

ASAT EDQUAD

Plastic Quad Flatpack Package

Reliability Assessment Report

Abstract

This report summarizes reliability assessment test results obtained on the EDQUAD plastic quad flatpack surface mount package manufactured at ASAT Ltd. in Hong Kong. The 100 lead TQ8105 and TQ8106 devices were used as test vehicles. This report is comprised of data from various JEDEC standard tests including Wire Pull, Ball Sheer, Physical Dimensions, Mark Permanency, Solderability, and Lead Integrity. Additional reliability data from ASAT is also included.

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Package Description

The EDQUAD package is a thermally enhanced plastic quad flatpack package that is manufactured by ASAT Ltd. in Hong Kong. Internal construction consists of a copper heat sink, an interposer ring for down bonding (Ground), a ceramic spacer to separate the lead frame and heat sink, and a copper leadframe. Specific materials used are listed in Table 1. Figure 1 shows a cross-sectional diagram of the package construction.

Package dimensions are 14mm x 14mm x 2mm. The junction-to-case (Θ_{jc}) thermal impedance of the package has been measured at TriQuint to be 6°C/W. Average junction-to-ambient (Θ_{ja}) thermal impedance is reported by ASAT to be 18.7°C/W.

Table 1 - EDQUAD Package Materials

Item	Material
Leadframe	EFTEC 64T Copper Alloy
Leadframe Finish	Tin/Lead (85%/15%)
Die Attach	Sumitomo CRM-1079B
Interposer Ring Attach	Sumitomo CRM-1146A
Molding Compound	Sumikon EME 6710SJ
Bond Wire	1.0 mil Gold
Heat Sink	Copper

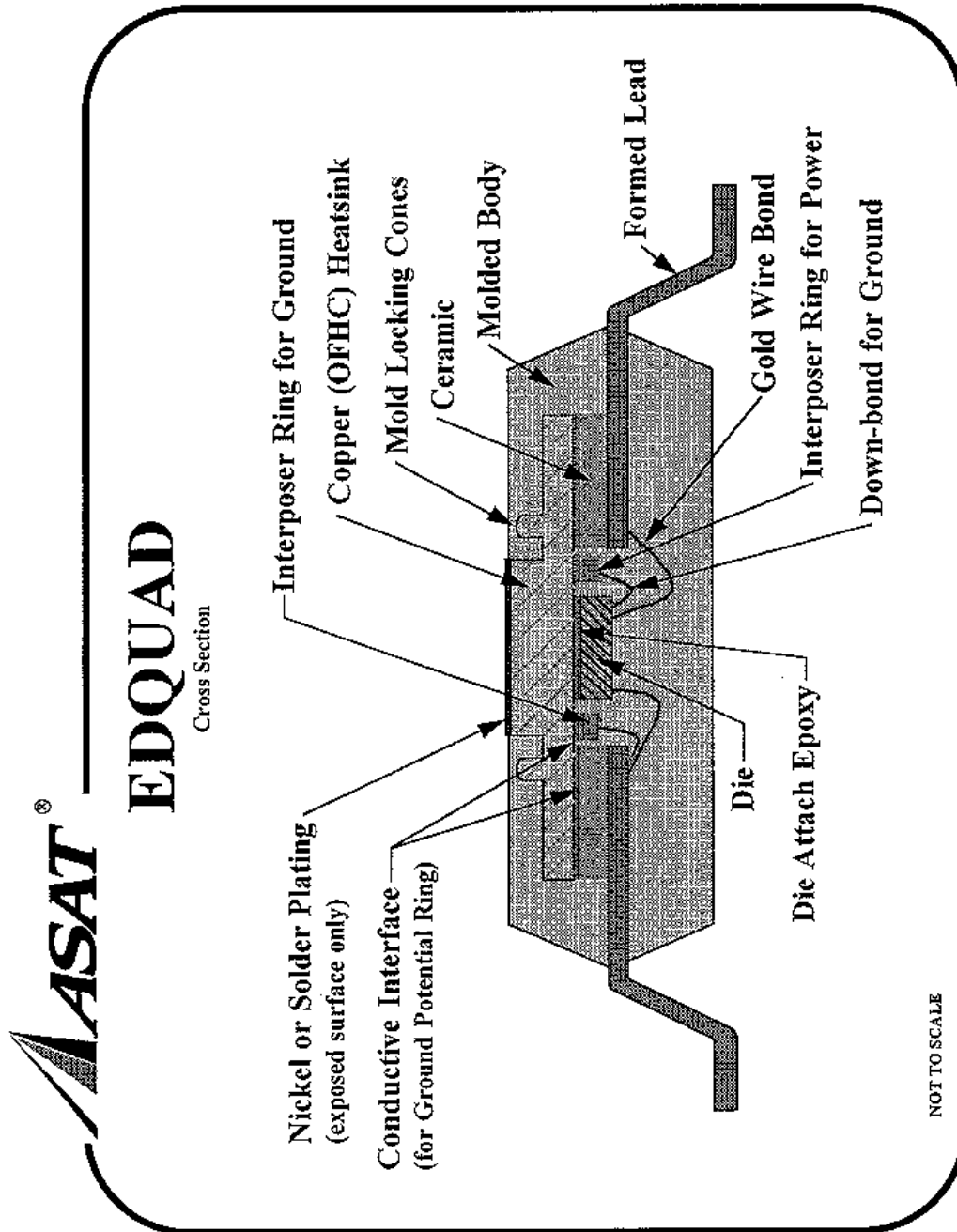
Reliability Assessment Plan

Table 2 - EDQUAD Package Reliability Assessment Plan

Item	Test Name	Specification / Method	Lots Sampled	Samples per Lot
1	Physical Dimensions	JEDEC JESD22-B100	3	2
2	Mark Permanency	JEDEC JESD22-B107	3	4
3	Solderability	JEDEC JESD22-B102	3	3
4	Lead Integrity	JEDEC JESD22-B105	3	3
5	Wire Pull	ASAT Procedure SC30501	3	1
6	Ball Shear	ASAT Procedure SC30502	3	1



