

ITECH Solid-State Transformer (SST) Test Solution

—Complete Test Platform for AI Data Centers and MVDC Distribution Systems

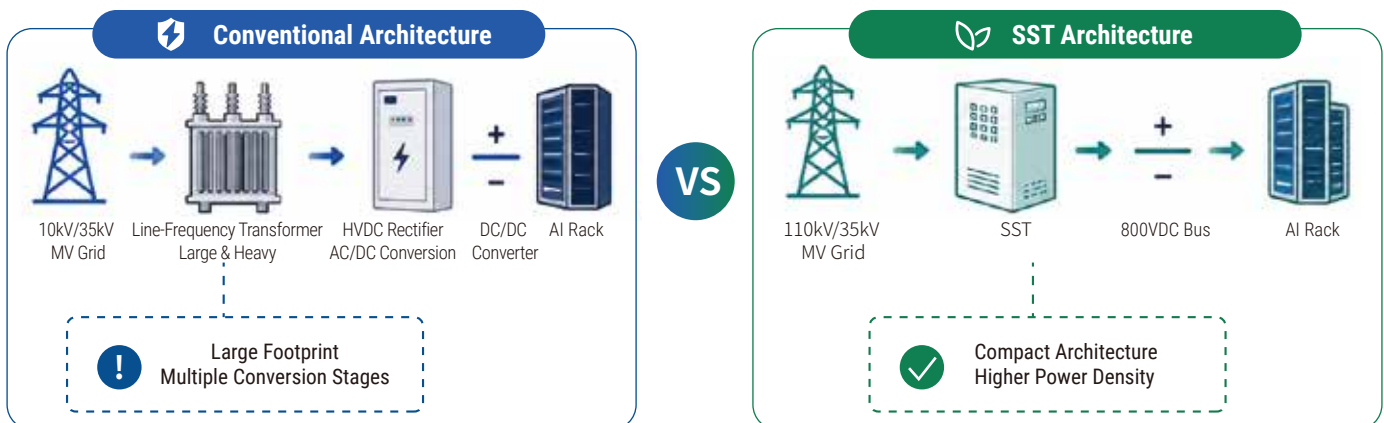
As AI data centers, HVDC distribution systems, energy storage installations and next-generation power networks continue to evolve, conventional line-frequency transformers are increasingly challenged by requirements for higher efficiency, greater power density and digital controllability. Solid-State Transformers (SSTs) enable direct conversion from medium-voltage AC to high-voltage DC through advanced power electronics and are emerging as a key building block of future power infrastructures.

Leveraging high-voltage grid simulation, bidirectional DC power conversion and MW-class system test capabilities, ITECH provides a complete validation platform covering device characterization, module validation and full-system SST testing.

Why SST is Becoming the Next-Generation Power Architecture

AI-Driven Power Architecture Transformation

Driven by rapid growth in AI computing power, rack-level power consumption has increased from traditional 10–20kW levels to well above 100kW, with future deployments expected to exceed 300kW per rack.



Key Benefits of SST Architecture



Typical Applications



Time	SST Industry Adoption Timeline		
2023		OCP Introduces 800VDC Architecture	
2024		NVIDIA Announces 800V HVDC Roadmap	
2025	 	Meta & Google Begin SST Evaluation	
2026		SST Pilot Deployments	



AI data centers are driving the evolution of power architectures from traditional AC distribution toward 800VDC and MVDC systems. SSTs are emerging as the key technology connecting medium-voltage grids to high-voltage DC buses.

Key Challenges in SST Validation

As a highly integrated power-electronics system combining AC/DC conversion, DC/DC conversion and advanced digital control, SST validation is significantly more complex than conventional transformer testing.

Challenge 1: High Voltage

Typical Input Voltage:
10kVAC、20kVAC、35kVAC

Typical Output Voltage:
800VDC

Customer Challenge

The test platform must simultaneously support medium-voltage AC and high-voltage DC environments.

