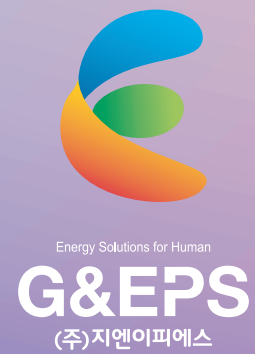


Energy Solutions for Human



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| Corp R&D Center | Industry-Academic Cooperation Center2, 77, Yongbong-ro, Buk-gu, Gwangju, Republic of Korea
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“G&EPS, as a leader in the smart power conversion field, is developing innovative new technologies and producing new products based on accumulated technologies and experiences, and is continuously growing.”

G&EPS is developing the world's best products in the power electronics field and will become a company that can contribute to the happiness and growth of customers. Based on the technology and abundant know-how in the power electronics sector accumulated over the years, we are developing advanced smart systems, and developing and selling products such as grid-connected CTTS, energy converter, smart DC circuit breaker, renewable energy power converter, uninterruptible power supply, and ESS (Energy Storage System). We will devote ourselves to the development of new products that can meet customer needs through continuous research and development, and we will strive to grow into a global company with customer value as the top priority.

G&EPS

Achievement

- | | |
|-------------|---|
| 2022 | <ul style="list-style-type: none">• Patent Application (Control system for uninterruptible power supply)• Surge Protector CE certification• Recognition of excellent workplace that has passed a risk assessment |
| 2021 | <ul style="list-style-type: none">• Acquired SGSF certification for 25KW class power factor compensation inverter• Registration of manufactured goods in PPS (Motor/Gear/Valve failure prediction diagnosis machine)• Certified as an excellent development innovative product (Grid Tied CTTS)• Received a gold medal in the technology field at the '2021 Korea Environment and Energy Awards' (Korea District Heating Corporation) |
| 2020 | <ul style="list-style-type: none">• Distribution Consisting of a Patent-Pending Full-Bridge Type ESS Cell Unit• Registered a Manufactured Product Item with the Public Procurement Service (Grid-Tied CTTS Low Pressure 11 Cases, High Pressure 4 Cases)• Direct Production Verification Certification (Closed Switchboard, Motor Control Panel) |
| 2019 | <ul style="list-style-type: none">• Hybrid Uninterruptible Changeover Switch System using Patent Registered Mechanical And Electronic Switches• Power Factor Compensation Inverter (KTI Performance Test Report) Certified By SGSF• Certified as a Venture Business• Direct Production Verification Certification (Distribution Board)• K-Water's Purchase Conditional Technology Development Project (System-Connected CTTS) Success• Selected as an Excellent Technology in the 2019 Water Industry Technology Competition, Awarded the President of K-Water• Doosan Fuel Cell, 10kW Class Fuel Cell Inverter Development |
| 2018 | <ul style="list-style-type: none">• Patent Registration for Energy Bank System• Patent Application for Voltage Equalization Technique of Series Circuit Using Clamp Circuit for High Voltage SMPS• Patent Application for High Voltage SMPS using Discontinuous Boost Mode• Quality Management System (ISO 9001) Certified• Environmental Management System (ISO 14001) Certified• LS Electric Power Co., Ltd. and DNS Co., Ltd. Merged• Electric Construction Business Registration (Gwangju-00919) |
| 2017 | <ul style="list-style-type: none">• Completed Development of PCS for 50kW, 100kW, 125kW ESS and Built Mass Production System• Patent Registration for Inrush Current Response Type Reactor used in ESS for Compensation of Inrush Current Generated from Electric Compressor Start• Patent Application for Ultra-High Voltage Insulation Gate Driver Capable of 100% Application Rate using Pulse Transformer• PCS for ESS (KTC Performance Test Report) Certified by SGSF |
| 2016 | <ul style="list-style-type: none">• Patent Registration for DC Power Distribution Circuit Breaker using Semiconducto Switch and Relay• Patent Registration for Portable Solar Module Aging Measurement Device and Its Measurement Method• Patent Registration for Conversion Module Device that Enables Generator Voltage and Frequency Control• 1200[Vdc] High Voltage SMPS Development Completed and Test Report Obtained• Attracted KRW 1 Billion Investment from KTE Co., Ltd.• Changed the Company Name to G&EPS Co., Ltd. |
| 2015 | <ul style="list-style-type: none">• Established A Company-Affiliated Research Institute• Established EPS Co., Ltd |

계통연계형 CTTS(GCTTS)

Grid Tied Closed Transition Transfer Switch

Feature

- Synchronous transfer of various emergency generators such as domestic and foreign
- Applicable to standalone generator systems in use
- Soft Load Transfer operation
- Extending operating reliability and lifespan by arc-free transition
- Because it is a product developed with original technology, various customizations are possible
- Parallel operation and load sharing ratio control function between KEPCO and emergency generators
- Generator soft start function
(Can replace the inverter drive in use)

Multiplex driving modes of GCTTS

- Automatic/Manual emergency generator mode
- Automatic/Manual check mode of generator
- Preliminary power outage UPS mode
- KEPCO Incoming maintenance mode
- Demand response (DR) generator mode
- Peak cut mode
- Power factor compensator generator mode

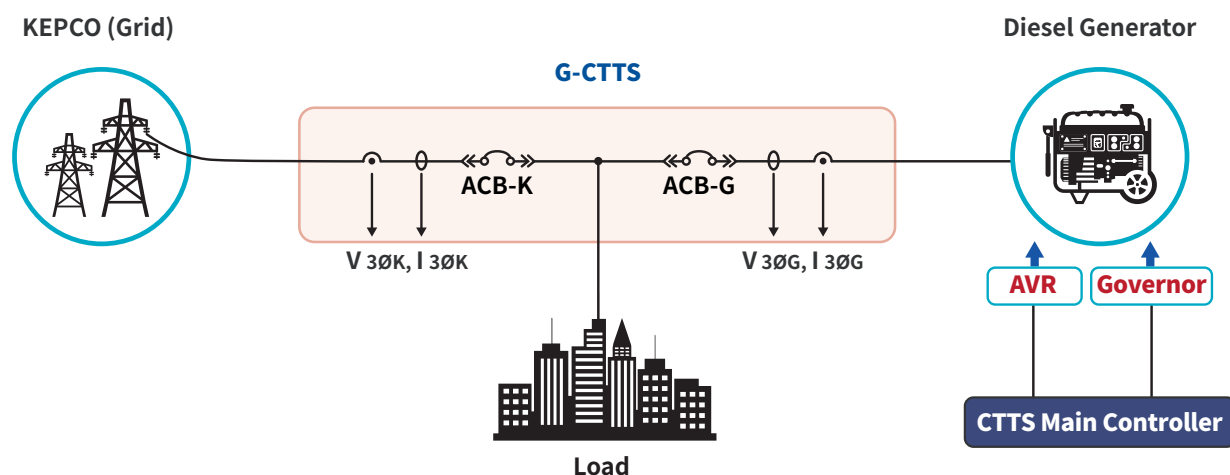
Delivery performance

- K-Water
- Water purification plant : High voltage type 3 places
Low voltage type 10 places
- Pressurized area : High voltage type 2 places
Low voltage type 6 places
- Water intake : High voltage type 3 places
Low voltage type 4 places
- 5 fish farms in Jeollanam-do area



