



I-Pak

RoHS Compliance Document

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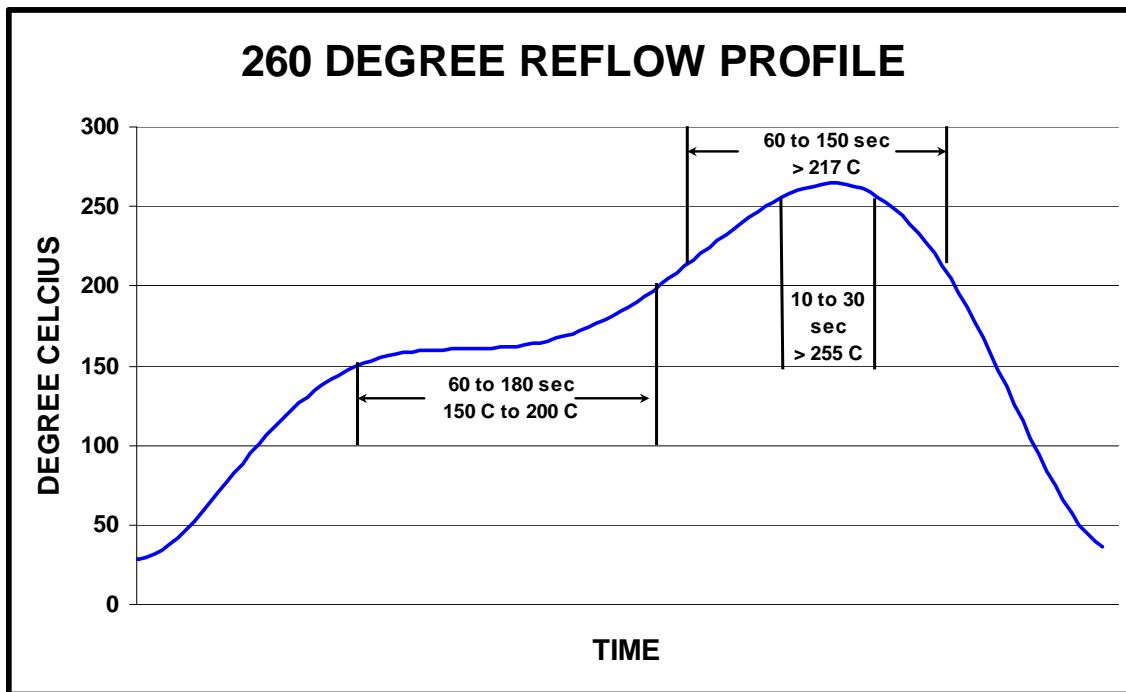
1. Composition
2. Solder Reflow
3. Tin Whisker Report



I-pak BOM 1

| Component | Material Name | Material Mass (g) | Element Name Composition | CAS # | Substance Mass (g) | Material Analysis Weight (%) | % of Total Weight |
|----------------------|------------------------|-------------------|--------------------------|----------------|--------------------|------------------------------|-------------------|
| Chip | Silicon | 0.00713 | Si | 7440-21-3 | 0.00713 | 100% | 1.9% |
| Encapsulant | Epoxy Resin | 0.11419 | SiO2 | 7631-86-9 | 0.09136 | 80% | 24.8% |
| | | | Epoxy | 90598-46-2 | 0.01142 | 10% | 3.1% |
| | | | Other | - | 0.01141 | 10% | 3.1% |
| Lead Frame | Copper | 0.24040 | Cu | 7440-50-8 | 0.23992 | 99.8% | 65.1% |
| | | | Sn | 7440-31-5 | 0.00048 | 0.2% | 0.1% |
| Die Attach | Soft Solder | 0.00270 | Pb | 7439-92-1 | 0.00242 | 90% | 0.7% |
| | | | In | 7440-74-6 | 0.00014 | 5% | 0.0% |
| | | | Ag | 7440-22-4 | 0.00014 | 5% | 0.0% |
| Wire bond | Aluminum | 0.00080 | Al | 7429-90-5 | 0.00080 | 100% | 0.2% |
| Lead Finish | Matte Tin over Nickel* | 0.00320 | Ni | 7440-02-0 | 0.00050 | 16% | 0.1% |
| | | | Sn | 7440-31-5 | 0.00270 | 84% | 0.7% |
| MSL1 at 260 C | | Total Weight (g) | | 0.36842 | | | |

* Tin whisker mitigation strategy is nickel under-plate.



This part is compliant with EU Directive 2002/95/EC (RoHS) and does not contain lead, mercury, cadmium (0.01%), hexavalent chromium, PBB or PBDE in concentrations greater than 0.1%, except as permitted by Annex (7).

