



# ANALOG MODULES, INC.

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## QI030003 - First Article Inspection Report (FAIR) Procedure & Lessons Learned

### Table of Contents:

1. Purpose
2. Scope
3. Roles and Responsibilities
4. PFD
5. Definitions
6. Requirement of FAIR Package
7. FAI Forms & Examples:
  - 7.1. FAI Form 1
  - 7.2. FAI Form 2
  - 7.3. FAI Form 3
  - 7.4. Bubbled Drawings
  - 7.5. Certificate of Conformance / Certificate of Analysis
  - 7.6. Test Certificate
  - 7.7. MTR (Material Traceability Report)
8. Lessons Learned:
  - 8.1. Administrative / Editorial Errors:
  - 8.2 Measurement Errors:
  - 8.3 Errors in supporting documents:
  - 8.4 Lessons Learned – PCBAs / PCBs



# First Article Inspection Report

## 1.0 PURPOSE:

The purpose of this procedure is to provide for a system ad instructions and to assigns responsibilities for performing, recoding, reviewing and approving first article inspections. First article inspection exercise shall be used to provide objective evidence tat the production processes, production documentation and tooling are capable of producing parts and assemblies that meet applicable requirements.

## 2.0 SCOPE:

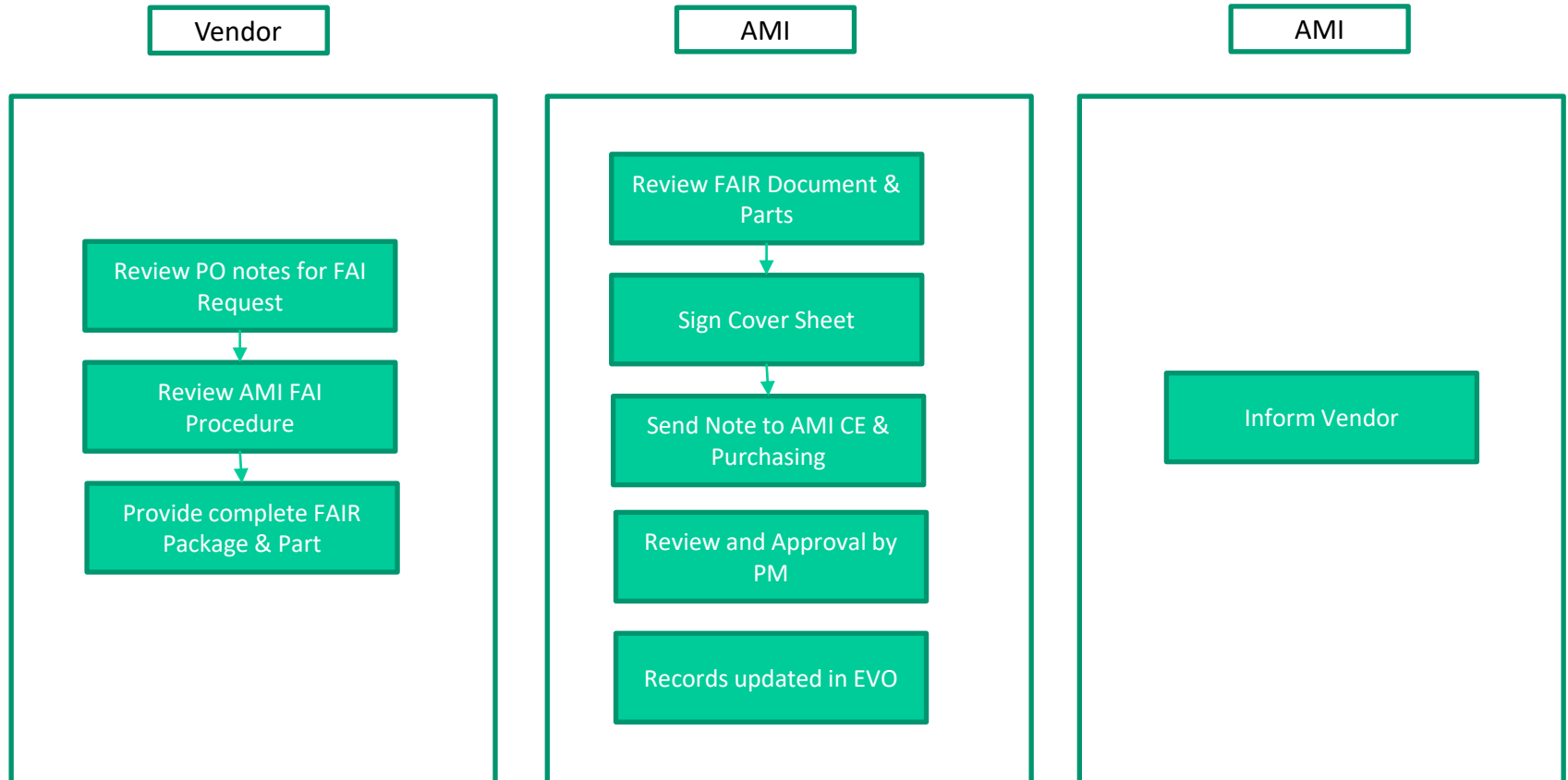
This procedure applies to piece parts, components, sub assemblies, assemblies purchased from vendors. A FAIR is required if Quality Provision Q8 is called out on supplier purchase order.