GCTTS Model

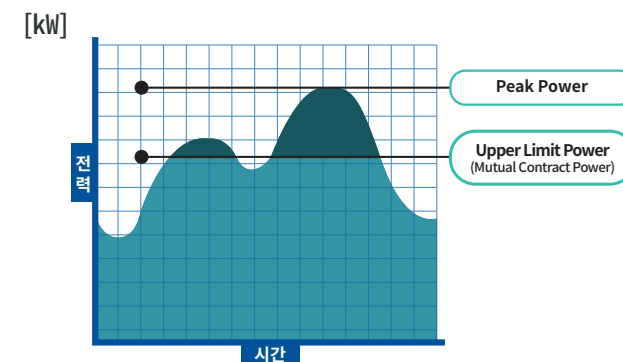
Low voltage type : 11 items (400A ~ 6300A)
High voltage type : 4 items (630A ~ 3150A)



계통연계형 CTTS(GCTTS)

Grid Tied Closed Transition Transfer Switch

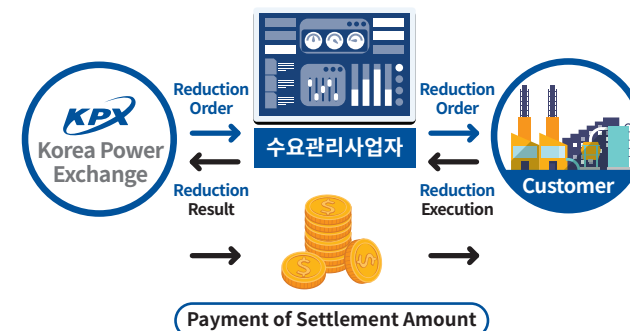
Peak Cut Mode



If the maximum demand power exceeds the contract power and uses a certain amount of time, the power user will be charged a penalty according to the number of times exceeded.

A function that allows the emergency generator to share the amount of power that exceeds the contract power with Peak Cut Mode

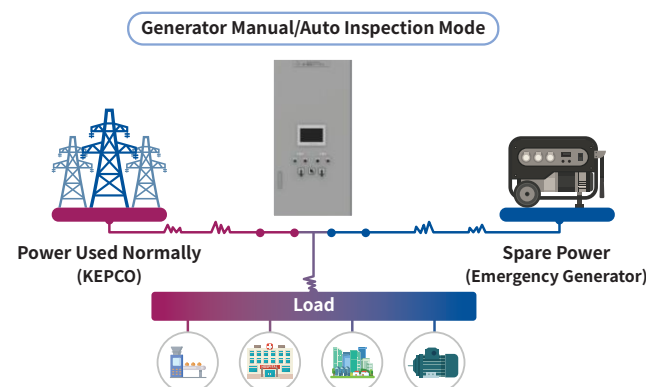
Demand Response (DR) Mode



A system in which electricity users are compensated financially by reducing the use of grid electricity when the electricity market price is high or when the electricity system reserve ratio is low

Customers participating in the demand response business can participate in the electricity demand response trading market through reduction of emergency response obligations and voluntary demand reduction

