

Necessity for DPA on Passive EEE Components

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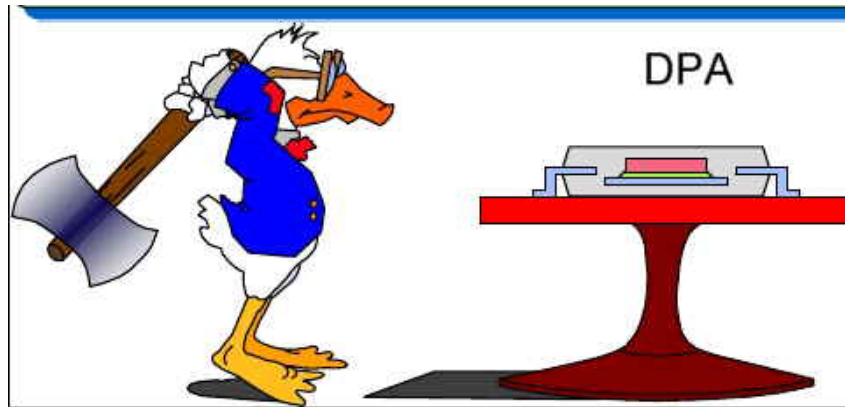


Necessity for DPA on Passive EEE Components

- Introduction
- EEE Parts Laboratory at TESAT
- Evaluation procedure
- Results and discussion
- Summary
- Acknowledgement

Necessity for DPA on Passive EEE Components

Introduction



- EEE components procured for TESAT and agency customers
- The importance of passive EEE components
- DPA as quality verification, not formality
- DPA on QML/QPL, proven reliability or not?
- DPA statistics from January 2009 to April 2013

EEE Parts Laboratory at TESAT

making the hidden visible

- 10 Optical microscopes
- 4 SEM systems (New: JEOL JSM6610 QSEM)
- 3 PIND Test systems
- 3 X-Ray (Radiography) systems
- 1 Precision Temperature forcing system
- 4 Temperature cycling systems
- 2 Seal Test (fine and gross leak) systems (New MS.50 Dry)
- 2 Bond Wire Pull Test + Die Shear Test Systems
- 2 Solderability Test + Steam Aging setups
- Several equipment for electrical measurements
- Metallography and materials lab: microsections,...

Bond pull and die shear tests
Dage series 4000



ESD Test

X-Ray radiographic inspection
Y.Cougar SMT FeinFocus



Hermetic Seal Test
MS.50 Dry High Sensitivity



SEM Inspection
JEOL JSM6610 QSEM



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Evaluation procedure

Completed DPAs from 01.2009 to 04.2013



Separate DPAs on passive components



Annual findings quota per part family
and for the considered period.



Proportion of findings on qualified parts



Ranking manufacturers per part family (findings quota)



DPA`s performed according to TESAT`s DPA specification:
RA.0010.900.10 combines MIL-STD-1580 and ESA/ESCC

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General distribution of DPA findings

Year	No. of lots	No. of findings	Finding quota (%)
2009	1181	62	5.25
2010	1425	70	4.91
2011	1625	86	5.29
2012	1222	76	6.22
2013*	247	32	13.06

Finding quota for entire period: 5.7%
=> 325 out of 5700 lots

Distribution of findings on passive parts

Year	No. of lots	No. of findings	Finding quota (%)
2009	547	27	4.94
2010	614	18	2.93
2011	818	39	4.77
2012	635	32	5.04
2013*	154	22	14.29

Finding quota for entire period: 5%
=> 138 out of 2768 lots

*Till April 2013

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Findings according to families from January 2009 to April 2013

Family code	Family name	No. of DPAs	No. of findings	Finding quota (%)
01	Capacitors	1903	38	2.00
02	Connectors	125	16	12.80
03	Quartz	12	0	0
05	Filters	23	1	4.35
06	Fuses	69	0	0
07	Inductors	122	15	12.30
09	Relays	34	3	8.82
10	Resistors	192	6	3.12
11	Thermistors	55	4	7.27
13	Cables	3	0	0
14	Transformers	56	2	3.57
16	Switches	4	0	0
20	Thermostat	0	0	0
27	Fibre Optic	0	0	0
89	Miscellaneous	170	53	31.17

8 families
above 0%

>15% finding: filters 2009, relays 2011, thermistors 2011, resistors 2013

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Findings quota on qualified parts with respect to total number of findings.

Family code	Family name	No. of findings January 2009 to April 2013	No. of findings on QPL listed parts: (ESCC/MIL)	Finding quota of qualified parts (%)
01	Capacitors	38	14 (11/3)	36.84
02	Connectors	16	9 (5/4)	56.25
05	Filters	1	1 (0/1)	100
07	Inductors	15	15 (14/1)	100
09	Relays	3	3 (3/0)	100
10	Resistors	6	0	0
11	Thermistors	4	1 (0/1)	25
14	Transformers	2	0	0

Qualified passive parts make up 50.6% of findings on passive components (2768 lots, 55% qualified)

Findings quota on unqualified passive parts: 1.62%

Findings quota on qualified passive parts: 1.66%

Do qualified parts really deserve an exemption from DPA?