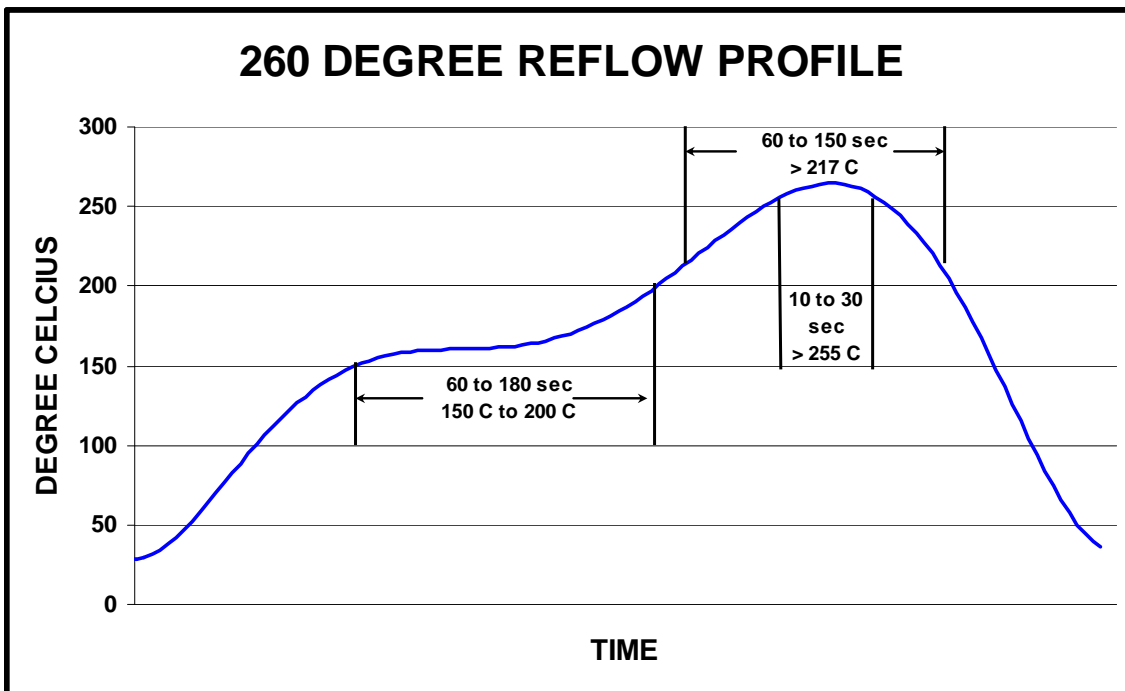
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I-pak BOM 2

| Component | Material Name | Material Mass (g) | Element Name Composition | CAS # | Substance Mass (g) | Material Analysis Weight (%) | % of Total Weight |
|----------------------|---------------|-------------------|--------------------------|----------------|--------------------|------------------------------|-------------------|
| Chip | Silicon | 0.00713 | Si | 7440-21-3 | 0.00713 | 100% | 1.9% |
| Encapsulant | Epoxy Resin | 0.11419 | SiO2 | 7631-86-9 | 0.09136 | 80% | 24.8% |
| | | | Epoxy | 90598-46-2 | 0.01142 | 10% | 3.1% |
| | | | Other | - | 0.01141 | 10% | 3.1% |
| Lead Frame | Copper | 0.24040 | Cu | 7440-50-8 | 0.23992 | 99.8% | 65.2% |
| | | | Sn | 7440-31-5 | 0.00048 | 0.2% | 0.1% |
| Die Attach | Soft Solder | 0.00270 | Pb | 7439-92-1 | 0.00242 | 90% | 0.7% |
| | | | In | 7440-74-6 | 0.00014 | 5% | 0.0% |
| | | | Ag | 7440-22-4 | 0.00014 | 5% | 0.0% |
| Wire bond | Aluminum | 0.00080 | Al | 7429-90-5 | 0.00080 | 100% | 0.2% |
| Lead Finish | Matte Tin* | 0.00320 | Sn | 7440-31-5 | 0.00320 | 100% | 0.9% |
| MSL1 at 260 C | | Total Weight (g) | | 0.36842 | | | |

* Tin whisker mitigation strategy is 150 C, 1 hour anneal within 24 hours of tin plating.



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I-pak IR

| Test Definition | Test Conditions | Inspection Interval Class 1 and 2 Products | Total Duration Class 1 and 2 Products | Maximum Whisker Length (um) |
|--|--|---|--|------------------------------------|
| Room Temperature Humidity Storage | 30± 2°C/60± 3%RH | 1000 hours | 4000 hours | 20 |
| Temperature Humidity Unbiased | 55± 3°C/85±3% RH | 1000 hours | 4000 hours | 20 |
| Temperature Cycling | -40 to 55°C to 80 to 95°C, air to air, 10 min soak, approx 3 cycles /hours | 500 cycles | 1500 cycles | 45 |

Tin Whisker testing per JESD201, Environmental Acceptance Requirements for Tin Whisker Susceptibility of Tin and Tin Alloy Surface Finish

Tin Whisker Results (number of failing whiskers)

| Test | 1000 Hours | 2000 Hours | 3000 Hours | 4000 Hours |
|--|-------------------|--------------------|--------------------|-------------------|
| Room Temperature Humidity Storage | 0/60 | 0/60 | 0/60 | 0/60 |
| Temperature Humidity Unbiased | 0/60 | 0/60 | 0/60 | 0/60 |
| Test | 500 Cycles | 1000 Cycles | 1500 Cycles | |
| Temperature Cycling | 0/60 | 0/60 | 0/60 | |