Emergency generator automatic inspection mode

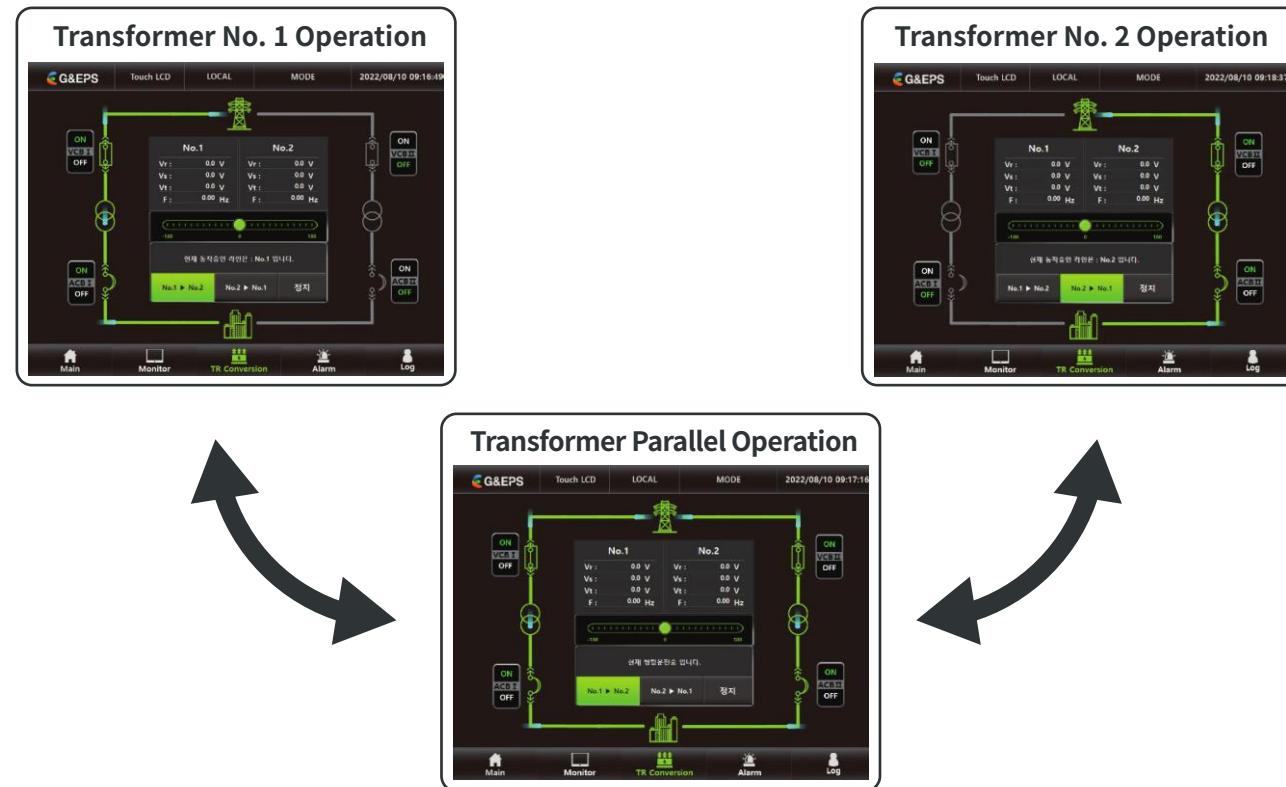


Mode to automatically inspect the emergency generator by the program set in the grid tied CTTS

1. Automatic emergency generator start
2. Generator no-load operation inspection
3. Emergency generator inspection according to load
(Subject to change depending on settings)
- 25% - 50% - 75% - 100% - 110% Step Test
- Load operation at 100% load for more than 60 minutes, etc

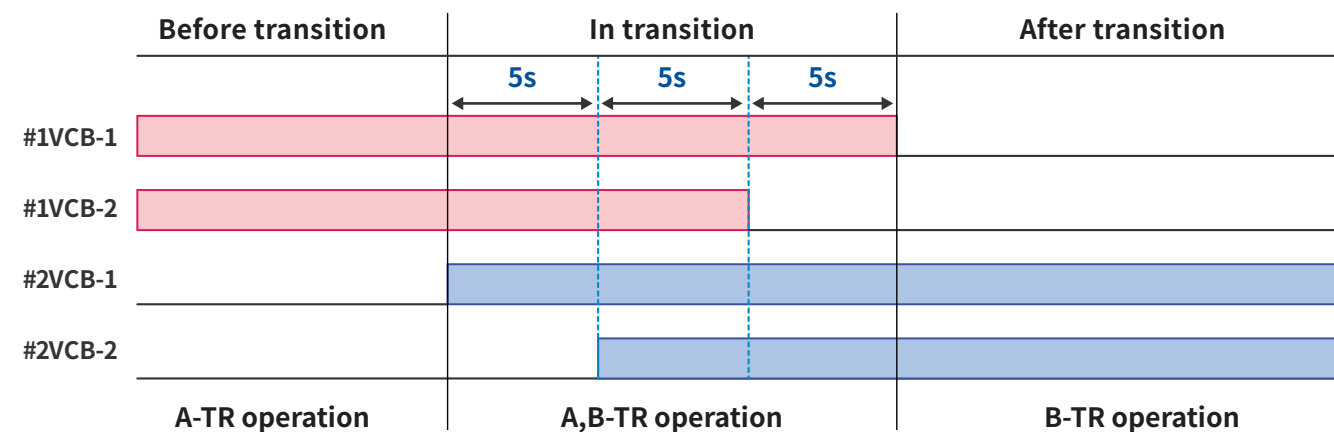
계통연계형 CTTS (GCTTS)

MV transformer uninterruptible transition system using LV CTTS
- Transformer Parallel Operation (Option)



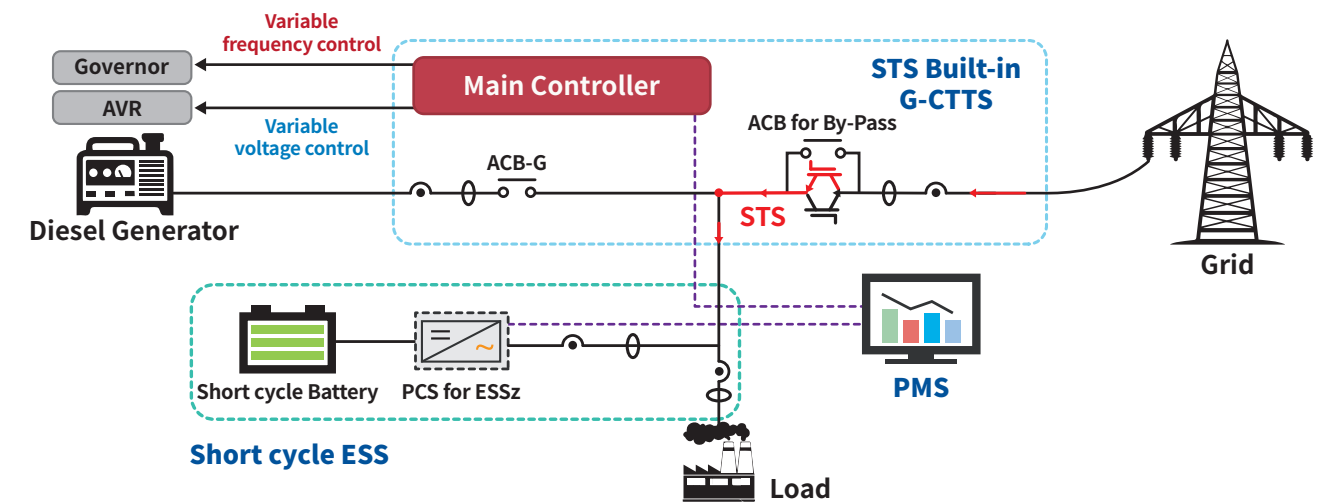
Feature

- Non-interruptible automatic transformer transition function through Touch LCD instead of conventional manual sequential transition
- Stable parallel operation function through synchronized operation by monitoring voltage difference, phase, and frequency
- Uninterrupted power supply is possible because uninterrupted transition is possible through parallel operation.
- Maximizes the convenience of safety managers by enabling remote automatic transition



