

## **ASSR-12xx/14xx/15xx**

### **Standard, 1 Form A, 60V Solid State Relay (MOSFET)**

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## **Introduction**

This report documents the qualification results of the replacement MOSFET, driver IC, and LED to allow business continuity for the affected industrial solid state relay (SSR) in the following parts affected list.

## **Parts Affected**

|                 |                |                |
|-----------------|----------------|----------------|
| ASSR-1218-003E  | ASSR-1410-003E | ASSR-1510-003E |
| ASSR-1218-503E  | ASSR-1410-503E | ASSR-1510-503E |
| ASSR-1218-503ME | ASSR-1411-001E | ASSR-1511-001E |
| ASSR-1219-001E  | ASSR-1411-301E | ASSR-1511-301E |
| ASSR-1219-301E  | ASSR-1411-501E | ASSR-1511-501E |
| ASSR-1219-501E  | ASSR-1420-002E | ASSR-1520-002E |
| ASSR-1228-002E  | ASSR-1420-302E | ASSR-1520-302E |
| ASSR-1228-302E  | ASSR-1420-502E | ASSR-1520-502E |
| ASSR-1228-502E  |                | ASSR-1530-005E |
| ASSR-1228-502ME |                | ASSR-1530-505E |

## **Qualification Matrix**

The qualification was to ensure that the change in MOSFET, driver IC, and LED does not affect the product performance quality and reliability.

The ASSR-1510 was selected as the representative test vehicle for the above-mentioned change and the test vehicle for the SO4 package platform.

**Table 1: Reliability Stress Tests, SO4 Package Platform<sup>a</sup>**

| Item | Test                            | Reference Standard | Test Conditions                                                             | Sample Size                 | Results  |
|------|---------------------------------|--------------------|-----------------------------------------------------------------------------|-----------------------------|----------|
| 1    | High Temperature Operating Life | JESD22-A108        | T <sub>A</sub> = 105°C<br>Biased<br>Duration: 1000 hours                    | 77 units × 3 lots           | Pass     |
| 2    | High Temperature Reverse Bias   | JESD22-A108        | T <sub>A</sub> = 105°C<br>Biased<br>Duration: 1000 hours                    | 77 units × 3 lots           | Pass     |
| 3    | Temperature Cycling             | JESD22-A104        | T <sub>A</sub> = –55°C/125°C<br>Dwell = 15 minutes<br>Duration: 1000 cycles | 77 units × 3 lots           | Pass     |
| 4    | Highly Accelerated Stress Test  | JESD22-A110        | T <sub>A</sub> = 130°C, 85% RH<br>Biased<br>Duration: 96 hours              | 45 units × 3 lots           | Pass     |
| 5    | Unbiased HAST                   | JESD22-A118        | T <sub>A</sub> = 130°C, 85% RH<br>Duration: 96 hours                        | 77 units × 3 lots           | Pass     |
| 6    | High Temperature Storage        | JESD22-A103        | T <sub>A</sub> = 150°C<br>Duration: 1000 hours                              | 77 units × 3 lots           | Pass     |
| 7    | Preconditioning                 | J-STD-020          | Conform to MSL1                                                             | All units from items 1 to 6 | Pass     |
| 8    | ESD – HBM                       | JS-001             | Per reference standard                                                      | 3 units × 1 lot             | Class 2  |
| 9    | ESD – CDM                       | JS-002             | Per reference standard                                                      | 3 units × 1 lot             | Class C3 |

a. Preconditioning includes 20 cycles (–55°C/125°C) prior 3x reflow (with a peak temperature of 260°C)

The ASSR-1511 was selected as the representative test vehicle for the 6-Pin DIP package platform.

