

VARIASS



30/31 MEI & 1 JUNI 2017 ELECTRON JAARBEURS UTRECHT

Variass Veendam

Electronic Manufacturing Services









Variass Drachten

System Supplier

VARIASS

High tech assembly & quality

Certified: ✓ISO 9001 ✓ISO 14001 ✓ISO 13485 ✓IPC-A-610/620 ✓AQAP 2120



✓ DIN EN 61340-5-1

✓ Work according OHSAS 18001, ISO 14971 (risk management) & ISO 26000 (MVO)

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We enable your success!



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Why? Reliability

- ✓ Failure in the field
- ✓ Damaged image, claims
- \checkmark High costs for service and repair
- ✓ If a reliability problem exists, the customer will find it!
- Or opportunity for new business models
- ✓ Service & repair
- ✓ Product upgrade
- ✓ Spare parts
- ✓ Product costs reduction





What? Definitions

- Quality = The product performance in relation to the functional requirements straight after delivery.
- Reliability = The ability of a system to consistently perform it's intended function without degradation or failure. Quality over time.
- Robustness = The ability of a system to remain functioning under the presence of invalid inputs or stressful environmental conditions cf. error tolerance, fault tolerance.



When? Reliability



How? Predicted Reliability

✓ Physics of Failure (PoF, "How stuff fails").

- Knowledge of the technology, market and application
- Field return predecessor
- QA database
- Weibull analysis (continuous probability distribution, statistics)
- ✓ Data sheets
 - Failure rate (MTBF, FIT, Useful Live, etc.)
 - De-rating specifications
- ✓ Reliability Standards (empirical models)
 - MIL-HDBK-217
 - FIDES
 - SR-332

✓ Testing

• HALT, MEOST, ALT





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How? Physics of Failure

✓ Register failure data.

when, show time, interval, serial number, environment, conditions, ...

- 1. Effect, Expected function not available No output, No connection, No coffee, ...
- 2. Mode, Type of failure shutting down, degraded functionality, ...
- 3. Mechanism, Physical explanation corrosion, fracture, fatigue, ...
- 4. Initiator, Physical root cause Temperature, Moisture, Vibration, Voltage, Salt, ..
- ✓ Analyze the data

Weibull Distribution, Trends, Big-data, ...



Revenues

Design support



Life suppor



How? Weibull Distribution



Beta <1: Infant Mortality Beta=1: random failure Beta 1...4: Early Wear out Beta>4: age rapid wear out Statistical distribution (CDF) $F(t) = 1 - e^{-\left[\frac{t}{\eta}\right]^{\beta}}$

F(t) = Failure Percentage β = Shape Parameter η = Characteristic Live

> @ $\beta=1$, $\eta=t$ F = 1 - 0,368 Failure = 63,2% R = 1 - F Reliability = 36,8%



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How? Weibull Distribution



Statistical distribution (CDF) $F(t) = 1 - e^{-[t/\eta]^{\beta}}$

F(t) = Failure Percentage β = Shape Parameter η = Characteristic Live

Beta <1: Infant Mortality ^{5.00} Beta=1: random failure Beta 1...4: Early Wear out _{1.00} Beta>4: age rapid wear out











How? Data sheets



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\bigcirc **ENVIRONMENTAL SPECIFICATIONS**