## 3.0 ROLES AND RESPONSIBILITIES:

ACTION	WHO	COMMENTS
Insert note requesting FAI on Vendor PO	Purchasing	Note: Product Manager has the authority to waive FAIR requirement.
Manufacture part and provide FAIR Package	Vendor	
Review FAIR Package and inspect Parts	Quality	
Communicate FAIR Accept/Reject Status (internally)	Quality	Form 1 of AS9102 Document will be signed and returned to vendor.
Communicate FAIR Accept/Reject Status (to Vendors)	Purchasing	
Approve FAIR	Product Management	
Maintain FAIR Procedure, Training Material, Lessons Learned	Quality	

# FAIR- Process Flow

## 4.0 Process Flow



# First Article Inspection Report

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## 5.0 DEFINITIONS:

- **Partial / Delta FAIR:** In limited cases a Delta FAIR is acceptable. However, such determination shall be made by Quality and Product Management.
- **FAIR Forms:** AMI mandates use of AS9102 Forms to complete FAIR. In limited circumstance and based on pre-approval from AMI , an equivalent form may be acceptable
- **Special Process:** A documented method used to manufacture products where a product undergoes a physical, chemical or metallurgical transformation where conformance to the specification cannot be readily verified by normal inspection methods, and the quality of the product depends on use of specific equipment operated in a specific manner, under controlled conditions, by trained personnel with instructions, procedures and standards.
- **Sub-tier:** All suppliers that the contracted supplier uses for products and/or services.
- **Variables Data:** Quantitative measurements taken on a continuous scale. For example, the diameter of a cylinder or the gap between mating parts.
- **Ballooning:** This technique establishes an organized method to capture objective evidence that each drawing requirement is met. Ballooning is recommended to ensure accuracy and completeness. It is preferred if a ballooned drawing of the accepted FAI is submitted as part of the officially documented FAI package



# FAI Requirements - Mandatory

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## 6.0 REQUIREMENT:

6.1 First Article Inspection Report (FAIR) is required for:

- Parts manufactured to AMI's drawings and specification (Ex: PCB, PCBA, Sheet Metal Parts etc..)

6.2 FAIR is **not** required for:

- Off the shelf parts

6.3. Complete First Article Inspection Report shall be required, if:

- Supplier is making the part for a first time
- There is a revision change that impacts form / fit / function of the part
- A lapse in production for a period of more than 2 years

Note: Product Manager has the authority to waive FAIR requirement

## 6.4. FAIR Package Must include following items:

- |  |  |
|--|--|
| a) AS9102 Forms (1, 2, 3)                    | f) Material Certifications                             |
| b) Bubbled Drawing                           | g) Special Process Certifications (if applicable)      |
| c) Bill of Material (BOM)                    | h) Test Data (if applicable)                           |
| d) Certificate of Compliance                 | i) COTS PO / Packing slip and Traceability information |
| e) ROHS or REACH Certificate (if applicable) | j) X ray images (if applicable)                        |
|  | k) Cross Section Samples (if applicable)               |

