

# UPI driver uP1966x Qualification Report



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*This report summarizes the Product Qualification results for UPI driver, uP166x, which meets all required qualification requirements and is released for production.*

## Scope

This report summarizes the product qualification and package qualification tests, test conditions, and results, related to the product family uP1966x.

## Qualification Test Overview

The uP1966x is a silicon-based IC consisting of a single-channel gate driver for GaN transistors. It can drive high-side and low-side transistors in a half-bridge configuration.

The product was designed and is manufactured by uPI Semiconductor Corp. It was originally qualified by uPI Semiconductor Corp., and later re-qualified by EPC. All tests qualification tests followed JEDEC standards.

The list of tests conducted include:

- Preconditioning (PC): Parts undergo the following steps in sequence: (1) 125°C bake for a minimum of 24 hours; (2) moisture soak for Moisture Sensitivity Level 3 (MSL3).
- Moisture sensitivity level 3 (MSL3): Parts are subjected to moisture, followed by three cycles of reflow with peak temperature of 260°C. MSL3 calls for a 192-hour moisture soak at 30°C and 60% relative humidity.
- High Temperature Storage Life (HTSL): Parts are subjected to a bake at 150°C for 1000 hours according to Grade 1 requirements.
- Unbiased highly accelerated test (uHAST): Parts are stressed in a non-condensing humid environment for 96 hours at 130°C, 85% humidity, and vapor pressure 33.3 psia.
- Temperature cycling (TC): Parts are subjected to alternating high and low temperature extremes.
- High Temperature Operating Life (HTOL): Parts are subjected to maximum recommended operating conditions at  $T_j = 125^{\circ}\text{C}$  for 1000 hours.

## EPC Qualification

For the re-qualification conducted at EPC, all samples were mounted on boards. The boards or test coupons, consist of a 4 layer, 1.6 mm thick board made of high Tg FR-4. The devices under test and additional components (such as capacitors) were assembled using SAC305 lead-free solder and a corresponding reflow process per JSTD-020.

### Product level tests

Product	Test	Duration	Conditions	Sample size	Failures	Ref. standards
uP1966E	HTOL	1000 hours	$T_A = 125^{\circ}\text{C}$ $V_{IN} = 88\text{ V}$ $V_{DD} = 5.5\text{ V}$	1 lot, 77 samples	0	JESD47 JESD85 JESD22-A108

Table 1.

### Package level tests

Product	Test	Duration	Conditions	Sample size	Failures	Ref. standards
uP1966x	PC	0	MSL3 + 3 x reflow	1 lot, 231 samples	0	JESD22-A113 JSTD-020
	TCT	1000 cycles	$-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$	1 lot, 77 samples	0	JESD22-A113 JSTD-020
	uHAST	96 hours	$T_A = 131^{\circ}\text{C}$ r.h. = 85% $P_{\text{vapor}} = 33\text{ psia}$	1 lot, 77 samples	0	JESD22-A113 JSTD-020
	HTSL	1000 hours	$T_A = 150^{\circ}\text{C}$	1 lot, 77 samples	0	JESD22-A103

Table 2.