MTBF Demonstration Test Report

Test Purpose :	Z19 MTBF 測試
Test Results:	Pass
Model Type:	M215HAN01.200
Testing date	2016/06/13~2017/07/26
Issue date	2016/07/27

Ver.	Judgment	Changed	Description
0	Pass		

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MTBF Demonstration Test

1.0 Purpose:

The purpose of this report is to 1) formally describe the procedure used by LCD vendor to demonstrate MTBF with a higher confidence level prior to mass production and show that this procedure is adequate to meet the requirements of the Customer and 2) formally establish the methodology that AUO and LCD system customer shall use to meet the Ongoing Reliability Requirements (ORT) goal.

2.0 Definitions:

LCD Module – LCD Module consists of LCD panel, Inverter and CCFL.

MTBF – Mean Time Between Failures

q0 – Goal MTBF or Upper test MTBF. The upper test MTBF is an acceptable value of MTBF equal to the discrimination ratio times the lower test MTBF. Standard tests will accept, with a high probability, product with a true MTBF approaching q0.1

q1 – Lower test MTBF. The lower test MTBF is a value that is unacceptable and the standard test plans will reject, with a high probability, product with a true MTBF that approaches q1.1

D – Discrimination ratio. Discrimination ratio is the test plan envelope, d = q0/q1.1

b - Consumer's risk. Consumer's risk is the probability of accepting product with a true MTBF equal to the lower test MTBF (q1). The probability of accepting product less than q1 is less than b. 1

a - Producer's risk. Producer's risk is the probability of rejecting product with true MTBF equal to the goal MTBF (q0). The probability of rejecting product with true MTBF greater than q0 is less than a. 1

3.0 References:

1. MIL-STD-781. Department of Defense, 21 October 1977.
2. AUO Engineering Instruction (EI) Test Procedure, current revision.
3. AUO LCD Panel Product Specification.

4.0 Test procedure of AUO to demonstrate MTBF prior to mass production:

"Reliability Demonstration Test Plan", the following test plan will be applied to all newly developed LCD modules or any LCD module that is modified in a considerable manner.

• MTBF Demonstration time: 100,000 hours

• Confidence Level: 90%

• Sample quantity: shall not be less than 10 units

• Demonstration time: shall not be less than 300

• Temperature /Humidity: 40℃-70℃/ humidity should be ranged from. 25% -85% RH

Additional test conditions if applicable:

• Power cycling: 3.0 hours ON and 30 minutes OFF (TBD).

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A time terminated reliability test will be performed with the following time requirements dependant on the numbers of failures:

Failures MTBF	Time multiplier	90% confidence	Min. test hours with 0	failure	Sample size Hours
0	100,000	2.3	230,000	20	11,500
1	100,000	3.89	389,000	20	19,450
2	100,000	5.32	532,000	20	26,600
3	100,000	6.68	668,000	20	33,400
4	100,000	7.99	799,000	20	39,950
5	100,000	9.27	927,000	20	46,350

Therefore the minimum “on test” time will be 100,000 hours with zero failures not considering acceleration factors. The demonstrated MTBF for this time with zero failures will be:

Demonstrated MTBF

= (sample size) x (# days) x 24 (hours/day) x 11.64 (temp. accel @60℃)/2.3 (90% confidence level)

=100,000 hours (0 failures)

Thermal acceleration factor based on Arrhenius model with eV = 0.6

Ambient temp.(T1)	Test temp.(T2)	Taf (Temp only)	Taf(consider humidity-80%RH)
25C/50%	35C	2.13	5.47
25C/50%	40C	3.06	7.84
25C/50%	45C	4.34	11.12
25C/50%	50C	6.09	15.68
25C/50%	55C	8.46	21.66
25C/50%	60C	11.64	29.79

5.0 Test Result: demonstrate MTBF > 100,000 hours

5.1 Test Equipment : Dynamic operation, DC power supply, Signal generator

5.2 Test Location : QRE Aging Lab.

5.3 Test Date : 2016/06/13~2016/07/26 42Days

5.4 Sample Size : 20 Pcs

5.5 Test condition : Temperature/Humidity: 60. 0C/0%RH

5.6 Check Point : 100 hrs. 200 hrs. 300 hrs 500 hrs 1000 hrs…

5.7 Check Item :

1) The LCD module shall meet the Product Spec. after HTO test. No mal- function, screen quality and appearance.

2) The LCD cell shall meet the Functional Spec. after HTO test. No defect of function, screen quality and appearance. (Bezel deform action and polarizer abnormal were belong to fail. And the pixel defect shall not be increased after test)

3) The LCD array shall meet the Functional Spec. after HTO test. No defect of function, screen quality and

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appearance. (To put in normal temp, and check FOS at each time, the mura, bezel deform action and pixel defect increase shall not be allowed)

5.8 Test Criteria: Confident Level: 90%; MTBF >100,000 hours

5.9 Test Result : Pass

Demonstrated MTBF = (sample size) x (# days) x 24 (hours/day) x 11.64 (Temperature/Humidity: 40 0C/0%RH) / 2.3 (90% confidence level)

= 20*42*24*11.64/2.3

= 102027 hours

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