# FAI Requirements - Recommended

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## **6.5. FAIR Package - Recommended Items**

- a) Process Flow Diagram of Manufacturing process, including reference to Assembly, test and quality procedures
- b) Images of Key Fixtures / Setup
- c) Firmware Version
- d) Image of Label
- e) Compliance to UL Logo

# FAI Requirement - Forms

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## 7.0 The following forms comprise a First Article Inspection Report (FAIR)

- AS9102 Form 1: Part Number Accountability
  - Shall be used to identify the part that is being first article inspected and associated sub-assemblies or detail parts
- AS9102 Form 2: Product Accountability – Raw Material, Specification and Special Process(s), Test Verification
  - Shall be used if any material, special processes or functional testing are defined as a design requirement.
- AS9102 Form 3: Characteristic Accountability, Verification and Compatibility Evaluation
  - Shall be used to record an actual measurement or inspection/verification of the FAI part for every design characteristic on the drawing including Notes.
  - Include requirement and tolerance information in column 8
  - Record actual dimensions in column 9
  - Record tool used (asset number) to take the measurement in column 10
  - Do not use “Pass” or “Compliant” for dimensional data
  - No need to include reference dimensions
- Fields on the forms are
  - **Required:** Mandatory information
  - **Conditionally Required:** This field shall be completed when applicable to the product (e.g., serial number shall be entered when there is a serial number) or when required by the customer. **AMI always requires the fields be filled.**
  - Optional: This field is provided for convenience; the field may be left blank (N/A)



## 7.1.1 EXAMPLE FORM 1

			NUMBER OF PAGES
PAGE 1			
1. Part Number	2. Part Name	3. Serial Number	4. FAI Report number
5. Part Revision Level F	6. Drawing Number	7. Drawing Revision Level	8. Additional Changes
9. Mfg Process Reference N/A	10. Organization Name	11. Supplier Code	12. Customer P.O. Number
13. Detail FAI <input checked="" type="checkbox"/> Assembly FAI <input type="checkbox"/>	14a. Full FAI <input checked="" type="checkbox"/> Partial FAI <input type="checkbox"/>	14b. Baseline Part Number:	14c. Baseline Part Rev Level:
		14d. Reason for partial FAI:	
<i>Index of part numbers or sub-assemblies</i>			
15. Part Number	16. Part Name	17. Part Serial Number	18. FAI Report Number/ Certificate of Conformance
N/A	N/A	N/A	N/A
FAI complete <input checked="" type="checkbox"/>	FAI not complete <input type="checkbox"/>	FAI Approved <input checked="" type="checkbox"/>	FAI Rejected <input type="checkbox"/>
19a. Typed Name:		20. Date: May 20, 2020	
19b. Signature:		22. Date: May 20, 2020	
21. Reviewed By:		24. Date: 5/21/20	
23. Customer Approval:			

FORM 2 - PRODUCT ACCOUNTABILITY - MATERIALS, SPECIAL PROCESSES, AND FUNCTIONAL TESTING

Sheet \_\_\_\_ of \_\_\_\_

## 7.2 AS9102 FORM 2

[illegible]

1-4. Same as FORM 1

5.(CR) Name of applicable materials or special processes.

6.(CR) Provide the following information:

Material specifications and material form (e.g., sheet, bar) for all materials incorporated into the FAI part (e.g., weld or braze filler). Special process specifications; including class, if applicable, and permitted substitutions. If standard catalogue items (e.g., fasteners) or COTS are modified, then list that standard hardware or COTS item.

7.(O) Any required code from the customer for material or process listing, as applicable.

8.(CR) Identify supplier name, address, and code performing special processes or supplying material. Supplier name and address may be used, when supplier code is not available or not adequate for identification.

9.(CR) Indicate if the special process(es) or material sources are approved by the customer. Enter "Yes" if approved; "No" if approval is required, but process source is not approved; or "NA" if customer approval is not required.

