## FUJI ELECTRIC REVIEW vol.61 no.2 2015 Detailed Contents

Prefac	e

"Fuji Electric's Contribution to the Creation of a

Responsible and Sustainable Society Through Innovation in Electric and Thermal Energy Technology"

#### **Special Conversation**

80

95

78

"How We Should Take Advantage of Our Power Semiconductors and Power Electronics to Proceed in Era of Networking and Standardization"

Achievements and Future Outlook 88 "Providing Powerful Component Based Energy Solutions"

### Highlights

Mega Solar PCS Incorporating All-SiC Module "PVI1000AJ-3/1000"

All-SiC Module for Chopper Circuit

Power System Analysis Simulator for Chubu Electric Power Co., Inc.

Exhaust Gas Cleaning System for Ships (Cyclone Type  $\mathrm{SO}_{x}$  Scrubber)

Small- and Medium-Scale Monitoring and Control System "MICREX-VieW XX"

Inverter for Elevators in European Market "FRENIC-Lift LM2A" Medium-Frequency Isolation Type Auxiliary Power Supply

Lineup Enhancement for Circuit Protector "CP30F"

Fuji Electric's Top Runner Motor "Premium Efficiency Motor"

2nd Generation IPM for Hybrid Vehicles

ZERO Heating Power Vending Machine

Donut Fixture for Seven-Eleven Japan Co., Ltd.

Equipment for Greenhouse Horticulture of Tomatoh Farm Co., Ltd.

Arc Coupled Analysis Technology Anticipating Short-Circuit Faults Inside Switchgear

Electric Power Generation Systemss	103
------------------------------------	-----

#### Thermal/Geothermal Power Plants ...... 105

- Start of Commercial Operations of Sur IPP Power Plant in Oman
- [2] Unit 3 and Unit 4 at Ulubelu Geothermal Power Station in Indonesia
- Idemitsu Oita Geothermal Co., Ltd. Takigami Binary Geothermal Power Plant
- [4] Renovation of Power Generation Equipment with Combined Cycle Upgrade
- Renewable Energy and Power Stabilization ...... 106
- 1 Mega Solar Power Plant in Kisozaki Reclaimed Land (49.2 MW DC)
- Storage Battery Power Conditioning Sub-System "PVI800-3/750"

- I Retrieval for Bent MARICO-2 Test Subassembly Using Remote Control Device of Experimental Fast Reactor "Joyo"
- 2 Medium-Voltage Switchgear (Earthquake Resistant Specification) for Nuclear Power Plants

Social Infrastructure	108
Social Infrastructure	110

1 Micro-Grid System for the Kingdom of Tonga

- Large-Capacity PCS for Zhoushan Marine Science and Technology Demonstration Island of Zhejiang University in China
- 3 Photovoltaic Power Generation System for the Republic of Kiribati
- Distribution Static Var Compensator for Tohoku Electric Power Co., Inc.
- **5** Optimum Facility Operation for "K Computer"
- 6 Technology for Isolated Operation in Disaster Situations Using Photovoltaic Power Generation
- Technology to Visualize Energy Operation Optimization Based on Formula Manipulation Technology