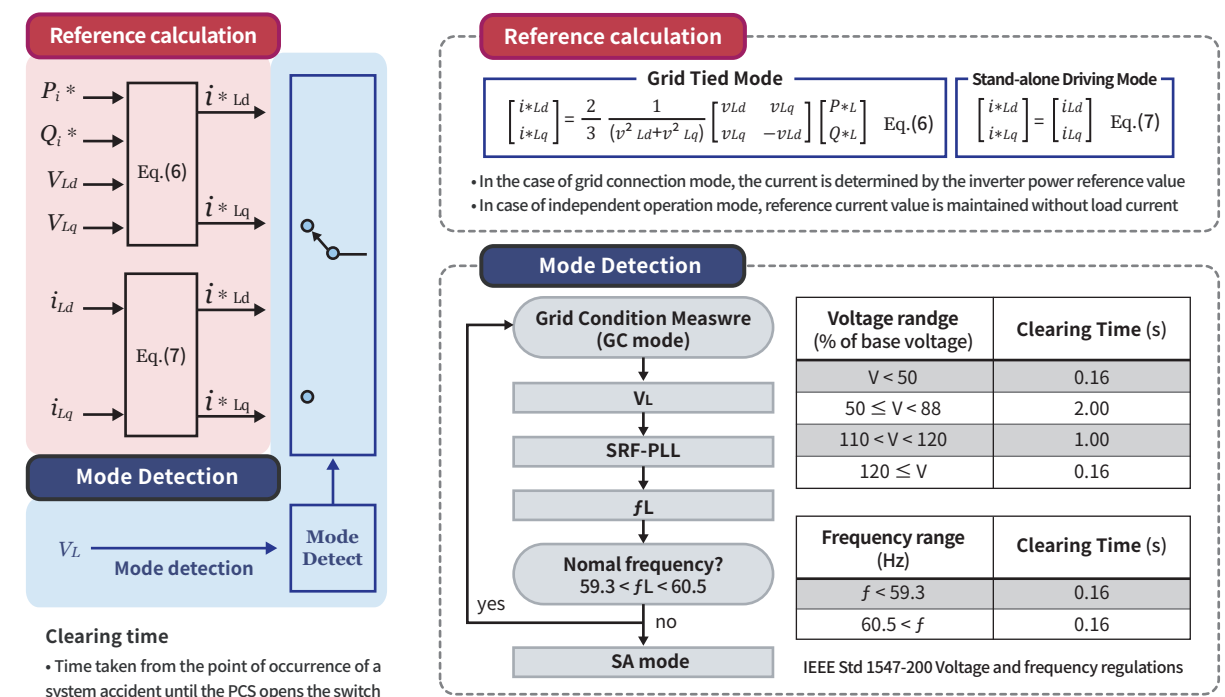
계통연계형 CTTS(GCTTS)

ESS uninterruptible transition system (Option)



Feature

- Hybrid uninterruptible system consisting of STS built-in G-CTTS and short-cycle ESS
- Diesel generator frequency and voltage variable control (VVF) possible
- CTTS capable of parallel operation and power control with the system or PCS
- Built-in high-speed electronic circuit breaker capable of shutting off the system within 4 ms in case of power failure



서지보호기

Surge Protector Device

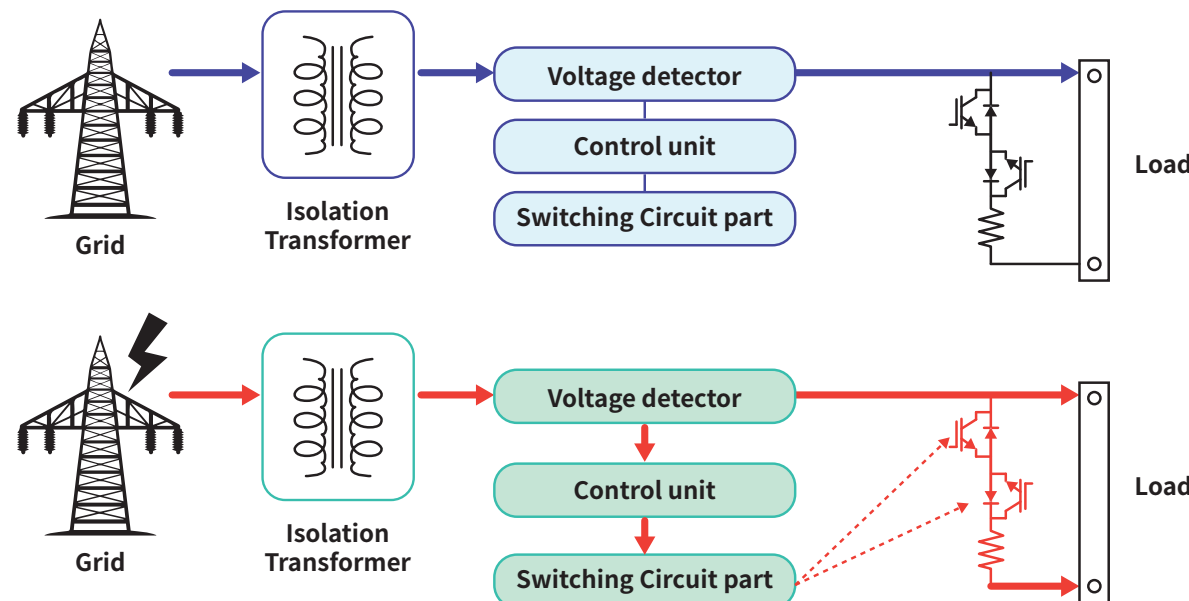
ISC-SPD

Voltage protection level	Maximum continuous operating voltage
L - N : 2.0 kV N - PE : 2.0 kV	L - N : AC 320V / 48 ~ 62Hz N - PE : AC 255V
Surge protection class and capacity	Dimension
L - N : T2 in 40 kA / imax 80 kA N - PE : T2 in 40 kA / imax 80 kA	(285 x 180 x 182) 500W (350 x 240 x 232) 1kW, 2kW



Feature

- Serial surge protector
- Overvoltage drop due to surge using the saturation characteristics of transformer
- Load protection using high-speed switching parts (IGBTs) capable of clamping overvoltages
- Groundless type surge protector using dummy resistor
- Surge counter, voltage, current, temperature, etc. can be measured and stored through EEPROM
- Equipped with upper level communication (RS-485) function (optional)
- CE Certified Products