**Table 2: Reliability Stress Test, 6-Pin DIP<sup>a</sup>**

| Item | Test                | Reference Standard | Test Conditions                                                            | Sample Size           | Results  |
|------|---------------------|--------------------|----------------------------------------------------------------------------|-----------------------|----------|
| 1    | Temperature Cycling | JESD22-A104        | T <sub>A</sub> = –55/125°C,<br>Dwell = 15 minutes<br>Duration: 1000 cycles | 77 units × 3 lots     | Pass     |
| 2    | Preconditioning     | J-STD-020          | Conform to MSL1                                                            | All units from item 1 | Pass     |
| 3    | ESD – HBM           | JS-001             | Per reference standard                                                     | 3 units × 1 lot       | Class 2  |
| 4    | ESD – CDM           | JS-002             | Per reference standard                                                     | 3 units × 1 lot       | Class C3 |

a. Preconditioning includes 20 cycles (–55/125°C) prior 3x reflow (with peak temperature of 260°C).

The ASSR-1520 was selected as the representative test vehicle for the 8-Pin DIP package platform.

**Table 3: Reliability Stress Test, 8-Pin DIP<sup>a</sup>**

| Item | Test                           | Reference Standard | Test Conditions                                                           | Sample Size                 | Results  |
|------|--------------------------------|--------------------|---------------------------------------------------------------------------|-----------------------------|----------|
| 1    | Temperature Cycling            | JESD22-A104        | T <sub>A</sub> = –55/125°C,<br>Dwell = 15 minutes<br>Duration:1000 cycles | 77 units × 3 lots           | Pass     |
| 2    | Highly Accelerated Stress Test | JESD22-A110        | T <sub>A</sub> = 130°C, 85% R.H.<br>Biased<br>Duration: 96 hours          | 45 units × 3 lots           | Pass     |
| 3    | Unbiased HAST                  | JESD22-A118        | T <sub>A</sub> = 130°C, 85% R.H.<br>Duration: 96 hours                    | 77 units × 3 lots           | Pass     |
| 4    | Preconditioning                | J-STD-020          | Conform to MSL1                                                           | All units from items 1 to 3 | Pass     |
| 5    | ESD – HBM                      | JS-001             | Per reference standard                                                    | 3 units × 1 lot             | Class 2  |
| 6    | ESD – CDM                      | JS-002             | Per reference standard                                                    | 3 units × 1 lot             | Class C3 |

a. Preconditioning includes 20 cycles (–55/125°C) prior 3x reflow (with peak temperature of 260°C).

The ASSR-1530 was selected as the representative test vehicle for the SO8 package platform.

**Table 4: Reliability Stress Test, SO8 Package Platform<sup>a</sup>**

| Item | Test                           | Reference Standard | Test Conditions                                                           | Sample Size                 | Results  |
|------|--------------------------------|--------------------|---------------------------------------------------------------------------|-----------------------------|----------|
| 1    | Temperature Cycling            | JESD22-A104        | T <sub>A</sub> = –55/125°C,<br>Dwell = 15 minutes<br>Duration:1000 cycles | 77 units × 3 lots           | Pass     |
| 2    | Highly Accelerated Stress Test | JESD22-A110        | T <sub>A</sub> = 130°C, 85% R.H.<br>Biased<br>Duration: 96 hours          | 45 units × 3 lots           | Pass     |
| 3    | Unbiased HAST                  | JESD22-A118        | T <sub>A</sub> = 130°C, 85% R.H.<br>Duration: 96 hours                    | 77 units × 3 lots           | Pass     |
| 4    | Preconditioning                | J-STD-020          | Conform to MSL1                                                           | All units from items 1 to 3 | Pass     |
| 5    | ESD – HBM                      | JS-001             | Per reference standard                                                    | 3 units × 1 lot             | Class 2  |
| 6    | ESD – CDM                      | JS-002             | Per reference standard                                                    | 3 units × 1 lot             | Class C3 |

a. Preconditioning includes 20 cycles (–55/125°C) prior 3x reflow (with peak temperature of 260°C).

## Summary

The qualification report showed that the MOSFET, driver IC, and LED change had no significant impact on the quality and reliability of the affected products.

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