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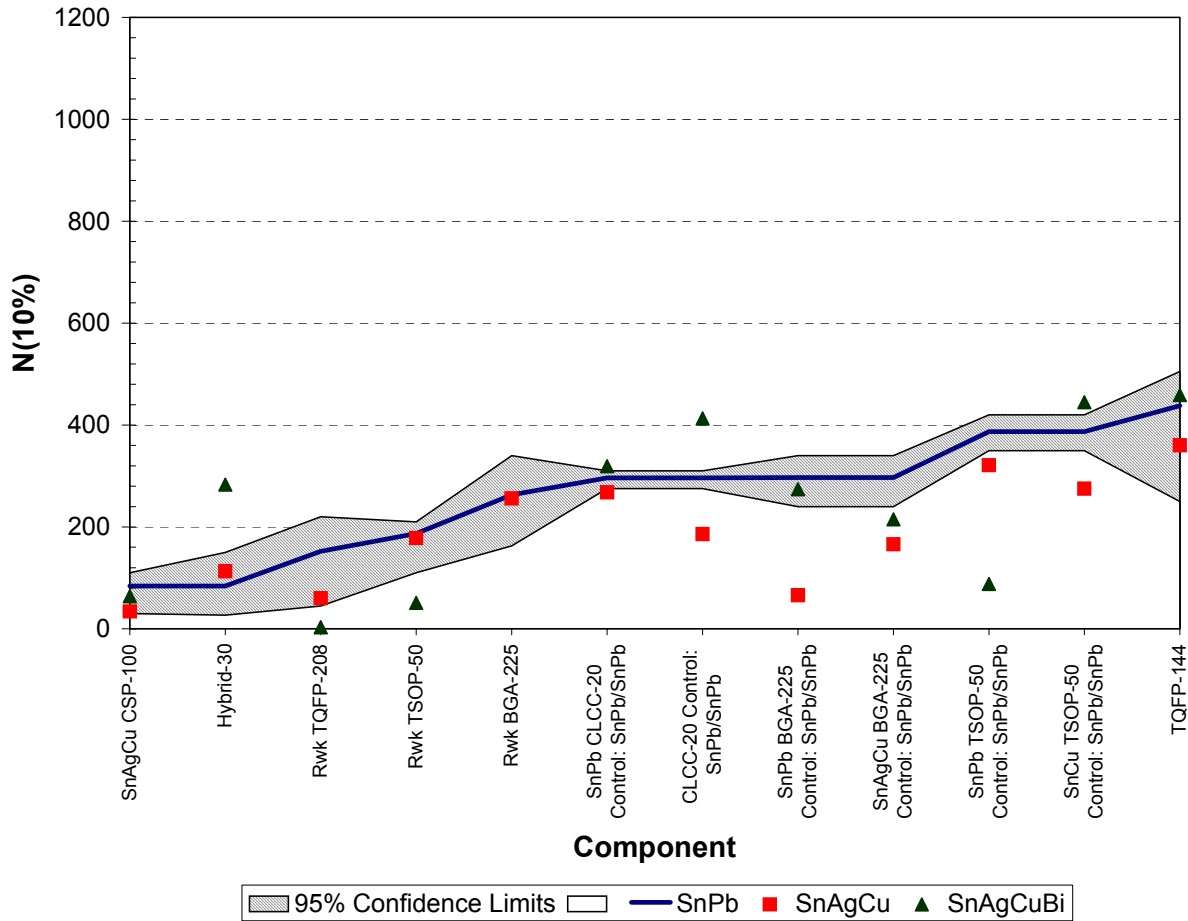


Figure 1 – Lead-Free Solders Compared to Tin Lead Controls Based on N(10%)

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Table 1 - Solder Performance During Combined Environments Testing