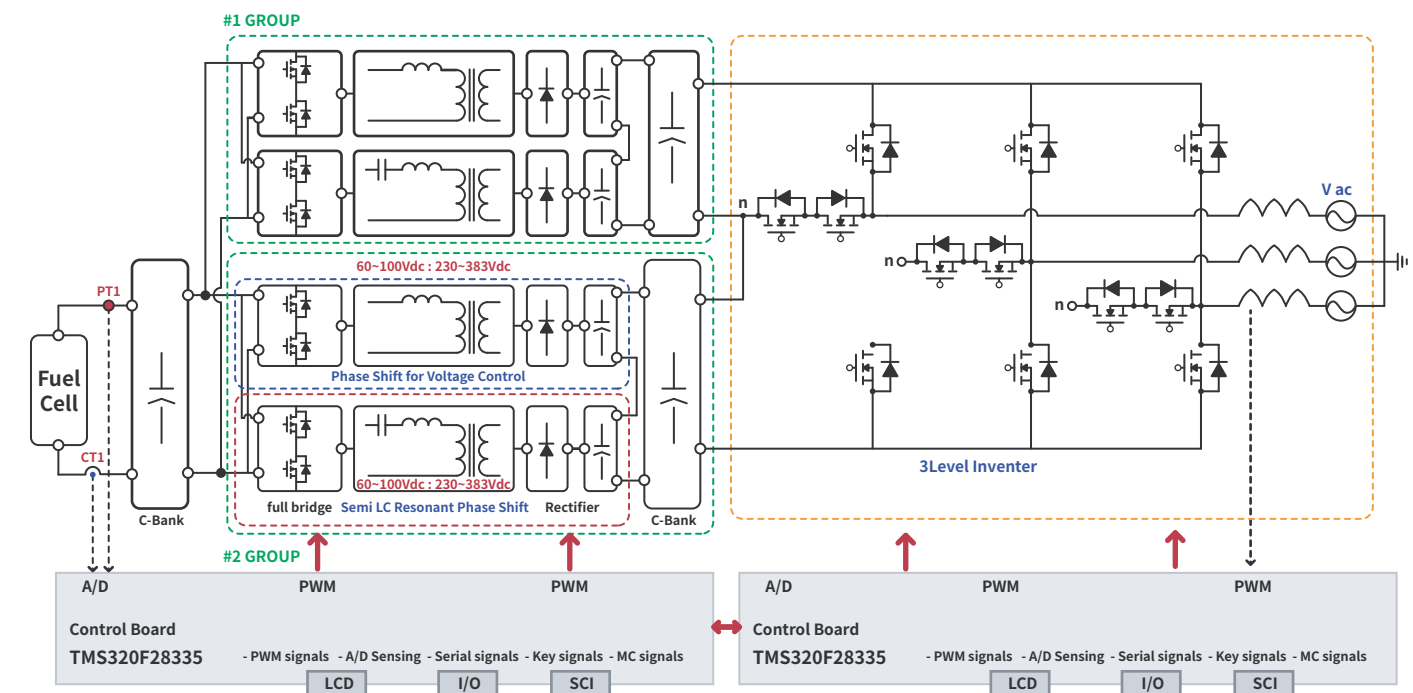


Fuel Cell/Smart Power Conversion System



Feature

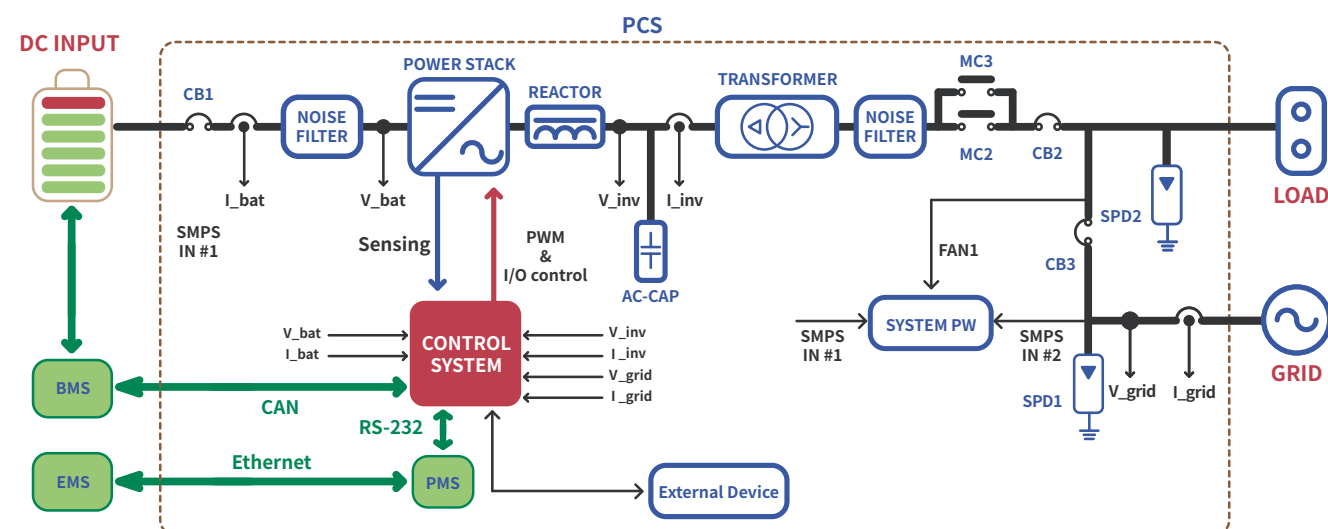
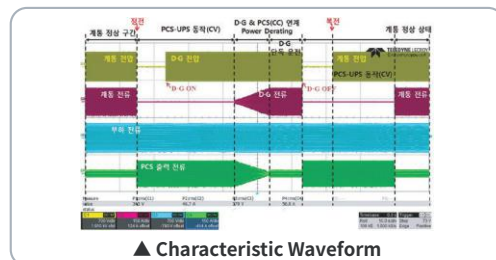
- 12kW Isolated Converter for Input Low Voltage
 - Input 58~100V/Output 680~800V
 - Resonance Type Converter Serial Structure
 - Reduce Voltage Ripple by Module Inter-Leaved Method
 - Semi LC Resonance Isolated Converter
 - 99% Maximum Efficiency of Converter
- On/Off Grid High Efficiency Inverter Type
 - 3 phase 380VAC
 - 95% Maximum Efficiency of the Entire System



Energy Storage System (ESS)

Feature

- Select by 50/100/125/250kW Capacity
- SPS - SGS F- 025 - 4 - 1972 : 2016 Certification Completed (Smart Grid Standards Forum)
- Power System Connection Standard Protection and Operation (IEEE Std. 1547)
- Adoption of Various Types of Batteries
- UPS Mode Capable of 4[msec] Input
- Linked Operation and Independent Operation
- Remote Control and Monitoring
- PCS Parallel Operation for Each Capacity
- PCS for Peak Control, PCS for Emergency Power
- Various Options can be Added According to the Need of the Customer
- Supplying and Operating Multiple Sites for Peak Reduction and Solar PCS