Challenge 2: High Power

SST Module Power Rating:
200kW~600kW

System-Level SST Power Rating:
2.5MW~10MW+

Customer Challenge

Power requirements continue to increase as SST systems scale.

Challenge 3: High Energy Consumption

Typical SST Validation Tasks:
Efficiency Testing
Thermal Validation
Long-Term Reliability Testing

Customer Challenge

Conventional testing solutions consume substantial energy and incur high operating costs.

Challenge 4: Fast Protection Response

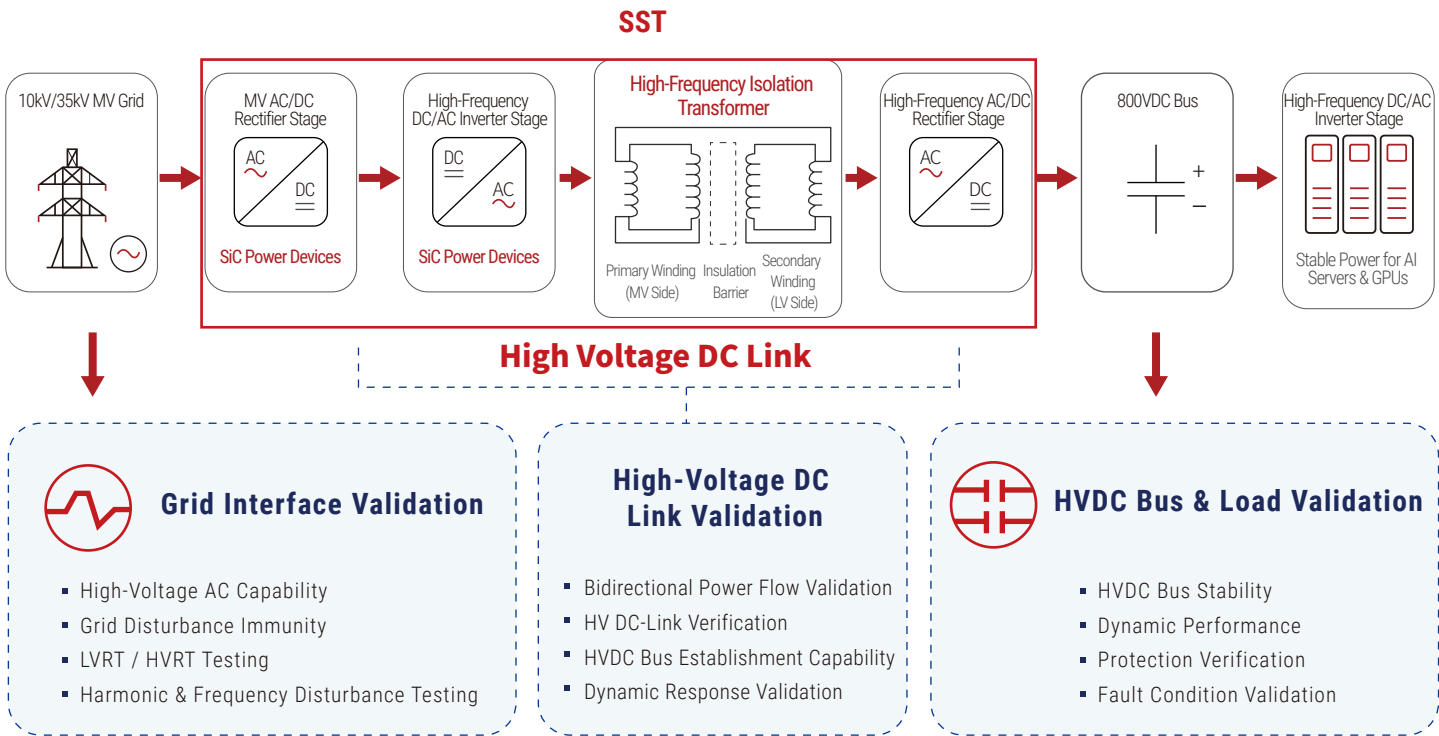
SST protection systems demand ultra-fast fault response.
SSCB (Solid-State Circuit Breaker)
Operating Time < 1 ms

Customer Challenge

Testing platforms require extremely fast dynamic response capabilities.