| Solder Performance | | | | |
|--------------------|---------------|-------------|-----|-----|
| Component | Solder/Finish | 1st Failure | N10 | N63 |
| BGA-225 | SnPb/SnPb | 175 | 297 | 504 |
| | SAC/SAC | 100 | 166 | 317 |
| | SACB/SAC | 1 (137) | 215 | 394 |
| | SAC/SnPb | 30 | 66 | 385 |
| | SACB/SnPb | 223 | 274 | 445 |
| CLCC-20 | SnPb/SnPb | 259 | 296 | 369 |
| | SAC/SAC | 168 | 186 | 260 |
| | SACB/SACB | 1 (363) | 413 | 507 |
| | SAC/SnPb | 230 | 268 | 326 |
| | SACB/SnPb | 302 | 319 | 410 |
| TQFP-144 | SnPb/Sn | 327 | 438 | 667 |
| | SAC/Sn | 308 | 360 | 566 |
| | SACB/Sn | 29 (353) | 459 | 653 |
| TSOP-50 | SnPb/SnPb | 347 | 387 | 516 |
| | SAC/SnCu | 221 | 275 | 392 |
| | SACB/SnCu | 367 | 445 | 595 |
| | SAC/SnPb | 301 | 321 | 428 |
| | SACB/SnPb | 51 | 88 | 220 |
| CSP-100 | SnPb/SnPb | 15 | 84 | 287 |
| | SAC/SAC | 24 | 34 | 171 |
| | SACB/SAC | 2 (36) | 64 | 145 |
| Hybrid-30 | SnPb/SnPb | 36 | 84 | 319 |
| | SAC/SAC | 105 | 113 | 310 |
| | SACB/SACB | 232 | 283 | 500 |
| Rwk BGA-225 | NA/SnPb | 252 | 263 | 336 |
| | NA/SAC | 169 | 256 | 458 |
| Rwk TQFP-208 | SnPb/AuPdNi | 148 | 152 | 365 |
| | SAC/AuPdNi | 52 | 60 | 385 |
| | SACB/AuPdNi | 2 | 3 | 169 |
| Rwk TSOP-50 | SnPb/SnPb | 186 | 187 | 281 |
| | SAC/SnCu | 156 | 178 | 375 |
| | SACB/SnCu | 22 | 51 | 226 |

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Table 2 - Relative Solder Performance During Combined Environments Testing

| Relative Solder Performance | | | | |
|------------------------------------|----------------------|--------------------|------------|------------|
| Component | Solder/Finish | 1st Failure | N10 | N63 |
| BGA-225 | SnPb/SnPb | 0 | 0 | 0 |
| | SAC/SAC | -- | -- | -- |
| | SACB/SAC | -- | -- | -- |
| | SAC/SnPb | -- | -- | -- |
| | SACB/SnPb | ++ | - | - |
| CLCC-20 | SnPb/SnPb | 0 | 0 | 0 |
| | SAC/SAC | -- | -- | -- |
| | SACB/SACB | ++ | ++ | ++ |
| | SAC/SnPb | - | - | - |
| | SACB/SnPb | + | + | + |
| TQFP-144 | SnPb/Sn | 0 | 0 | 0 |
| | SAC/Sn | - | - | - |
| | SACB/Sn | + | 0 | 0 |
| TSOP-50 | SnPb/SnPb | 0 | 0 | 0 |
| | SAC/SnCu | -- | -- | -- |
| | SACB/SnCu | + | + | + |
| | SAC/SnPb | - | - | - |
| | SACB/SnPb | -- | -- | -- |
| CSP-100 | SnPb/SnPb | 0 | 0 | 0 |
| | SAC/SAC | ++ | -- | -- |
| | SACB/SAC | ++ | -- | -- |
| Hybrid-30 | SnPb/SnPb | 0 | 0 | 0 |
| | SAC/SAC | ++ | ++ | 0 |
| | SACB/SACB | ++ | ++ | ++ |
| Rwk BGA-225 | NA/SnPb | 0 | 0 | 0 |
| | NA/SAC | -- | 0 | ++ |
| Rwk TQFP-208 | SnPb/AuPdNi | 0 | 0 | 0 |
| | SAC/AuPdNi | -- | -- | + |
| | SACB/AuPdNi | -- | -- | -- |
| Rwk TSOP-50 | SnPb/SnPb | 0 | 0 | 0 |
| | SAC/SnCu | - | 0 | ++ |
| | SACB/SnCu | -- | -- | - |

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Table 3 Combined Environment Test Samples Meeting the JTP Acceptance Criteria

| Test Vehicle | Solder Alloy | Component Finish | Component Type |
|---------------------|---------------------|-------------------------|-----------------------|
| “Manufactured” | SnAgCuBi | SnAgCuBi | CLCC-20 |
| “Manufactured” | SnAgCuBi | SnPb | CLCC-20 |
| “Manufactured” | SnAgCuBi | Sn | TQFP-144 |
| “Manufactured” | SnAgCuBi | SnCu | TSOP-50 |
| “Rework” | N/A | SnAgCu | BGA-225 |
| “Hybrid” | SnAgCuBi | SnAgCuBi | Hybrid-30 |
| “Hybrid” | SnAgCu | SnAgCu | Hybrid-30 |