Standalone Smart Power Supply (50kW Hybrid PCS)

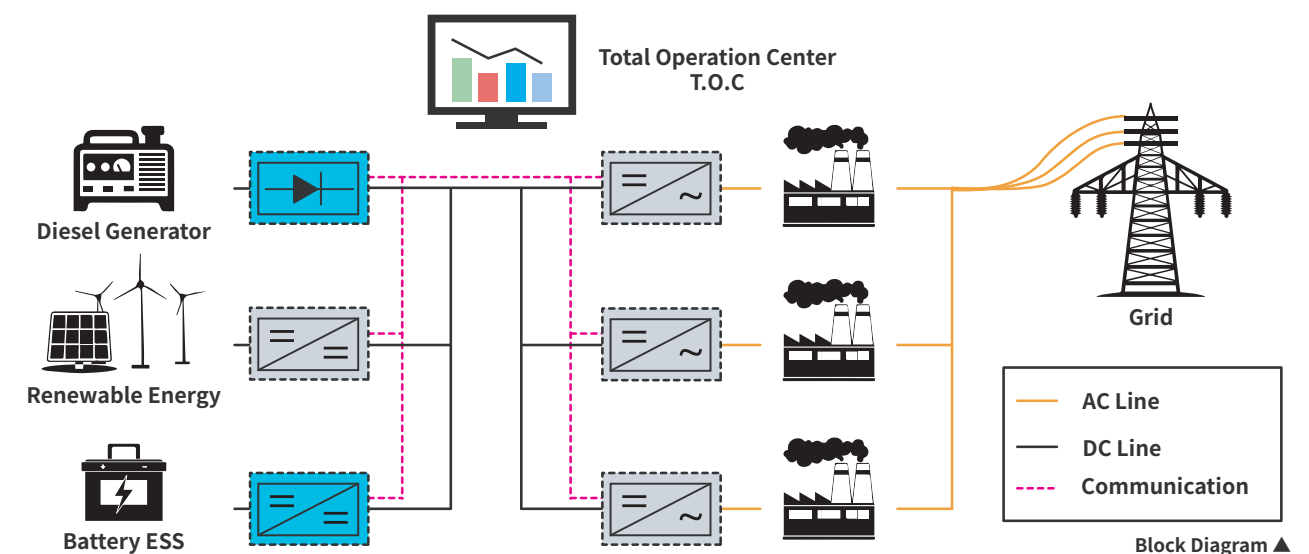
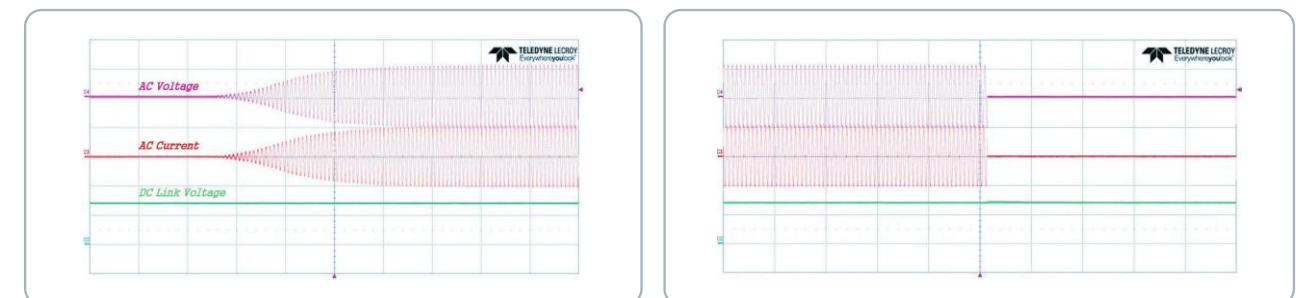
Off-Micro-Grid Power System

Feature

- **Small Micro Grid System**
 - For Solar DC-DC Converter
 - ESS for DC-DC Converter
 - for Diesel Generator AC-DC Converter
 - Grid-Connected 3-Phase Inverter
- **Seamless Function**
 - Power Failure Detection and Rated UPS Output within up to 4ms Even During Charging/System Connection
- **Demand Management Function**
 - MS (Built-in Demand Management Program)
 - Provision of Date for Demand Management
 - Time/Load Usage Setting Peak Cut Operation
- **Supplied Independent 50kW to Maralison Island, Philippines**



▼ Characteristic Waveform



Electronic Load

Feature

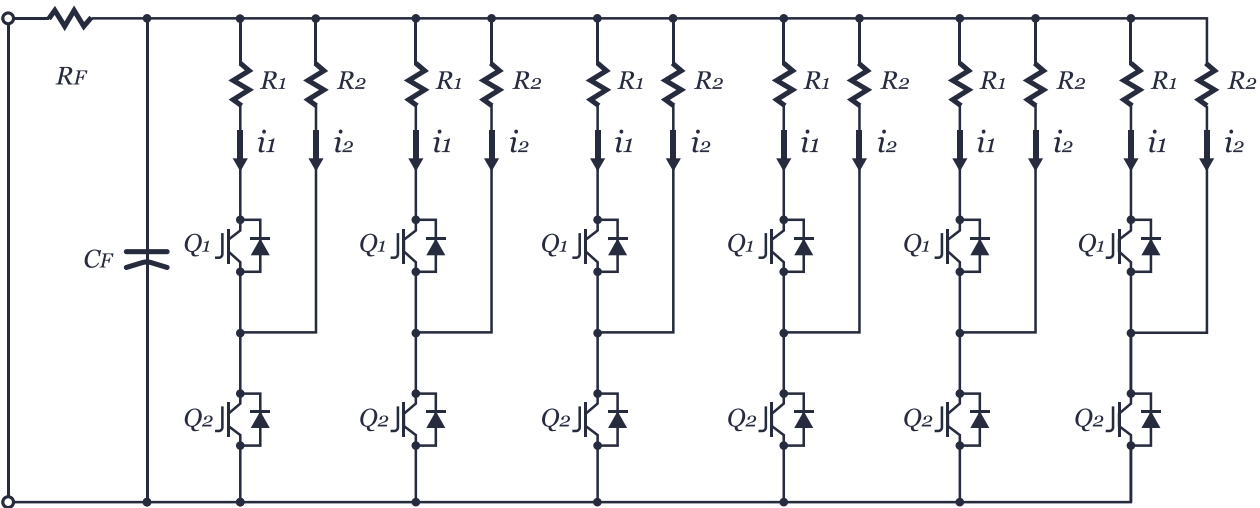
- Multilevel Interleaved Topology to Reduce Current Ripple in Electronic Load
- Using 2-Level Leaved Converter
- CC/CV/CR/CP Operation Available
- Local/Remote Mode Available
- Water Cooling, Refrigerant Temperature Check Available
- Low Noise Load