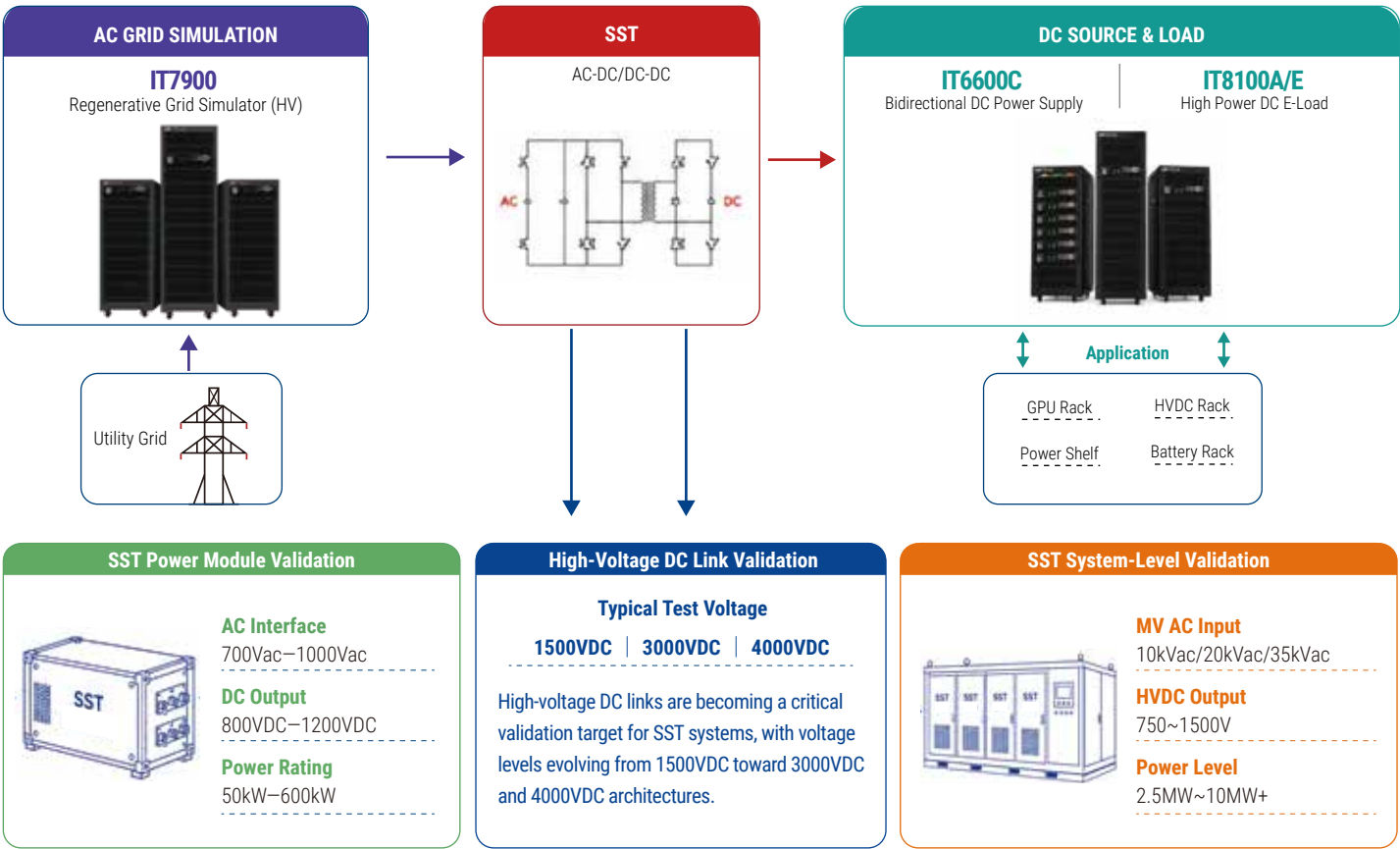
Critical Validation Points in SST Systems

The primary function of an SST in AI data centers is to connect the medium-voltage AC grid to the HVDC bus architecture.