10.(CR) The applicable certificate number (e.g., special process completion certification, raw material test report number, modified standard catalogue item compliance report number, traceability number).

11.(CR) Functional Test Procedure number identified as a design characteristic.

12.(CR) The functional test certification indicating that test requirements have been met.

## 7.2.1 EXAMPLE FORM 2

PAGE 2 OF 0					
1. Part Number	2. Part Name	3. Serial Number	4. FAI Report number		
		N/A	65817		
5. Material or Process Name	6. Specification number	7. Code	8. Supplier	9. Manufacturer/ Customer Approval Verification	10. Certificate of Conformance Number
					1807LB9527
					445003
					383681 390814
					00141175
11. Functional Test Procedure Number	12. Acceptance Report Number				
13. Comments					
14. Prepared By			15. Date		
			5/20/2020		

### 7.3 AS9102 FORM 3

[illegible]

SAE INTERNATIONAL

AS9102B

Page 19 of 21

1 to 4. Same as Form 1 and Form 2

5.(R) Unique assigned number for each design characteristic.

6.(CR) Location of the design characteristic [e.g., drawing zone (page number and section)]

7.(CR) If applicable, record characteristic type

8.(R) Specified requirement for the design characteristic

9.(R)List measurement(s) obtained for the design characteristics. NOTE: The organization shall record the results in the units specified on the drawing, or specification, unless otherwise approved by the customer.

- For multiple characteristics list each characteristic as individual values or list once with the minimum and maximum of measured values attained. If a characteristic is found to be nonconforming, then that characteristic shall be listed separately with the measured value noted.
- When qualified tooling (e.g., radius gauges) is used as a go/no-go gauge record the results as an attribute (e.g., pass / fail).
- When automated inspection tooling produces measurement results, those results may be referenced on 9102 Form 3, identified as pass/fail, and attached only when:
  - The characteristic numbers are clearly linked in the attached report.
  - The results in the attached reports are traceable to the characteristic numbers.
  - The results are directly comparable to the design characteristic.

If a design requirement requires verification testing, record the actual results on the form. If a laboratory report or certificate of test is included in the FAIR, the results may be recorded as an attribute (e.g., pass / fail) and the test reference number recorded on the forms. The laboratory report or certificate of test shall show specific values for requirements and actual results.

- For characteristics with visual verification requirements that are rated against standard photographs, list the photo number of the closest comparison. A statement of conformance is acceptable; record the reference number on the forms.
- For processes that require verification per design characteristics, include a statement of conformance (e.g., certification of conformance, verification indicator-accept).
- For characteristics verified by attribute inspection include statement of conformance (e.g., accept).

10.(CR) When design tooling or specially designed tooling, including NC programming as a media of inspection, is used for attribute acceptance of the characteristic, record the tool identification number. When qualified tooling is used for attribute acceptance, record the gauge value or range (e.g., minimum/maximum value), as applicable.

11.(CR) If the characteristic is found to be nonconforming, record a nonconformance document reference number.

14.(O)Additional Data / Comments: This area is reserved for optional fields; add additional columns, as required, by the organization or customer.