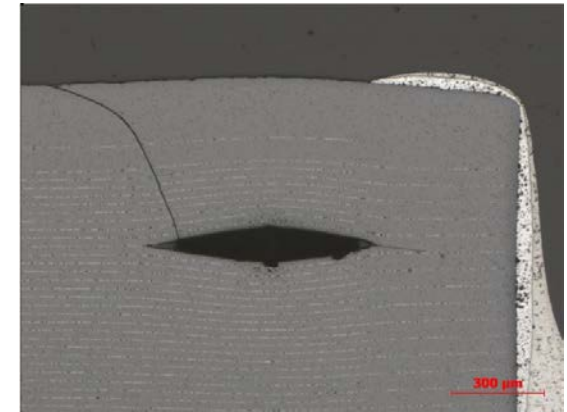
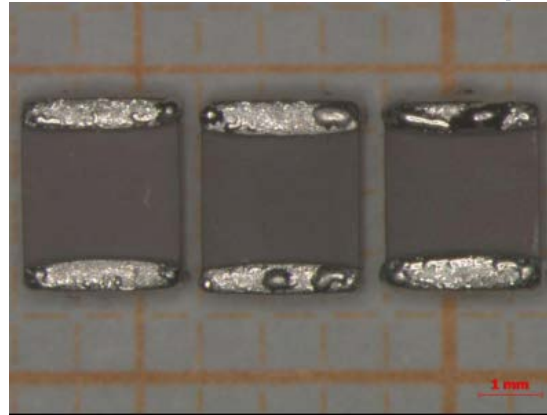
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Monitoring manufacturers (Part families with failed parts on QPL)

Capacitors

Manufacturer (Coded)	Number of DPA lots	Finding Quota (%)
M011	782	0.77
M012	375	1.33
M013	336	0.30
M014	97	3.09
M015	50	2.00
M016	48	4.17
M017	46	43.48
M018	37	0
M019	35	0
M0110	31	0

Some examples of findings



Connectors

Manufacturer (Coded)	Number of DPA lots	Finding Quota (%)
M021	40	10.00
M022	26	15.38
M023	15	0
M024	11	9.09
M025	06	0
M026	05	60.00
M027	04	75.00
M028	04	0
M029	03	0
M0210	02	0



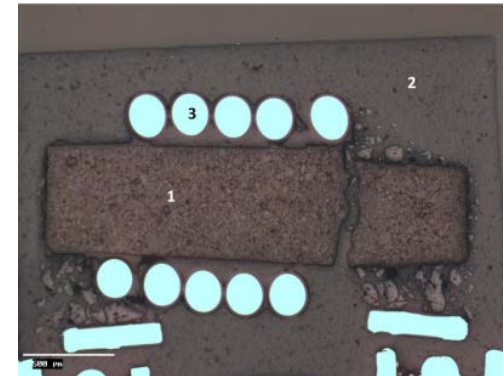
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Monitoring manufacturers (Part families with failed parts on QPL)

Some examples of findings

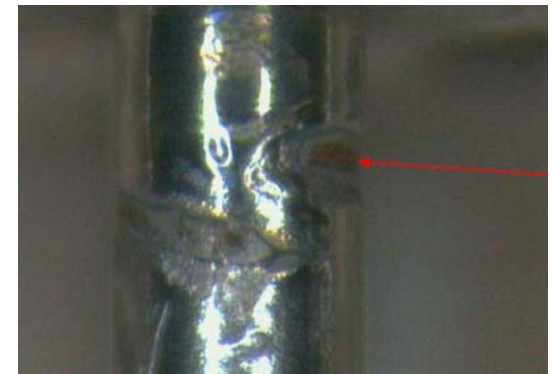
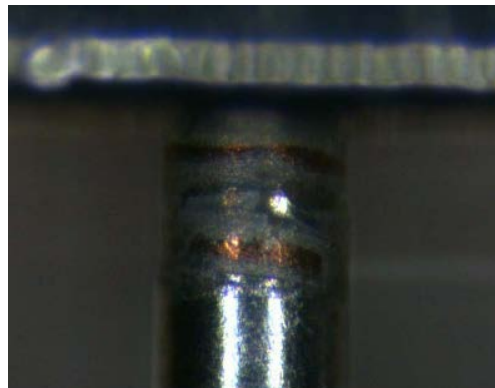
Inductors

Manufacturer (Coded)	Number of DPA lots	Finding Quota (%)
M071	83	16.86
M072	12	08.33
M073	11	0
M074	06	0
M075	05	0



Relays

Manufacturer (Coded)	Number of DPA lots	Finding Quota (%)
M091	11	18.18
M092	10	0
M093	07	14.28
M094	2	0
M095	2	0



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Summary

- DPA results on 2768 lots of passive EEE components analysed
- 5% findings quota was noted from January 2009 to April 2013
- No difference between qualified and unqualified parts
- Close monitoring of manufacturers is facilitated through DPA
- Feedbacks to manufacturers lead to continuous improvement in part quality.

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Acknowledgement

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- EEE Component Technology Laboratory of Astrium in Portsmouth,
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- Colleagues of TESAT's EEE Parts Laboratory and of TESAT-Spacecom GmbH & Co KG.

Thank you for your attention