

GOVERNMENT - INDUSTRY DATA EXCHANGE PROGRAM

PROBLEM ADVISORY

1. TITLE (Class, Function, Type, etc.) Breach Detection in Hybrid Package Seal using CHLD		2. DOCUMENT NUMBER FV5-P-16-001	
		3. DATE (DD-MMM-YY) 16-May-16	
4. MANUFACTURER AND ADDRESS International Rectifier, HiRel Products 2520 Junction Ave. San Jose, CA 95134	5. PART NUMBER FSC 5962	6. NATIONAL STOCK NUMBER Not Applicable	
	7. SPECIFICATION MIL-PRF-38534	8. TYPE DESIGNATOR Hybrid Microcircuits	
	9. LOT DATE CODE START 1206	10. LOT DATE CODE END 1610	
11. MANUFACTURER'S POINT OF CONTACT Granville C. Rains	12. CAGE 52467	13. MANUFACTURER'S FAX ()	
14. MFR. POC PHONE (408) 434-5086	15. MANUFACTURER'S E-MAIL grains1@irf.com		
16. CROSS REFERENCE VENDOR NA	17. CROSS REFERENCE CAGE NA	18. CROSS REFERENCE PART NA	
<p>19. PROBLEM DESCRIPTION / DISCUSSION / EFFECT: Basic Operation of CHLD: The DUT is placed in a chamber connected to an evacuating system and a mass-spectrometer-type leak detector. When the chamber is evacuated, any trace gas which was previously forced into the specimen (i.e. 10% Helium backfill during seam weld) will thus be drawn out and indicated by the leak detector as a measured leak rate (R).</p> <p>In the course of a DLA Land and Maritime audit of International Rectifier San Jose (IR) Cumulative Helium Leak Detection (CHLD) conducted March 9-11, 2016 it was noted that the CHLD system internal threshold was not set to register a hybrid package with a large hermetic breach such as punch holes in the lid (i.e. IGA puncture) or taped on lid as a hermetic failure. The hybrid packages tested were IGA samples from various product families and dates code which were sitting in open air storage and not exposed to Helium bomb. Specifically for the test in question IR had a gross leak threshold set at 6.00E-07 atm cc/sec (He). The CHLD gross leak detection threshold settings allowed the tester to pump out the room air from the package but not register the obvious gross package breach as a failure. The CHLD would then switch to the fine leak test mode and register a pass, since no trace Helium gas from seal operation was present.</p> <p>Hybrid packages are hermetically sealed with an internal gas content comprised of 10% (minimum) Helium tracer gas as required by MIL-PRF-38534. Prior to the seal test after environmental screening the hybrid packages are submitted to fine and gross leak test immediately after seal in order to detect errant welds (common gross leak). IR tested packages with defective weld made intentionally, where the package lid was only welded 90% of the perimeter (and also parts with Laser Drilled Holes of 1.2-10 mils diameter in the lid). When those packages were submitted to CHLD testing they were consistently rejected at post seal leak test with the old gross leak threshold of 6.00E-07 atm cc/sec (He) and the new tighter threshold..</p> <p>Thus, IR believes that the risk of delivering a hybrid package with a large hermetic seal breach is unlikely, and that any package with a leak path large enough to escape CHLD detection after environmental screening would have been found as defective at the required visual inspection. Supporting this opinion, IR has conducted in excess of 20,000 individual CHLD test (testing one hybrid at a time). We have not detected any hybrid failures due to hermetic seal, nor have we received any customer complaints for hermetic concerns for CHLD screened devices since the implementation of CHLD in Sept of 2011. Several customers have also used end of life samples such as Group C1 & C2 samples for DPA, each with passing hermetic reports from independent third party labs.</p>			
<p>20. ACTION TAKEN/PLANNED</p> <p>1/ Following the discovery of this possible gap in gross leak detection, IR immediately added a second Gross Leak test post CHLD with either Kr-85 or FC (Fluorocarbon) as specified and allowed within given customer purchase orders. No Leak failures have been noted on any military or space hybrid product subjected to the additional test.</p> <p>2/ IR consulted with the CHLD OEM, and adopted new calibration procedures that allow for the extension of gross leak detection capability and threshold. By following these procedures, parts with large hermetic seal breach (i.e. IGA puncture hole) were subjected to additional CHLD tests and were now detectable as gross leakers.</p> <p>3/ Even though IR has validated the threshold limit as outlined by the CHLD manufacturer and can successfully detect IGA samples placed within a given test sequence, prior to shipment, all Class K SMD and CK hybrid product is being subjected to an additional hermetic test via FC until such time as DLA indicates their satisfaction with the system performance. DLA has since reauthorized use of the CHLD system for gross leak testing effective June 12, 2016.</p> <p>4/ International Rectifier is also testing all Class K SMD and CK inventory from the affected date codes and has not detected any failures.</p> <p>5/ Customers in receipt of Class K SMD and CK hybrids of the affected date codes may contact IR for data queries or for additional test of their product if required. .</p> <p>6/ This Problem Advisory has been coordinated with DLA Land and Maritime -VQH prior to its release.</p>			
21. DATE MFR. NOTIFIED		23. ORIGINATOR ADDRESS/POINT OF CONTACT	
<input type="checkbox"/> REPLY ATTACHED <input type="checkbox"/> NO REPLY			
24. GIDEP REPRESENTATIVE Granville C. Rains		25. SIGNATURE 	26. DATE 16 June 2016

19. PROBLEM DESCRIPTION / DISCUSSION / EFFECT (cont.)

Investigation at IR further concluded that the primary issue was the high threshold setting which was programmed into the test system. IR reviewed the fundamental design work of the CHLD system and determined that in the gross leak detection mode, it is required that the gross leak threshold limit be checked using appropriate fixturing and empty test chamber. This check should be conducted at the start of the day after at least 3 calibrations have been completed and the S/B ratio is well above the 100 limit. Since the Gross Leak Amplitude is the sum of the Helium in the purge gas as well as the Helium released from the package under test, it is important that the threshold limit be verified with each set up and use.

20. ACTION TAKEN/PLANNED (cont.)

To use the CHLD to its full capability of both fine and gross leak detection, IR has implemented the CHLD OEM latest recommendations that the gross leak threshold limit be determined or checked on a daily basis using a known package placed within appropriate fixturing and empty test chamber. To perform this daily set up, IR has put in place solid metal slugs of the same size as the package to be tested. This ensures that the presence of any additional He beyond the pre-set cavity void is clearly detected. As an added benefit to these actions, IGA sampled devices which have been sitting in open air are now able to be detected as a Gross Leak device when tested even though internal process control are such that any device with such visible damage would never be subjected to such a test in the normal course of daily production activities.