Specification	Test Conditions / Notes	Min	Nominal	Max	Units	600 W AC-DC POWER	SUPPLY
Operating Temperature Range	No de-rating up to 50°C	-20	-	50	°C	DICAL BATED DDP600	SEDIEC
Operating Temperature Range	See de-rating curves and conditions in the	-	-	70	°C	DS_DDP600 Series_Rev02 Oct	TOBER 2015
with De-rating	Output Specifications section						
Storage Temperature		-40	-	85	°C		
Humidity	RH, Non-condensing Operating.	-	-	90	%		
Operating Altitude	MoPP (100 – 250 V _{AC} , 50/60 Hz)	-	-	4000	70		
	MoPP (100 - 277 V _{AC} , 50/60 Hz)	-	-	3000	m		RoHS
	MoOP, ITE grade	-	-	5000		rial Medical THREE YEAR	UTT/65/UE
	Power de-rating above 1800 m					nt 2x Mopp	
Shock	EN 60068-2-27						
	Operating: Half sine, 30 g, 18 ms, 3 axes,	6x each (3 posit	ive and 3 negat	ive).			
	Non-Operating: Half sine, 50 g, 11 ms, 3 axes,	6x each (3 posit	ive and 3 negat	ive).			
Vibration	EN 60068-2-64			_,		Contraction of the second seco	
	Operating: Sine.10 - 500 Hz, 1 g, 3 axes.	1 oct/min., 60 m	nin.				
	Random, 5 – 500 Hz, 0.02 g ² /	Hz. 1 gene. 3 axe	s. 30 min.				
	Non-Operating: 5 - 500 Hz, 2 46 gauge (0.0122)	a^2/H_7 axes	30 min				
MTRE	Full Load 40 °C ambient	g Then o areo, c					1
	80% Duty cycle Telcordia SR-332 Issue 2	300000	-	-	Hours		
Useful Life	Worst nominal V _{IN} , 80% load, 40 °C ambient.	-	4	-	Years		
		rating When nat	el convection cooled th	ne II-frame variant	an deliver		Ť
		rating. when natur	ar convection cooled, ti	ie o mane variane	can deriver		

convection cooled, the U-frame variant can deliver rating. a steady 400 W up to 50 °C ambient fan speed control circuit

MTBF = 300.000h -> 34 Years ?





T = 3 Year, N = 100 units Q = 100 * (26.280 / 300.000) = 9 units

10 degrees decrease in temperature makes the lifetime double



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How? Reliability Standards

Design support NPI Series Life support

R

120

Q

80

A

40

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	MIL-HDBK-217	FIDES	SR-332	
Origin	US Army	European tech industry US telecom inc		/
Publisher	DoD, model is not supported anymore	Fides group (Thales, Eurocopter, Airbus, others)	Telcordia (subsidiary of Ericsson)	y
Modelling	Components only	Components and process	Components only	
Required input	Relatively much	Relatively much	Relatively few	
Supported components	Many components, some are obsolete	Relatively few components	Many components	
Quality assessment	Very complex	Complex	Easy	0.
	1		•	0

Reliability software:

-ReliaSoft

-RAMS (Reliability, Availability, Maintainability and Safety)



How? Reliability Standards

Component name	Description	Number of components			Failure rate			N*Lamda	
		at stres	s fact		at stres				
		20%	50%	80%	20%	50%	80%	0,00000001	
Resistors									
	Metal low pow.	0	19	0	1,5	2	3	38	
	Metal high pow		0		8	10	13	0	
Fixed Wire	Precision	0	2		3,5	5	8	10	
	Power	1	0		8	15	30	8	
Variable Wire	Precision		0		320	400	440	0	
	Power	0	0		170	210	275	0	
Trim	Cermet		0		5	6	7	0	
Capacitors									
Elco	Solid		0		45	75	175	0	
	Wet Mini		0		25	55	135	0	
	Wet Small	0	0	2	8,6	14,4	36,5	73	
	Wet Large			2	12,9	21,9	54	108	
X - Y				1	0,6	2	4	4	
Film				0	0,5	0,9	7,5	0	
Ceramic		0	5	0	0,6	2,5	9	12,5	
Somiconductore									

Design support NPI Series Life support

Failure Rate $\lambda = 1 / MTBF$ FIT , Failures In Time (10⁹h) FIT = 10⁹ / MTBF











WWW.EABEURS.N

 Total failure rate

 Factor for ambient temperature

 Kt=
 0.8 for
 15
 Kt=

K3=	1 for	gnd benign	K3=	3	
	3 for	gnd fixed			
	9 for	gnd mobile			
N*L*k	(t*K3=	3083,07			

1027,69

M.T.B.F 324352,0257

How? Test

✓ HALT (Highly Accelerated Life Testing)

- "smoking out failures"
- Testing for Failure and Robustness
- Define weak components for improvements

✓ ALT (Accelerated Life Testing)

- Testing for live
- Reliability
- Predict lifetime

✓ MEOST

(Multiple Environmental Over Stress Testing)

- Determine or Demonstrate field failures
- Combined more stresses
- No Standards











follow our lead

Visit us at stand 7E060



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