ITECH SST Validation Platform

A Unified Platform for Module-Level and System-Level Validation



Grid Interface Testing

IT7900 High-Voltage Regenerative Grid Simulator

- 700Vac L-N/1050Vac L-N
- Expandable to 10kVac+ / 20kVac+
- LVRT/HVRT
- Grid Disturbance Simulation
- Four-Quadrant Operation
- Up to 10MVA+



Conventional transformers are inherently immune to most grid disturbances. In contrast, SSTs rely on power electronic converters and advanced control systems, making them highly sensitive to voltage, frequency, phase, and grid variations.

Grid Simulation is Essential

DC Source & Load Validation

IT6600C Bidirectional DC Power Supply

- Source & Load in One
- Up to 42kW in 3U
- 600V–2250V, up to 4000VDC
- Dual Channels, Series/Parallel Configurable
- Expandable to 10MW+



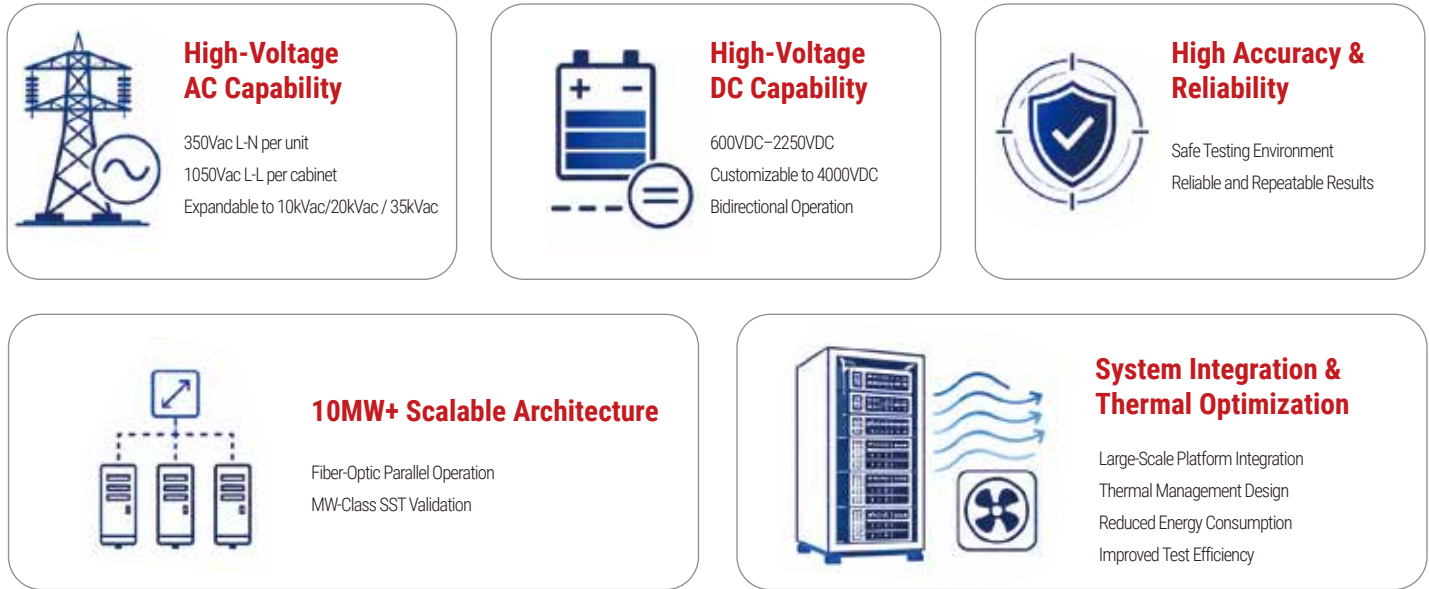
IT8100A/E High-Power DC Electronic Load

- Up to 7.2kW in 3U (150V Model)
- Scalable to 2MW+
- 150A/μs Dynamic Slew Rate
- Optimized for AI Server Load Simulation
- 1.5x Short-Term Overload Capability