Figure 1: EDQUAD Package Cross Section



Physical Dimensions

Physical dimensions were measured on 2 sample devices from each of 3 different assembly lots. The samples used were 100-lead count TQ8105 products. The testing was performed in accordance with JEDEC standard JESD22-B100 and package measurements were compared to the manufacturer's datasheet for this package. The results are shown in Table 3.

Table 3 - Physical Dimensions Results

Device	Lead Count	Assembly Lot	Failures / Samples
TQ8105	100	9927A	0 / 2
TQ8105	100	2259A	0 / 2
TQ8105	100	5744A	0 / 2

Mark Permanency

Mark Permanency was evaluated on 4 sample devices from each of 3 different assembly lots. The samples used were 100-lead count TQ8105 products. The testing was performed in accordance with JEDEC standard JESD22-B107. The results are shown in Table 4.

Table 4 - Mark Permanency Results

Device	Lead Count	Assembly Lot	Failures / Samples
TQ8105	100	9927A	0 / 4
TQ8105	100	2259A	0 / 4
TQ8105	100	5744A	0 / 4

Solderability

Solderability testing was performed on 3 sample devices from each of 3 different assembly lots. The samples used were 100-lead count TQ8105 products. The testing was performed in accordance with JEDEC standard JESD22-B102. 25 leads on each sample device were tested. The results are shown in Table 5.

Table 5 - Solderability Results

Device	Lead Count	Assembly Lot	Failures / Samples
TQ8105	100	9927A	0 / 3
TQ8105	100	2259A	0 / 3
TQ8105	100	5744A	0 / 3



Lead Integrity

Lead Integrity testing was performed on 3 sample devices from each of 3 different assembly lots. The samples used were 100-lead count TQ8105 products. The testing was performed in accordance with JEDEC standard JESD22-B105. 8-9 leads on each sample device (25 leads total per assembly lot) were tested. The results are shown in Table 6.

Table 6 - Lead Integrity Results

Device	Lead Count	Assembly Lot	Failures / Samples
TQ8105	100	9927A	0 / 3
TQ8105	100	2259A	0 / 3
TQ8105	100	5744A	0 / 3

Wire Pull

Wire Pull testing was performed on 1 sample device from each of 3 different assembly lots. The samples used were 100-lead count TQ8105 or TQ8106 products. The testing was performed in accordance with ASAT procedure SC30501. 10 bond wires on each sample device were tested. The results are shown in Table 7. All data exceed minimum specifications.

Table 7 - Wire Pull Results

Device	Lead Count	Assembly Lot	Mean (g)	St. Dev. (g)	Min. (g)
TQ8105	100	14093	6.42	0.65	5.6
TQ8105	100	14094	5.91	1.00	5.0
TQ8106	100	1538A	6.00	0.35	5.3

Ball Shear

Ball Shear strength testing was performed on 1 sample device from each of 3 different assembly lots. The samples used were 100-lead count TQ8105 or TQ8106 products. The testing was performed in accordance with ASAT procedure SC30502. 10 wire balls on each sample device were tested. The results are shown in Table 8. All data exceed minimum specifications.

Table 8 - Ball Shear Results

Device	Lead Count	Assembly Lot	Mean (g)	St. Dev. (g)	Min. (g)
TQ8105	100	14093	57.7	2.74	53.7
TQ8105	100	14094	63.0	10.66	38.5
TQ8106	100	1538A	82.8	11.55	74.0



Figure 2: ASAT EDQUAD Reliability Data



QUALIFICATION TEST RESULTS

TEST	SPECIFICATIONS	RESULT
Autoclave	TA=121°C, P=15 PSIG, 100% RH, Time=168/504 hours	0/77 0/77
Temperature Cycle	-65°C to 150°C, Air to air Soak time = 10 min, Cycles= 150/500	0/77 0/77
Thermal Shock	-65°C to 150°C, liquid to liquid, Dwell time = 5 min, Transfer time = 10 sec, Cycles=300/500	0/10 0/10
IR Reflow	Preconditioning: Temp Cycle: -65°C to 150°C, Dwell time = 10 min, 10 cycles, Dry bake 125°C, 24 hours, IR Reflow, 3 cycles	0/135
Solderability	T _A = 219°C, 8 hours Steam Age	0/22
Dye Penetration	P = 90 PSIG, Time 2 hours	0/22
SAM	Die Surface, Die Paddle (back) Surface	0/22
Lead Integrity	90° Bend, 3 Ounces, 3 Cycles 5 Leads/112 Units	0/55
Moisture Absorption	T _A = 18-26°C, 40-60% RH Time = 5 Days, 5 Units	0.042%

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