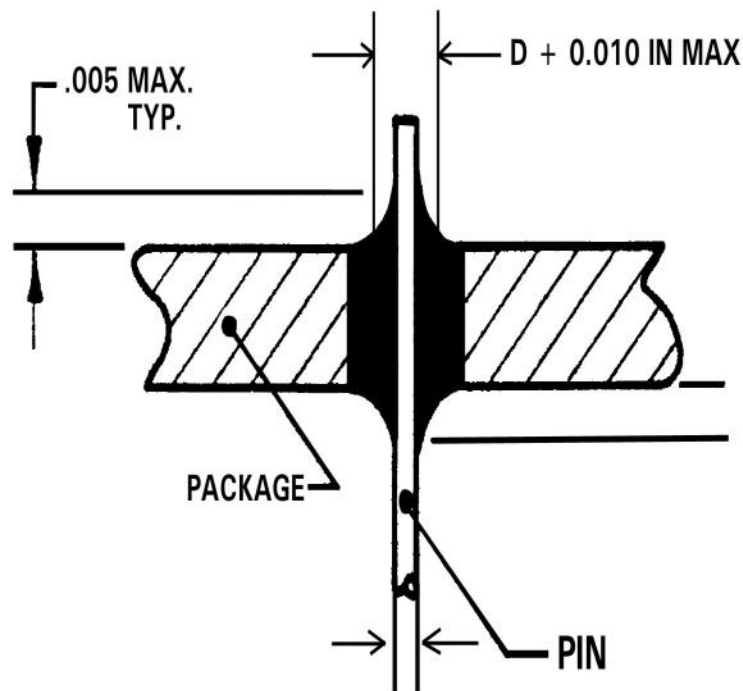
- 4.1.1 The individual item requirements for packages, covers, lids, baseplates, bonding blocks or lugs delivered under this specification shall be documented in the purchase documentation.
- 4.1.2 The operational temperature range shall be -65°C to $+125^{\circ}\text{C}$. The processing temperature range should be -70°C to 400°C .

4.2 **Design and Construction:**

4.2.1 **Package:**

- a. All hermetically produced packages supplied under this specification shall be capable of being hermetically sealed.
- b. Packages manufactured using beryllium oxide are not recommended. In those circumstances where BeO, in any form, is being utilized, the shipping container shall be clearly identified so caution and safety measures may be implemented.
- c. Ceramic packages shall be constructed using material specified on the MSK drawing. A die (chip) recess in the header, in either or both sides, is acceptable but must conform to the dimensions appearing on the package drawing and meet JESD 9.
- d. The manufacturer shall make available for review drawings which detail the package outline with material identified, acceptance test procedure, test equipment and technical data package on request.
- e. Metal packages shall be constructed from material meeting the requirements of ASTM specification F-15, AMS-I-23011 (MIL-I-23011), Class 1, and/or MIL-STD-1276, Type K unless otherwise specified.
- f. Finishes shall be in accordance with the package drawing.
- g. Flatpack packages fully compliant to MIL-PRF-38534 that are seam sealed, shall be required to have a minimum distance of 0.040 inches between the seal surface and the glass to metal seal. This dimension shall be specified on the package drawing.
- h. For Class K packages with leads glass isolated within 0.005 inch (0.13 mm) of the metal body shall have 600 Vdc applied between the case and leads not connected to the case. Packages which exhibit leakage greater than $10\text{G}\Omega$ (100 nA) shall be rejected.
- i. Package posts or bonding pads shall be suitable for the thermosonic, ultrasonic and/or thermocompression bonding of gold or aluminum wire and shall be capable of withstanding a wire pull test as specified in MIL-STD-883 method 2011.
- j. For packages that have leads extending through the base of the package (ie. TO style packages, Dual In-Line Packages, Bathtub style packages) the internal glass meniscus shall be a maximum of .005 inches above the internal base plane with the maximum diameter of the meniscus above the base of the package shall be the pin diameter (Dimension D) plus 0.010 inches.

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MSK prefers the glass to be below the internal base plane

4.2.2 Lead Material and Finishes:

- a. Lead material shall conform to the package drawing.
- b. Lead finish and surface treatment shall be as specified in the package drawing.
- c. There shall be no kinks or bends in the leads within 0.050" from the package body, unless by design. Outside this area, gradual bends that can be straightened manually are acceptable.

4.2.3 Cover/Lid:

- a. Cover/Lid material shall conform to the cover/lid drawing.
- b. Cover/Lid finish shall conform to the cover/lid drawing.

4.2.4 Bonding Blocks (BB):

- a. Bonding Block material shall conform to the BB drawing.
- b. Bonding Block finish shall conform to the BB drawing.
- c. Bonding Block shall be capable of being epoxy or solder attached based on BB drawing finish.
- d. Bonding Block shall not exhibit loose metal on the sides of the bonding block.

4.2.5 Lugs:

- a. Lug material shall conform to the lug drawing.
- b. Lug finish shall conform to the lug drawing
- c. Lug foot shall meet the solderability requirements of MIL-STD-883 Test Method 2003.
- d. Lug material and finish shall meet a 90° bend without peeling or blistering of the plating finish.