Input Voltage

- 0 - 850[V]

Load capacity

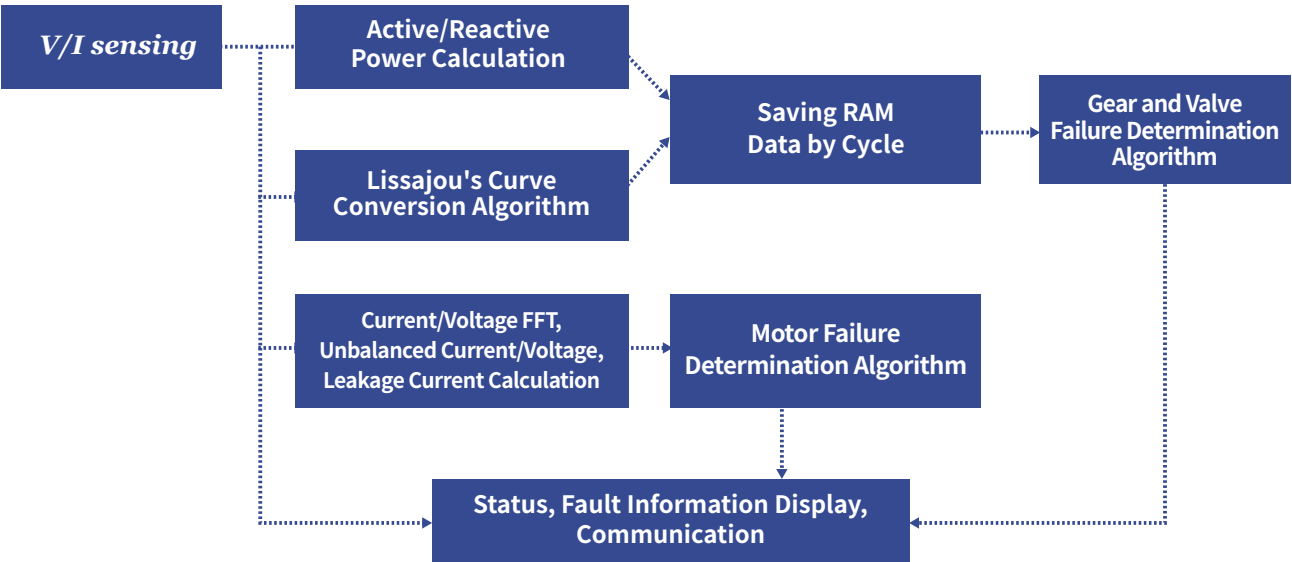
- 50 - 500[kW]



Predictive / Diagnosis System for Valve Motor Failure

Feature

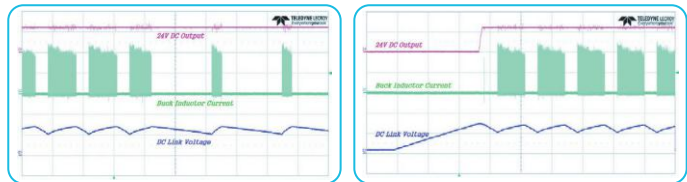
- Motor trip protection operation
 - Over Voltage, Over Current, Under Current
 - Reverse Phase Voltage Check
 - Phase Voltage Balance
 - Motor Restraint when Water Flow Stops
 - Motor Restraint while Driving
 - Ground Fault, Short Circuit Current Detection
- Failure Prediction/Diagnosis
 - Gear Prediction/Diagnosis
 - Valve Prediction/Diagnosis
 - Motor Prediction/Diagnosis



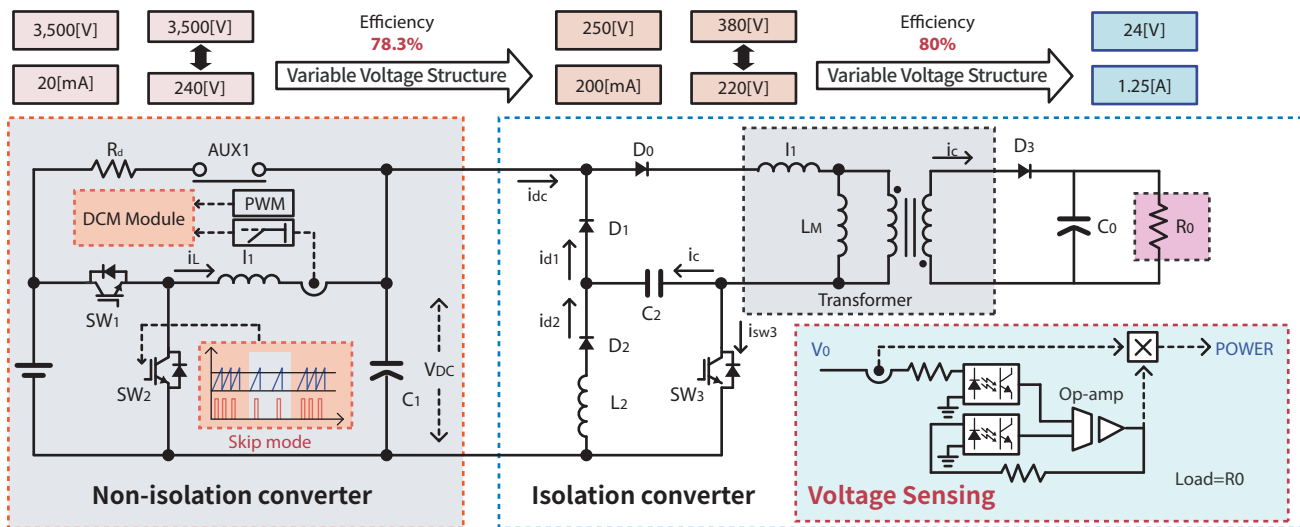
High Voltage SMPS

Feature

- SMPS Driven by High Voltage Input Voltage
- Input Operation Range 300[Vdc]-3500[Vdc]
- Two-Stage Converter Configuration for Wide Input Voltage Fluctuation
- High-Efficiency SMPS of 80[%] or More of Maximum Efficiency
- Remove the Super Charging Circuit in the Normal State
- Stabilized by Configuring the Input Voltage Direction Controller
- Gate Amp with Insulation Strength of 6000[V]
- Input Voltage Sensing and Current Source Output
- SMPS IOT with Built-in Communication Function
- Composition of Various Protection Circuits
- Skip Mode Application High Efficiency