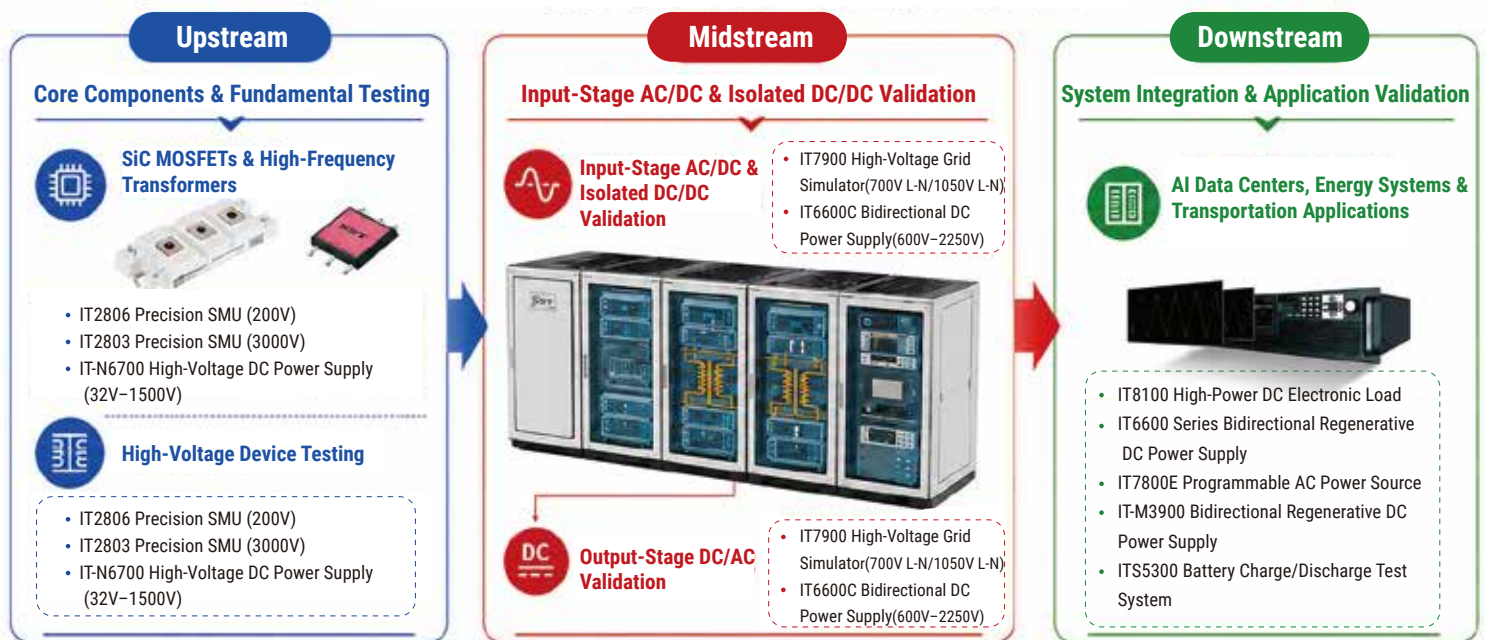
Why Choose ITECH

——MW-Class System Validation Capability



From SiC Devices to MW-Class SST Systems

ITECH provides a complete validation platform covering:



**Building a Complete SST Validation Platform
from Grid to HVDC Bus**

**High Voltage
High Power**

Coverage from 4kVDC
to 20kVAC+

**High Accuracy
High Dynamics**

Validating Complex
Operating Conditions

**Bidirectional
Power Flow**

Reduced Test
Energy Consumption

**Comprehensive
Application
Coverage**

SST/AI Data Center/
PCS

**Safe
&
Reliable**

Comprehensive Protection &
Validation Framework