

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°C V _{IN} = 88 V V _{DD} = 5.5 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°C to 150°C	1 lot, 77 samples	0	JESD22-A113 JSTD-020
	uHAST	96 hours	T _A = 131°C r.h. = 85% P _{vapor} = 33 psia	1 lot, 77 samples	0	JESD22-A113 JSTD-020
	HTSL	1000 hours	T _A = 150°C	1 lot, 77 samples	0	JESD22-A103

Table 2.