▲ Characteristic Waveform



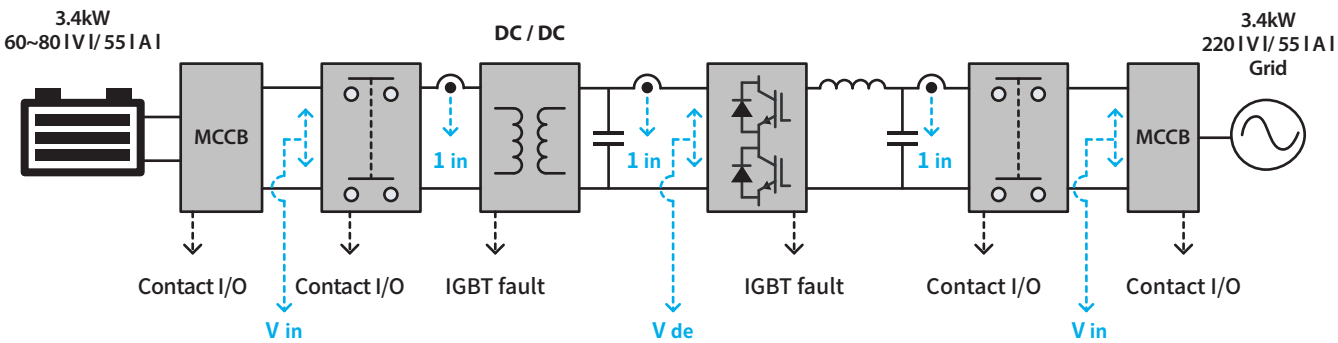
Block Diagram ▲

Vehicle-Mounted Charger/Discharger



Feature

- Controller-TMS320F28335 Processor
- Input Side-Output Side Isolation Type Transformer Configuration
- Can (Controller Area Network) Communication Support
- Can Port Configuration is D-Sub 9Pin
- High Boost DC/DC Secondary Side Double Voltage Circuit Configuration
- Rated Output [kW] : 3kW Continuous, Peak 3.5kW
- Overload Tolerance : 110%/10 Minutes
- Input Voltage : DC60~80V
- Output Voltage : DC 350V±10V
- Cooling Method : Forced Air Cooling
- Operating Temperature : -20°C~+125°C
- Supplied V2X Vehicle Charger to Korea Institute of Industrial Technology



Block Diagram ▲

Delivery Performance

Client Success

- **KEPCO**
- Supplied 100Kw ESS to Naju Sports Center as a Pilot Project of Jeollanamdo
- **Suntech**
- 250Kw Emergency Generator Interlocked Uninterruptible Ess Development Completed
- **KOREA STEEL**
- Developed/Supplied 10V, 300A, 300kW Plating Rectifier to Malaysian Factory
- **KEPCO**
- Supplied 125Kw ESS for AC Distribution Network in Seogeocho Island, Korea
- **KTE**
- 125Kw Class Peak Cut Demand Management Ess Maintenance And Operation

- **Honam University-KEPCO KPS**
- PCS-PMS for Emergency Power/Peak Load Response Developed/Supplied VRFB + LiFePo4 125kW DC/DC Converter + 125kW PCS
- **Green Energy Institute**
- Naju Dongsu Agricultural Industrial Complex Demonstration Developed/Supplied Bidirectional DC/DC Converter for 1.5MW DC Power Sharing Network
- **Asian Development Bank**
- Supplied A Small Independent Micro Grid in Maralison Island, Philippines Supplied 50Kw PV DC/DC + 50kW Generator+Battery+60Hz 3-Phase PCS Combined Micro Grid System
- **LS ELECTRIC**
- DC-Based Distributed Power and Load Connection System Construction Project Developed/Supplied 6 Types of Power Conversion Devices for DC Electronic Distribution Boards in Geocha Island

- **KETEP (KERI)**
- Developed Sub-Module Test Device for Voltage Type HvdC MME and High Voltage Insulation Power Supply
- Ultra Wide Range Input Voltage (240Vdc ~ 2400Vdc) High Input Self Power
- **The Gauss 10kW Fuel Cell Converter-Inverter Development**
- Eveloped/Supplied Grid-Tied Chargers and Dischargers for APT, Building Fuel Cells
- **KETEP (KERI)**
- Development of Resilient Hybrid Technology for High Quality Micro Grid
- Developed 100kW Class 4-Leg AC-DC Interlink Converter
- **Dosan Fuel Cell**
- 10Kw Fuel Cell Grid-Tied Converter-Inverter Development

- **KIAT (IRPE)**
- Design and Demonstration of 50kW Class 120Hz Micro Grid System for Export
- Developed/Supplied 120Hz Independent Small Micro Grid System Capable o Seamless Operation
- **Ministry of SMEs and Startups (K-Water)**
- Purchase Conditional SLTS Project in Progress
- Developed Emergency Diesel Generator SLTS (CTTS, Grid Connection, ATS)
- **KITECH**
- High-Voltage Insulated Charger and Discharger
- Developed Battery Charger and Discharger for Electric Vehicle Charging
- **K-Water Jangsung Pressure Plant**
- Developed UPS for CTTS (Research Project Prototype)



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G&EPS is developing the world's best products in the power electronics field and will be a company that can contribute to the happiness and growth of our customers. Based on the technology and abundant know-how in the power electronics sector accumulated over the years, we are developing advanced smart systems, and developing and selling products such as grid-connected CTTS, energy converter, smart DC circuit breaker, renewable energy power converter, uninterruptible power supply and ESS (Energy Storage Systems). We will do our best to develop new products that can meet customer needs through continuous research and development, we will strive to grow into a global company with customer value as the top priority