



聯 傑 國 際 股 份 有 限 公 司

DAVICOM SEMICONDUCTOR INC.

RELIABILITY TEST REPORT

PART No. : DM9161BIEP

PACKAGE TYPE: LQFP-48L

REPORT VERSION: [0]

RA No.: DSI-RA-9161BIEP

DATE: 03.03.2008

PREPARED BY

APPROVED BY

Vivian

Martin Lu

Vivian Chang

Martin Lu



聯傑國際股份有限公司

DAVICOM SEMICONDUCTOR INC.

新竹科學工業園區
 力行六路 6 號
 No.6 Li-Hsin Rd. VI, Science Park,
 Hsin-Chu, Taiwan, R.O.C.

TEL: 886-3-5798797

FAX: 886-3-5798859

PART No.: DM9161BIEP

Test Item	Start Date	Finished Date	Sample Size	Test Time	*ACC / REJ	Test LTPD	Test Result	Test Purpose	Remark
ESD	07/12/2007	07/19/2007	30	-	-	-	CLASS 3 7000V	NEW PD	SEE NOTE 1
Latch UP	07/13/2007	07/23/2007	15	-	-	-	CLASS 1	NEW PD	SEE NOTE 2
HTOL	01/11/2008	02/26/2008	77	1000H	1/2	5%	Pass 77ea	NEW PD	FIT=386
BLT	01/11/2008	02/26/2008	77	1000H	1/2	5%	Pass 77ea	NEW PD	-
HTSLT	01/11/2008	02/25/2008	77	1000H	1/2	5%	Pass 77ea	NEW PD	-
LTSLT	01/11/2008	02/25/2008	77	1000H	1/2	5%	Pass 77ea	NEW PD	-
Note 1:					Note 2:				
CLASS 1 : 0V – 1999V CLASS 2 : 2000V – 3999V CLASS 3 : 4000V – or ABOVE					CLASS 1 : $\pm VT = 1.5 \times VDD$ $-VT = -0.5 \times VDD$ $\pm IT = I_{nom} + 100mA$ $-IT = -100mA$				

* ACC. Criterion: ≤ 1 failure, REJ. Criterion: ≥ 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 1000 hours	MIL-STD-883D-1005.8	77	1/2	5%
High Temperature Bias Life Test (HTBLT)	TA=125°C 1000 hours	MIL-STD-883D-1005.8	77	1/2	5%
High Temperature Storage Life Test (HTSLT)	TA=150°C 1000 hours	EIAJ-ED-4701B-111	77	1/2	5%
Low Temperature Storage Life Test (LTSLT)	TA=-65°C 1000 hours	EIAJ-ED-4701B-112	77	1/2	5%
Latch-up	Current/Voltage Trigger pulse width =10ms	JEDEC-STD No. 78	2/mode	-	-
ESD	R=1.5kΩ, C=100pF	MIL-STD-883 Method 3015.7	2/mode	-	-

* ACC. Criterion: ≤ 1 failure, REJ. Criterion: ≥ 2 failures



聯傑國際股份有限公司

DAVICOM SEMICONDUCTOR INC.

THE FIT OF DM9161BIEP

1. CONCLUSION: The FIT value of DM9161BIEP is **386**.

The MTBF value of DM9161BIEP is $1/\text{FIT} \sim$ **2,589,353** hours

2. EXPLANATION :

(1) HISTORY of OLT :

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

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

Ea: activation energy (eV)

K: Boltzman's constant ($8.63*10^{-5}$ eV/⁰k)

t₁: test temperature in ⁰k

t₂: desired temperature in ⁰k

Note 2: Example of Calculation

CL = 90%

Ea = 0.7Ev

t₁ = 125 ⁰C = 398 ⁰k

t₂ = 55 ⁰C = 328 ⁰k → F = 77.43 (acceleration factor)

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

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

= 1.83/(2*77000)

= **1.18*10⁻⁵**

∴ $\lambda(t_2) = \lambda(t_1)/F = 1.18*10^{-5}/77.43 = 386*10^{-9} = 386$ (FIT)