4.2.6 Baseplate:

- a. Baseplate material shall conform to the baseplate drawing
- b. Baseplate finish shall conform to the baseplate drawing

4.3 Product Assurance:

4.3.1 Lot Acceptance:

4.3.1.1

Lot acceptance shall consist of the applicable condition specified in Paragraph 2.2. MSK reserves the right to perform extraneous tests which may be necessary in evaluating the ability of the package, cover, bonding block or lug to withstand production processing and environment screening and qualification. Implementation of these tests shall be based on history and application.

TABLE I

Subgroup	MIL-STD-883 Reference	P K G	L I D	B B	L U G	B A S E P L A T E	Operation	Condition	Sample
1	2016	X	X	X	X	X	Physical Dimensions	Acquisition document	3 (0)
2	2009						Visual Inspection <u>1/</u>	NA	100 %
							Device Finish <u>2/</u>	Acquisition document	3 (0)
3 <u>4/</u>	1011	X					Thermal Shock	C (50) Cycles	3 (0)
	1008	X					High Temp Bake	1 hr at 150°C	3 (0)
	2004	X			X		Lead Integrity	A1 (braze attached leads, 3 lead minimum). B1 (rigid leads and terminals only) B2 (lead fatigue) D (pad adhesion of leadless ship carriers) E (plating integrity of flexible and semi-flexible lead, 3 leads minimum). Pin grid array leads D (leadless carriers)	3 (0)
	1014	X					Seal	A4 unlidded cases 1 X 10 ⁻⁶	3 (0)
4	1003	X					Metal Package Isolation	600 Vdc, 10GΩ (100 nA) max	3 (0)
5	2003	X			X		Solderability	Solder Temp 245° ±5°C R type flux	3 devices all leads
6	1009	X	X		X	X	Salt Atmosphere	A	3 (0)
7									
8 <u>6/</u>	-						Device Seal	-	3 (0)
	1014						Seal Test	1 x 10 ⁻⁶	3 (0)
	1010						Temperature Cycle	-65°C to 150°C, 10 cycles	3 (0)
	2001						Constant Acceleration	Y1 axis, 3000G	3 (0)
	2002						Mechanical Shock	Cond B, Y1 direction	3 (0)
	2007						Vibration Variable Frequency	Cond B	3 (0)
	1014						Seal Test	1 x 10 ⁻⁶	3 (0)
	2003						Solderability	Solder Temp 245°C ±5°C RMA type flux	3 (0)
	1018						Internal Water Vapor	16-24 hour bake	3 (0)
2009						External Visual		3 (0)	

Note:

- 1/ Packages shall also meet the visual requirements of JESD 9.
- 2/ Using a recognized methodology (e.g. EDS, XRF) verify that finishes containing tin (Sn) have a minimum of 3 percent lead (Pb) by weight per MIL-PRF-38534 (JESD213 is also acceptable). Not required on packages with gold plated bodies and pins.
- 3/ B1 of method 2004 can be used as an option.
- 4/ Subgroup 3 shall be performed in sequence.
- 5/ Covers shall be capable of passing subgroup 6 and shall be tested to when specified on the purchase order.
- 6/ Packages shall be capable of passing Subgroup 8 and all screening tests specified below seal test.

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4.4 Preparation for Delivery:

4.4.1 Packaging:

Packages, covers, baseplates and lugs should be individually packaged, physically restrained from vibration and mechanically isolated from shock that might cause damage.

Containers shall be suitably packaged for acceptance by common carrier for shipment, handling and storage without allowing damage to the material.

4.4.2 Documentation:

Certificate of compliance as defined in Document #81000.

Test data (as specified by the purchase order) as required.

4.4.3 Marking:

Package, lid, cover, baseplate, bonding block and lug containers shall be marked as follows:

- Part Number and Revision
- Identification by inspection or production lot on the container and each box delivered.
- Quantity of packages in each shipping container.

5.0 QUALITY ASSURANCE PROVISIONS:

5.1 MSK reserves the right to perform testing in accordance with para 2.0 and any failure of the material to meet the requirements of this document shall be cause for rejection of the shipment.

5.2 MSK reserves the right to review any supplier's program, process and data to assure conformance to the requirements of this specification, the purchase order and the applicable SCD.

6.0 ACCEPT/REJECT CRITERIA:

6.1 Accept all material lots which pass the applicable paragraphs of this procedure and the PO/MSK drawing.

6.2 Reject all material lots which fail the applicable paragraphs of this procedure and the PO/MSK drawing.

6.3 Reject any lot which does not pass the lot acceptance test (ref 4.3.1).

7.0 REFERENCE DOCUMENTS:

7.1 MIL-STD-883

7.2 MIL-PRF-38534

7.3 MSK/Anaren purchase order

7.4 MSK drawing

7.5 JESD 9

7.6 Anaren supplier requirements for Quality, Design & Manufacturing, Document #81000

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