Industrial Infrastructure 113
Substation Systems
Completion of Supply and Installation of Additional
"S-Former" for ALBA (Aluminum Bahrain B.S.C) Line 5.
2 Self-Commutated Frequency Changer for Minamata
Factory of JNC Corporation
3 Start of Operations of ESL 66-kV Substation and HYL 66-kV
Substation for Bahrain Electricity and Water Authority
Industrial Plants
① Series Expansion for DC Motor Control Unit "LEONIC-M Compact"
2 Packages and Upgrade Tools for Steel Plant Control System
3 Functionality Enhancement for "MICREX-NX" Information and Process Control System
4 Monitoring and Control System
<b>5</b> Distributed Control System for Waste Incineration
Facilities
<b>6</b> Optimal Operation System "FeTOP" for Energy Plants
7 Steam Generation Heat Pump
8 Smart Factory System for Yamanashi Factory
(9) "Integrated Cloud Service"
10 Cloud-Based Equipment Maintenance Service
II Industrial Use Air Conditioning Control Software Platform
12 High-Speed Electric Power Generation System for Exhaust
Heat Recovery Steam Turbines
<b>13</b> Food Defense System for Ajinomoto General Foods, Inc.
14 Energy-Saving Hybrid Air Conditioner "F-COOL NEO,"
Utilizing Indirect Outside Air
Industrial Measuring Instruments
2 "MICREX-VieW XX" Network Adapter
3 Programmable Display "MONITOUCH V9 Series"
4 Biomass Gas Analyzer "ZPAF"
<b>5</b> Zirconia Oxygen Analyzer "ZFK8," "ZKMA" and "ZKMB,"
Equipped with HART Communication Function
<b>6</b> Energy Saving New Melting Furnace
7 Wireless-Type Rotating-Machine Vibration Monitoring
System "WISEROT" for Overseas Markets
8 Energy Harvesting Technology for Wireless Sensors
9 Engineering Linking Technology for EMS Layer and
Equipment Monitoring Layer
10 Ultra-Small Wireless Module with Built-In Antenna for
Embedded Applications
Power Electronics Equipment 124
Drive Systems

Inverter for Air Conditioning "FRENIC-eHVAC Series"
 Medium-Voltage Inverter "FRENIC4600FM6e Series"