# 7.3.1 EXAMPLE FORM 3

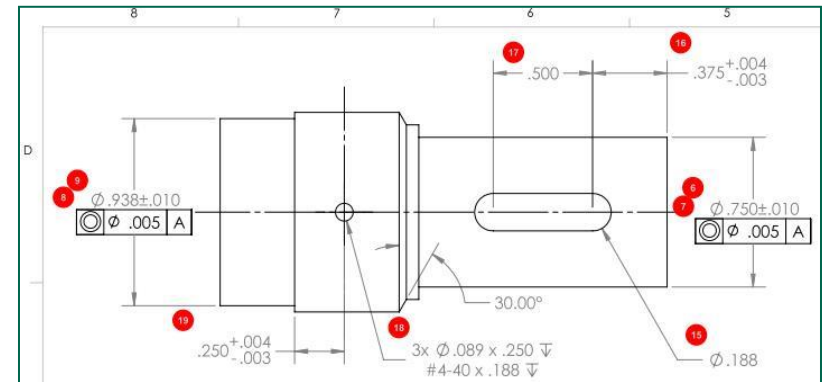
AS9102 Rev B FAI Form 3

PAGE 3 OF 8

1. PART NUMBER		2. PART NAME:				3. S/N (if app)		4. FAI REPORT:		
						N/A		65817		
Characteristic Accountability			Inspection / Test Results							
5. Char No.	6. Reference Location	7. Char. Designator	8. Requirement	8.A. Upper Tol.	8.B. Lower Tol.	9. Results	9.A. OOT	10. Designed Tooling #	11. Nonconformance Number	14. Comments
1	A1		Material...			Comply/w				
2	A1		Finish...			Comply/w				
3	A1	R	0.031	0.000	0.020	0.031		Radius Gauge		
4	A1		To be...			Comply/w				
5	A1		All...			Comply/w				
6	C4		0.500	0.020	0.020	0.492		Virtek CMM		
7A	B3		0.166	0.003	0.000	0.167		Pin Gauge (370)		
7B	B3		0.166	0.003	0.000	0.166		Pin Gauge (370)		
7C	B3		0.166	0.003	0.000	0.168		Pin Gauge (370)		
7D	B3		0.166	0.003	0.000	0.167		Pin Gauge (370)		
8	C2		0.180	0.020	0.020	0.170		Virtek CMM		
9	D3		5.240	0.020	0.020	5.225		Virtek CMM		
10	E3		4.880	0.020	0.020	4.877		Virtek CMM		
11	F2		Stamp			Comply/w				
12	H3		0.130	0.020	0.020	0.133		Virtek CMM		
13	F3		2.120	0.005	0.005	2.115		Virtek CMM		
14	F4		2.380	0.020	0.020	2.379		Virtek CMM		
15	H4		Min Relief			Comply/w				
16	E4		4.240	0.020	0.020	4.236		Virtek CMM		
17	E4		0.260	0.020	0.020	0.255		Virtek CMM		
18	J4		2.250	0.020	0.020	2.244		12 in Calipers (662)		
19	J3		0.070	0.020	0.020	0.069		12 in Calipers (662)		
20	B5		0.220	0.020	0.020	0.221		12 in Calipers (662)		
21	B5		0.320	0.020	0.020	0.324		12 in Calipers (662)		
22	C4		0.650	0.020	0.020	0.640		Virtek CMM		
23	E4		3.950	0.005	0.005	3.945		Virtek CMM		
24A	F4		0.094	0.005	0.005	0.093		Pin Gauge (370)		
24B	F4		0.094	0.005	0.005	0.097		Pin Gauge (370)		
24C	F4		0.094	0.005	0.005	0.097		Pin Gauge (370)		
24D	F4		0.094	0.005	0.005	0.095		Pin Gauge (370)		
25	E5		0.250	0.020	0.020	0.249		12 in Calipers (662)		
26	R4	X4	CLS-440-2			Installed				
27A	A8		0.166	0.003	0.000	N/A		Pin Gauge (370)		
27B	A8		0.166	0.003	0.000	N/A		Pin Gauge (370)		
27C	A8		0.166	0.003	0.000	N/A		Pin Gauge (370)		
27D	A8		0.166	0.003	0.000	N/A		Pin Gauge (370)		
28	B7		0.380	0.020	0.020	N/A		Virtek CMM		
29	D7		8.150	0.020	0.020	N/A		Virtek CMM		
30	E7		7.400	0.020	0.020	N/A		Virtek CMM		
31	F7		Stamp			N/A				
32	H7		0.130	0.020	0.020	N/A		Virtek CMM		


## 7.4 Bubbled Drawing

- a) Bubble (and number) all:
- dimensions and notes
  - surface finish callouts
  - material and hardness requirements
- b) Reference dimensions do not need to be bubbled
- c) Bubble number sequence to continue in all pages, if the drawings have multiple pages
- d) If part is shipped incomplete per Purchase Order (PO) or Statement of Work (SOW), account for the excluded characteristics by indicating in Form 3 **N/A per PO** or **N/A per SOW**



# 7.5. Certificate of Conformance / Certificate of Analysis

## Example 1

**IS**  
LLC

**ROHS Certificate of Compliance**

To: ANALOG Modules, Inc  
120 Baywood Ave  
Longwood, FL 32750  
USA

Date:

P.O.:


PN:

Qty:

SN's:


We certify that the finished parts and/or materials supplied on the invoice/packing list are in accordance with all applicable specifications, drawings and requirements referenced therein, as well as the latest ROHS directive. Test and/or inspection reports are on file with Synchron-EMS or with Synchron-EMS suppliers for examination and indicate conformance with applicable specifications.

