



聯 傑 國 際 股 份 有 限 公 司

DAVICOM SEMICONDUCTOR INC.

**RELIABILITY TEST REPORT**

**PART No. : DM9162IEP**

**PACKAGE TYPE: LQFP-48L**

**REPORT VERSION: [1]**

**RA No.: DSI-RA-9162IEP**

**DATE: 07.27.2012**

**PREPARED BY**

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## DAVICOM SEMICONDUCTOR INC.

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Part No.: DM9162IEP

Test Item	Start Date	Finished Date	Sample Size	Test Time	*ACC / REJ	Test LTPD	Test Result	Test Purpose	Remark
ESD	2011/05/31	2011/06/01	30				CLASS 3 6500V	NEW PD	SEE NOTE 1
Latch UP	2011/05/31	2011/06/01	9	-	-	-	CLASS 1	NEW PD	SEE NOTE 2
HTOL	2012/06/11	2012/07/25	77	1000H	1/2	5%	Pass 77ea	NEW PD	FIT=386
HTSLT	2012/06/11	2012/07/25	77	1000H	1/2	5%	Pass77ea	NEW PD	-
Note 1:					Note 2:				
CLASS 1 : 0V – 1999V CLASS 2 : 2000V – 3999V CLASS 3 : 4000V – or ABOVE					CLASS 1 : $+VT= 1.5 \times VDD$ $-VT= -0.5 \times VDD$ $+IT= Inom + 100mA$ $-IT= -100mA$				

\* ACC. Criterion:  $\leq 1$  failure, REJ. Criterion:  $\geq 2$  failures

### Reliability Test Item & Condition

Test Items	Test Conditions	Reference Standard	Sample Size	*ACC /REJ	LTPD
High Temperature Operating Life Test (HTOLT)	TA=125°C 500/1000 hours	MIL-STD-883D-1005.8	77	1/2	5%
High Temperature Storage Life Test (HTSLT)	TA=150°C 500/1000 hours	EIAJ-ED-4701B-111	77	1/2	5%
Latch-up	Current/Voltage Trigger pulse width =10ms	JEDEC-STD No. 78	3/mode	-	-
ESD	R=1.5kΩ, C=100pF	MIL-STD-883 Method 3015.7	3/mode	-	-

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## THE FIT OF DM9162IEP

1. CONCLUSION: The FIT value of DM9162IEP is **386**.

The MTBF value of DM9162IEP is  $1/\text{FIT} \sim$  **2,589,353** hours

2. EXPLANATION :

(1) HISTORY of HTOLT :

For each lot: sample size = 77, test time = 1000 hours

Result: Pass 1000 hours \* 1 lot

(2) CALCULATION OF FIT

$$\text{FIT} = \lambda(t_2) = \lambda(t_1) / F(t_1, t_2)$$

Where  $\lambda_t = X^2(2n=2, CL) / 2 * N * T$  failure rate

$F(t_1, t_2) = \text{Exp}[-(E_a/K)(1/t_1 - 1/t_2)]$  acceleration factor

Note 1: Meaning of Symbols

N: test sample size

T: test time

$X^2$ : CHI-SQUARE function

n: failure no.

CL: confidence level

$E_a$ : activation energy (eV)

K: Boltzman's constant ( $8.63 * 10^{-5}$  eV/K)

$t_1$ : test temperature in K

$t_2$ : desired temperature in K

Note 2: Example of Calculation

CL = 90%

$E_a = 0.7 \text{ eV}$

$t_1 = 125^\circ \text{C} = 398^\circ \text{K}$

$t_2 = 55^\circ \text{C} = 328^\circ \text{K} \rightarrow F = 77.43$  (acceleration factor)

$N * T = (77 * 1) * 1000 = 77000$

$\lambda(t_1) = X^2[2 * (n+1), 90\%] / (2 * N * T)$

$= 4.61 / (2 * 77000)$

$= 2.99 * 10^{-5}$

$\therefore \lambda(t_2) = \lambda(t_1) / F = 2.99 * 10^{-5} / 77.43 = 386 * 10^{-9} = 386$  (FIT)