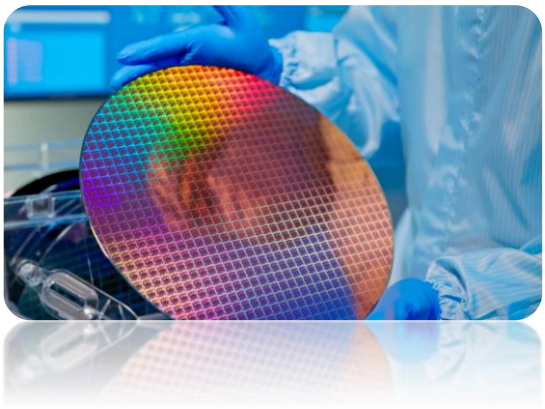
SEMI F47 Test in Semiconductor Industry

—How does IT7800 edit the voltage transient drop waveform easily

Background



Semiconductor manufacturers have extremely high requirements on power supply, in particular the wafer related industry with higher requirements on power supply quality. Once voltage transient drop occurs, it will not only cause unexpected damage to sensitive microcomputer automatic control devices but also interrupt the process and cause great losses. To protect sensitive devices from voltage transient drop damage, the SEMI F47 standard stipulates the tolerance level of the semiconductor processing equipment on voltage transient drop, and requires that the semiconductor processing equipment should be immune to voltage transient drop in the AC power grid.

What is the SEMI F47 test?

What is the SEMI F47 voltage transient drop test? Generally, voltage transient drop means that the voltage value at the load terminal falls below 90% of the rated voltage value and continues for 0.5 to 60 cycles. SEMI F47 is the voltage sag immunity specification for semiconductor

processing equipment. In SEMI F47-0706, take 50Hz as an example. When the voltage is 50% of the nominal value, the tolerance time is 10 cycles; when the voltage is 70% of the nominal value, the tolerance time is 25 cycles; when the voltage is 80% of the nominal value, the tolerance time is 50 cycles. Some wafer factories may require higher levels of tolerance. Compared with the tolerance time or strength at the time of voltage transient drop required in F47-0200, the tolerance time is increased to 1 cycle when the voltage is 0% of the nominal value, and 500 cycles when the voltage is 80% of the nominal value.

ITECH's new-generation IT7800 high power AC programmable power supply and IT7900/P regenerative grid simulator have strong editing functions in any waveform. In addition to built-in IEC61000-4-11/4-13/4-14/4-28 and other required waveform, it can simulate harmonics/inter-harmonics and various disturbance waveform in complex grids, which are an ideal choice for tests and labs.

Case study

SEMI F47 regulation pre-compliant test

Test requirement:

Three-phase output with transient drop (0V) at 50Hz (20ms) in one cycle per phase

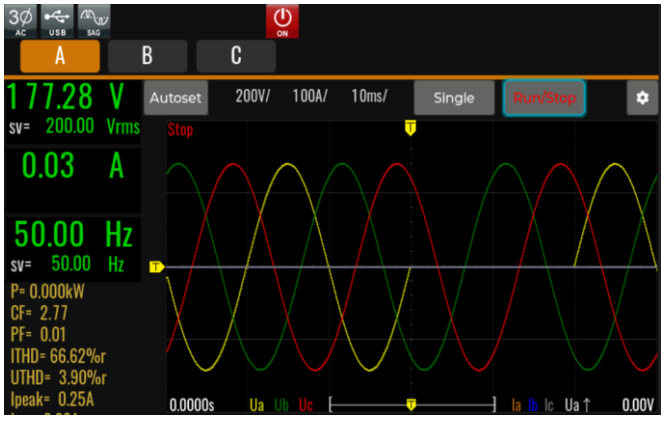
Test solution:

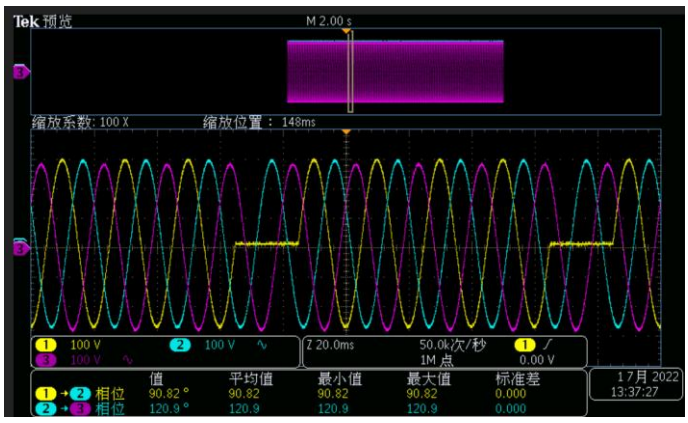
In general, people may think of using the List function to edit the waveform. This is workable. However, for non integer cycle like 60Hz (16.7ms), it will be relatively complex to calculate the continuing time of a single step. At this point, we may consider using the surge/trap function for easy realization.

The ITECH IT7800/7900/7900P series AC/DC power supply comes with the surge/trap simulation function. Users can add the surge/trap on the basis of output waveform to simulate abnormal fluctuation of voltage in the circuit system, and the surge/trap can be overlapped to any basic waveform. The settings are as follows:

Measured waveform is as follows:

You can see that Phase A drops to 0 and continues for 1 cycle, which appears once every 5 cycles.





The IT7800 high power programmable AC power supply and IT7900/7900P regenerative grid simulator provide up to 15kVA power output in the limited space of 3U. The maximum power of a single cabinet hits 165kVA, which can be expanded to 960kVA to the maximum extent. With the phase voltage output reaching 350V, the device has four output modes (AC/DC/AC+DC/DC+AC), single-phase, three-phase, reverse phase, and other flexible output capacities. It is applicable to the research and development, production, and quality inspection in such fields as new energy, rail traffic, semiconductors, and research institutes. The IT7900 grid simulator has the island protection test function and can be applied to grid-connected inverters and energy storage PCS tests. In addition to working as a grid simulator and full four-quadrant power amplifier, IT7900P can also serve as a regenerative AC/DC electronic load.

IT7800 High power AC/DC power supply

- High power density, 3U up to 15kVA
- Master-slave parallel with current sharing technology, up to 960kVA, multiple units in parallel work as one
- Voltage up to 350V L-N, 500V L-N*1
- Output frequency: 16-2400Hz, programmable slew rate setting for changing voltage and frequency
- Built-in single/3-phase AC power meter
- Multi-channel function, single unit can connect/test up to 3 DUTs*2
- 4 output modes: AC/DC/AC+DC/DC+AC
- Choose single phase, three-phase, reverse phase output mode, to simulate 3-phase imbalance, 3-phase harmonics imbalance, split phase test, reverse phase sequence tests etc.*3
- Comprehensive harmonics measurement and analysis, up to 50th*4

- Choose single phase, three-phase, reverse phase output mode, to simulate 3-phase imbalance, 3-phase harmonics imbalance, split phase test, reverse phase sequence tests etc.*3
- Comprehensive harmonics measurement and analysis, up to 50th*4
- Harmonics, inter-harmonics waveform synthesizer, according to IEC 61000-4-13*1
- Programmable output impedance, according to IEC 61000-3-3*1

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