Certified by:

QC Manager: 

23  ark Dr NE  
Su  
Pa  
Ph  
Fa

## Example 2

**e**

Ma  
30  
Vn  
Tel  
Fax  
Web  
 Inc.  
16, USA  
8328  
one.com

Product Name: E  
Lot Number: 0  
Manufacture Date: A  
Shelf Life: 1  
Expiration Date: M  
Customer: N  
PO#: 51610000 EN

**CERTIFICATE OF ANALYSIS / CONFORMANCE**

CHARACTERISTICS	SPECIFICATIONS			RESULTS	UNITS	TEST METHOD
	Minimum	Target	Maximum			
Gritted by Particles			20			
Adhesion						
Appearance						
Appearance (After Cure)						
Color Compared to Standard						
Cure						
Gloss						
Opacity						
Performance Test						
Viscosity, Brookfield RVF SH	6,000		12,000	9,800	cps	SHV-01521

Note: This product must be heat cured  for Type II qualification the kit

Note: All "less than" (<) values indicate measurement values below the instrument/method detection limit. Numerical results listed without Minimum and Maximum Specifications are provided as Read and Record (test performed, result recorded, specifications limits not required).

10/00/01/00110

**Conformance Statement**

We certify that the products detailed hereon have been manufactured from approved raw materials and fully conform to our Quality Assurance requirements, and meet the compositional requirements of the specification(s) listed.

For storage and shelf life guidelines refer to the technical bulletin.

Kat  ger

**Quality Authorization**

This certificate is electronically transmitted; therefore, no signature is required

A  if 1 ny

# 7.6 Test Certificate

## Example 1

Z [ ] Test Report

ZERO-ION G3

**PASS**

Board Serial Number: 1

Test Number: [ ] Board Type: [ ]  
 Recipe: [ ] Board Area: [ ]  
 Operator Name: [ ] Elapsed Time: [ ]  
 Test Date: [ ] Total Contamination: [ ]  
 Test Time: [ ] Contamination per unit: [ ]  
 Mode: [ ] PF Limit: [ ]  
 Alcohol Concentration: [ ]  
 Flow: [ ]  
 Temperature: [ ]  
 Remaining Media Life: [ ]  
 Last Calibration Date: [ ]

Test Notes: [ ]

Print Date 2/4/2016 4:04:06 PM  
Page 1 of 1

## Example 2

**TESTING CERTIFICATE**

CERTIFICATE NUMBER: 14,2938

CUSTOMER: [ ]  
 ADDRESS: [ ]  
 PART NUMBER: [ ]  
 WORK ORDER #: [ ]

**TYPE OF TEST**

DOUBLE-SI [ ]  
 MILLENNIUM [ ]  
 TEST METH [ ]  
 ADJACENC [ ]

**TEST PARAMETERS**

VOLTAGE [ ] CONTINUITY THRESHOLD [ ] ISOLATED THRESHOLD: [ ]

**TEST SPECIFICATION**

IPC-925 [ ] OTHER: [ ]  
 IPC-601 [ ]  
 IPC-601 [ ]  
 MIL-PRF-5 [ ] OTHER: [ ]  
 MIL-PRF-3 [ ]  
 MIL-PRF-3 [ ] OTHER: [ ]  
 OTHER: [ ]

Advanced Circuits Minnesota hereby certifies that these printed boards have been electrically tested to the requirements of the referenced purchase order or master drawing.