# FUJI ELECTRIC REVIEW vol.61 no.2 2015 Detailed Contents

Power Supply Systems 126
1 Rack-Mount DC UPS
Transportation Systems
Door Drive System and Auxiliary Power Unit for Subway
Cars of Washington Metropolitan Area Transit Authority
2 Auxiliary Power Unit for Newly Built Trains of Sanyo
Electric Railway Co., Ltd.
3 Power Unit for Echigo TOKImeki Railway Company
4 Rack and Pinion Door Drive System for Railways in North
America
5 Passenger Information System for Rolling Stock
<b>6</b> TRDP System Train Communication Card for Electrical
Rolling Stock Conforming to IEC 61375-2-3
Electric Distribution, Switching and Control Devices 129
1 Expansion of Compact Magnetic Contactor "SK Series"
(SK32 Type)
2 Magnetic Contactor for Photovoltaic Power Generation
Equipment "SC-N12/DS"
3 Mute Magnetic Contactor "SL Series"
3 Mute Magnetic Contactor "SL Series"
[4] Line Expansion of Multi-Circuit Power Monitoring Unit
5
[4] Line Expansion of Multi-Circuit Power Monitoring Unit
Line Expansion of Multi-Circuit Power Monitoring Unit     "F-MPC04P Series"
Image: A constraint of the second
Image: A constraint of the second
Image: A constraint of the second of the
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices</li> <li>131</li> <li>Power Semiconductors</li> <li>133</li> <li>1 Industrial RC-IGBT Module Technology Using a New Package</li> <li>2 High-Power 3-Level IGBT Module</li> </ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"         <ul> <li>Electronic Devices</li> <li>131</li> </ul> </li> <li>Power Semiconductors</li></ul>
<ul> <li>[4] Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>[Electronic Devices 131</li> <li>Power Semiconductors</li></ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices</li> <li>131</li> <li>Power Semiconductors</li> <li>133</li> <li>1 Industrial RC-IGBT Module Technology Using a New Package</li> <li>2 High-Power 3-Level IGBT Module</li> <li>3 6-Inch SiC-MOSFET</li> <li>4 High-Power In-Vehicle Standard Module for Electric and Hybrid Electric Vehicles</li> </ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices</li> <li>131</li> <li>Power Semiconductors</li> <li>133</li> <li>1 Industrial RC-IGBT Module Technology Using a New Package</li> <li>2 High-Power 3-Level IGBT Module</li> <li>3 6-Inch SiC-MOSFET</li> <li>4 High-Power In-Vehicle Standard Module for Electric and Hybrid Electric Vehicles</li> <li>5 1,200-V High-Speed Discrete IGBT "High-Speed W Series"</li> </ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices</li> <li>131</li> <li>Power Semiconductors</li> <li>133</li> <li>1 Industrial RC-IGBT Module Technology Using a New Package</li> <li>2 High-Power 3-Level IGBT Module</li> <li>3 6-Inch SiC-MOSFET</li> <li>4 High-Power In-Vehicle Standard Module for Electric and Hybrid Electric Vehicles</li> <li>5 1,200-V High-Speed Discrete IGBT "High-Speed W Series"</li> <li>6 Expansion of the 6th-Generation PWM Control IC Lineup</li> </ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices</li> <li>131</li> <li>Power Semiconductors</li> <li>133</li> <li>1 Industrial RC-IGBT Module Technology Using a New Package</li> <li>2 High-Power 3-Level IGBT Module</li> <li>3 6-Inch SiC-MOSFET</li> <li>4 High-Power In-Vehicle Standard Module for Electric and Hybrid Electric Vehicles</li> <li>5 1,200-V High-Speed Discrete IGBT "High-Speed W Series"</li> <li>6 Expansion of the 6th-Generation PWM Control IC Lineup</li> <li>7 High-Current IPS for Vehicles</li> </ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices</li> <li>131</li> <li>Power Semiconductors</li> <li>133</li> <li>1 Industrial RC-IGBT Module Technology Using a New Package</li> <li>2 High-Power 3-Level IGBT Module</li> <li>3 6-Inch SiC-MOSFET</li> <li>4 High-Power In-Vehicle Standard Module for Electric and Hybrid Electric Vehicles</li> <li>5 1,200-V High-Speed Discrete IGBT "High-Speed W Series"</li> <li>6 Expansion of the 6th-Generation PWM Control IC Lineup</li> <li>7 High-Current IPS for Vehicles</li> <li>8 Power Semiconductor Simulation Technologies</li> </ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices 131</li> <li>Power Semiconductors</li></ul>
<ul> <li>4 Line Expansion of Multi-Circuit Power Monitoring Unit "F-MPC04P Series"</li> <li>Electronic Devices</li> <li>131</li> <li>Power Semiconductors</li> <li>133</li> <li>1 Industrial RC-IGBT Module Technology Using a New Package</li> <li>2 High-Power 3-Level IGBT Module</li> <li>3 6-Inch SiC-MOSFET</li> <li>4 High-Power In-Vehicle Standard Module for Electric and Hybrid Electric Vehicles</li> <li>5 1,200-V High-Speed Discrete IGBT "High-Speed W Series"</li> <li>6 Expansion of the 6th-Generation PWM Control IC Lineup</li> <li>7 High-Current IPS for Vehicles</li> <li>8 Power Semiconductor Simulation Technologies</li> </ul>

High-Quality Positively Charged Organic Photoconductors

- Fundamental and Advanced Technologies 141

- Generation Power Devices
- [2] Protection Technologies of Photovoltaic Power Generation Systems
- 3 Conformance to International Standards Related to Power Electronics
- [4] Gas Analysis Technology Conforming to MARPOL Annex VI "Regulations for the Prevention of Air Pollution from Ships"
- **5** Thermal Simulation Technology in Reactor Design
- **6** Solder Joining Materials with High-Temperature Operations
- Advanced Technology ..... 145
- 1 SiC Epitaxial Film Growth Simulation Technology
- 2 Crystal Orientation Control Technology for Heat-Assisted Magnetic Recording
- **3** 3,300-V SiC-SBD and SiC-MOSFET
- 4 SiC Trench MOSFET
- **5** Visual Feedback Control in Robot Operation



\* All brand names and product names in this journal might be trademarks or registered trademarks of their respective companies.