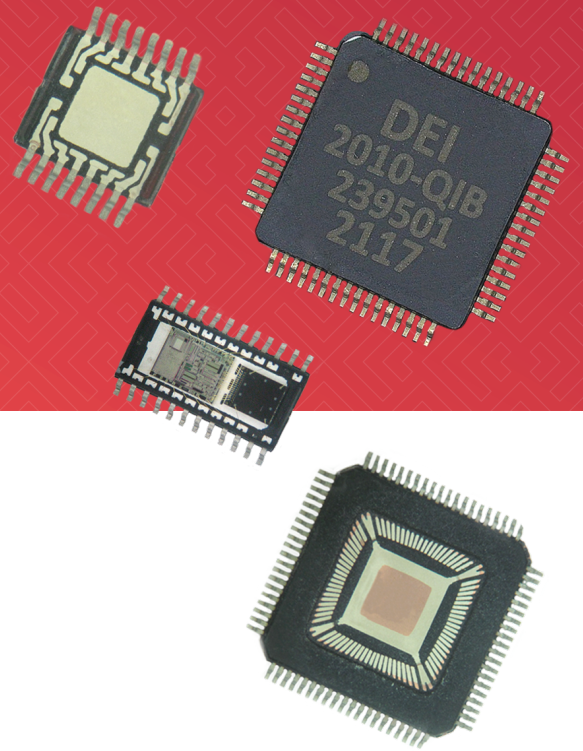




QPTECHNOLOGIES



Open-Cavity Plastic Packages (OCP):

A Robust IC Solution for High-Reliability Applications

Sam Sadri, QP Technologies & Tom Tammen, Device Engineering, Inc. (DEI)

- › OCPP is a quick-turn option for PQFP prototypes for fast IC design verification
- › Well-suited for cost-sensitive, small-batch projects or when specific plastic packages are not readily available
- › Any existing IC plastic package can be converted into OCPP, ready to be assembled with new die
- › Built at QP Technologies' stateside, ITAR-registered facility

CASE STUDY

Packages built for avionics ASIC provider DEI

- › Met MSL-3 / 235°C solder stress tests with NO evidence of delamination
- › Met requirements of FACTORY-FRESH parts
- › Enabled company to meet crucial production schedule

CASE STUDY FIGURES (P2) →

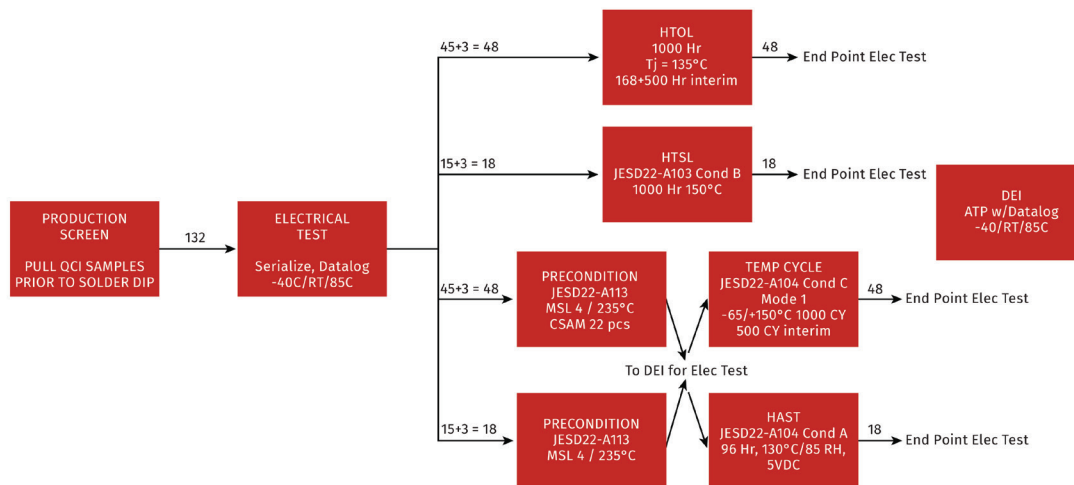


Figure 1: Qualification test plan for 64QFP OCPP

Package Assembly Tests

QC Lot				
Test	Min Limit	SS	Range	Result
Die Shear	2.5 kg	6 units	12.3 - 27.8 kg	Pass
Destructive Wire Pull	4.0 gr	2 units 12 wires each	7.4 - 14.3 gr	Pass

Tin Mitigation SnPb Hot Solder Dip Tests

HSD of "Dummy Packages" no die			
Test	SS	Notes	Results
CSAM Inspection	4 units	No delamination	Pass
XRF Composition/Thickness	3 units 4 readings each	SnPB% OK Thickness OK	Pass

Figure 2a: Qualification Test Summary

QC Lot ¹						
Test	Condition	Duration	Sample Size	Reject	Date	Notes
Electrical ASL Test	DC Characteristics and Function -40 °C, 25 °C, +85 °C	N/A	132	0	4Q20	
RF Test	RF Function -40 °C, 25 °C, +85 °C	N/A	132	0	4Q20	
PC Precondition	JESD22-A113 MSL4 / 235 °C, CSAM, qty 22	24 hours	66	0	4Q20	
PC+HAST	JESD22-A110 Cond A 130 °C, 85% RH, Biased, Cycled Power	96 hours	18	0	4Q20	
HTOL	883 Grp C TM1005 Tj>125 °C, Ta=90 °C, 5 V Constant Bias	1000 hours	47	0	4Q20	(2)
HTSL	JESD22-A103 cond B Ta = 150 °C	1000 hours	18	0	4Q20	
PC+TC	JESD22-A104 cond C Mode 1 -65 °C to +150 °C	1000 cycles	48	0	4Q20	

1. QCI samples are without SnPb HSD.
2. One of 48 HTOL samples was pulled at the HTOL 500 hr interim test due to a non-relevant failure. It failed electrical continuity due to lead/socket issues. The leads were cleaned with IPA/sonic and the unit then passed electrical test but was too late to return to the oven.

Figure 2b: Qualification Test Summary