TEST TECHNICIAN (PRINT): [ ]  
 TEST TECHNICIAN (SIGN): [ ]

GA-024-A007 Electrical Test Revised Date: 10/8/14

# 7.7 MTR (Material Traceability Report)

## Example 1

**Inspection Certificate EN10000**

Certificate No : 1807LB9527

Hulamin Operations Proprietary Limited Reg No 1999/0204 1007 VAT Reg. No. 45702350  
HEAD OFFICE: Moses Mathiba Rd, Pietermaritzburg 3201, P.O. Box 74, Pietermaritzburg 3200, South Africa  
Telephone: +27 33 305 6911 Telefax: +27 33 394 1335

Shipping File No: Lot No : P/List No : Release No : Cust Order No : HULAMIN Order No : Item Part :	Product : COIL STD MILL DEGREASED,, 5052-H32 0.063" (+0 -0.0035) x 48" ID:20" Dimension : Alloy - Temper : Certificate No : Cust Ref/Part No : Combined P/List No : R205195
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Case No : BHF541,BHF540

**MECHANICAL TEST RESULTS**

Lot No.	Cast No.	Metal Id	Alloy	Spec No	Mechanical Properties							
					Yield Strength (Ksi)	UTS (Ksi)	Elongation A50 (%)	Earing (%)	Test Date	Gauge Length (Inches)	Bend Test	Actual Gauge (Inches)
Spec				Min	22.2	21.2	2					
21/07/S2QJ6	18165A44											

**CHEMICAL COMPOSITION**

Cast No.	
Min	
Max	
	18165A44

**MECHANICAL AND CHEMICAL PROPERTIES COMPLY WITH AMS 4016 M, AMS-QQA 250/9C, ASTM B209 - 14, EN10204-3.1**

For purposes of determining conformance with these specifications, an observed value or a calculated value shall be rounded "to the nearest unit" in the last right-hand digit used in expressing the specification limit, in accordance with the rounding method of ASTM Practice E29, for Using Significant Digits in Test Data to Determine Conformance with Specifications.

WE HEREBY CERTIFY, THAT THE MATERIAL DESCRIBED ABOVE HAS BEEN TESTED AND COMPLIES WITH THE TERMS OF THE ORDER CONTRACT. THE INSPECTION RESULTS INDICATED IN THE CHEMICAL COMPOSITION HAVE BEEN OBTAINED FROM CAST ANALYSIS.

Printed Date : 16 Aug 2018 Ver 1.0.2

Inches, coils rolled and processed in South Africa -- meets Requirements of RoHS and REACH

1 of 1

## 8.0 Lesson Learned

### 8.1. Administrative / Editorial Errors:

1. All Dimensions and/or notes not accounted for.
2. Missing Signatures
3. Not checking **FAI Complete** or **FAI Not Complete** (Form 1)
4. Missing Material Certifications
5. Missing Bubbled Drawing
6. Leaving blank fields. Please **N/A** fields that do not need to be filled
7. Typo errors: (inverted numbers and tolerances, etc.)
8. Part numbers and subassembly parts missing (Form 1)
9. Incorrect revision level (Form 1)
10. Missing specification revision (Form 2)
11. Wrong part number identified on FAI form(s).

### 8.2 Measurement Errors:

1. Reporting **Pass** or **Complies** for measurable dimensions
2. Visual inspection method used for a dimension
3. Measured value noted as Nominal
4. Missing Tool / Incorrect Tools used to take measurement (Form 3, Field 10)
5. Non-Conforming Data in Form 3 (not identified or informed in advance)

### 8.3 Errors in supporting documents:

1. Missing Certs (RoHS, Test)
2. Revision level on certs does not match requirements on drawings
3. Incorrect Quantity
4. Missing Traceability Data
5. Use of Wrong revision of Requirement documents

# 8.0 Lesson Learned

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## 8.4 Lessons Learned – PCBAs / PCBs

- Missing Cross Section Samples
- Missing X Ray Images
- Missing RoHS Certs (Components and Raw Board)
- Missing bare board test data



# REVISION HISTORY

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Revision	Created By	Date	Changes
1	Abeer S	6/1/15	Initial Release
2	Sanjay S	6/1/20	Updated with examples and revamp of lessons learned notes

Contact Analog Module's Quality or Purchasing Contact with any questions or concerns