

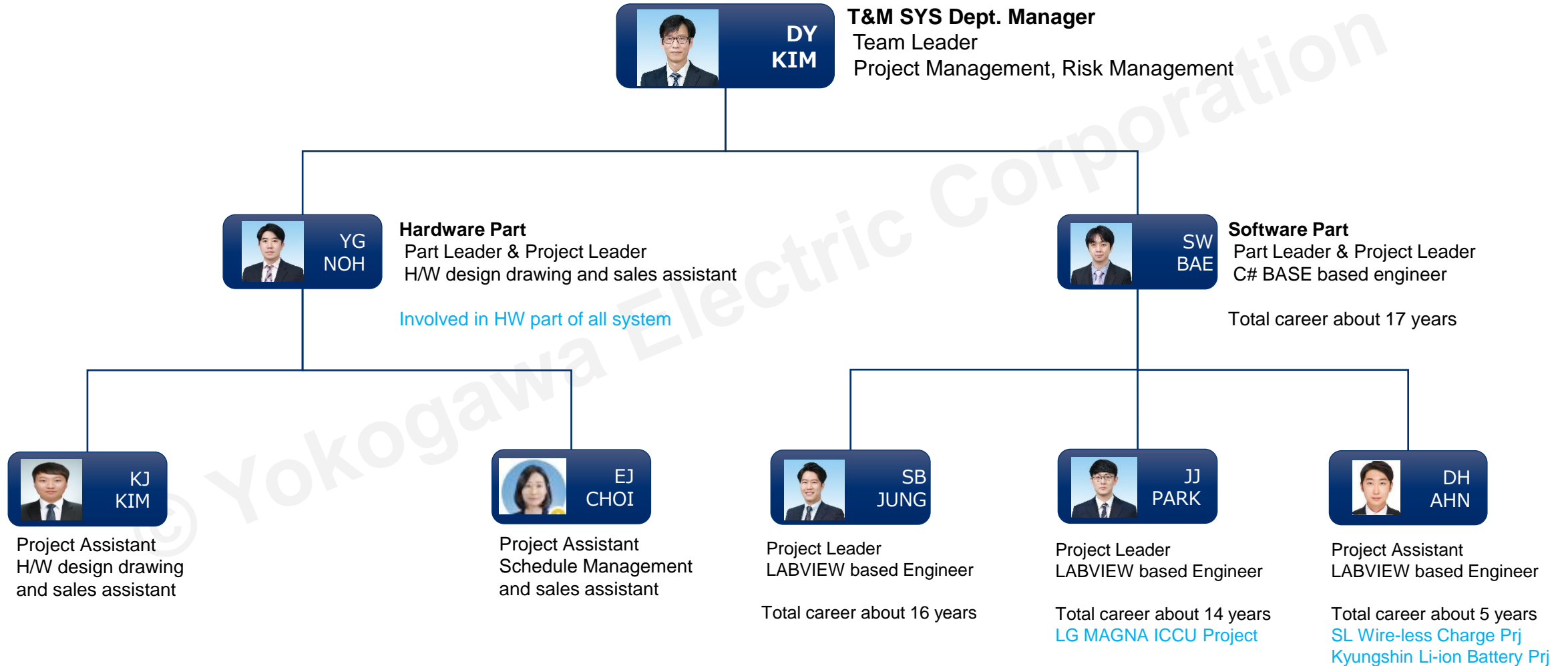


Top Gun Project DL950 Success Stories

2025-02-18

Confidential

T&M System Dept. Organizations



Self introduction



Profile

Name : BAE Seong woo(裴成友)

E-mail : seongwoo.bae@yokogawa.com

Birthday : 1980.05.03

Place of birth : Busan, Korea

Work(Assigned Task)

Develop programs to implement customer systems or services

Development Language : C++, C#, JAVA

Career

Power Noise Simulator

[Hyundai mobis](#), [Samsung SDI](#)

Battery TEST system

[Samsung SDI](#)

Camera durability test system

[Hyundai mobis](#), [LG Innotek](#)

Thermoelectric module and Peltier element efficiency and durability tester

[Hyundai](#)

Grid PV Simulator

[Hanwha](#)

DL950 Success Stories

Client



YURA TECH

auto parts manufacturer

(Major customers are **Hyundai/Kia Motors and Hyundai Mobis.**)

DL950 Sales volume – 6EA

Spark plug System

DL950-F-HK - 5EA
720211 20MHz -15EA
C60 SFP+ - 5EA
700929 Probe 1000 V - 30EA
701933 Current Probe 30A 50MHz - 5EA

Pre-charge Relay System

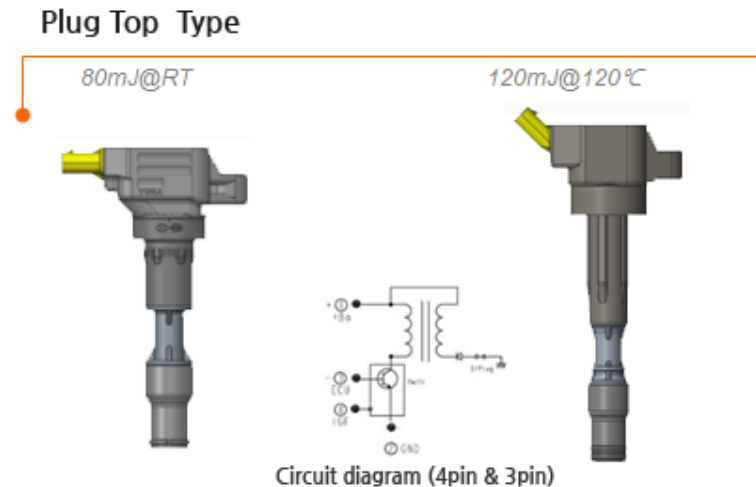
DL950-F-HK/M1 - 1EA
720268 1MS/s - 5EA
758933 Measurement lead set - 3EA
701904 1:1 Safety adapter lead - 3EA
758921 Fork Terminal adapters - 6EA
720256 4CH 10MS/s 12Bit Isolation Module - 1EA
CT60 Current Transducer(60Apeak) - 3EA
VZ20X -1EA
701930 Current Probe -1EA

DL950 Success Stories

Spark plug durability System

Customer Requirements

- Load resistance: 10Mohm
- Maximum voltage: 50kV
- 30CH normal operation and current level measurement
- Group 5EA each and determine whether the ignition coil is operating by measuring the current of the entire group.
- Provides 6 months of Hyundai Motor Company requirement waveform data storage

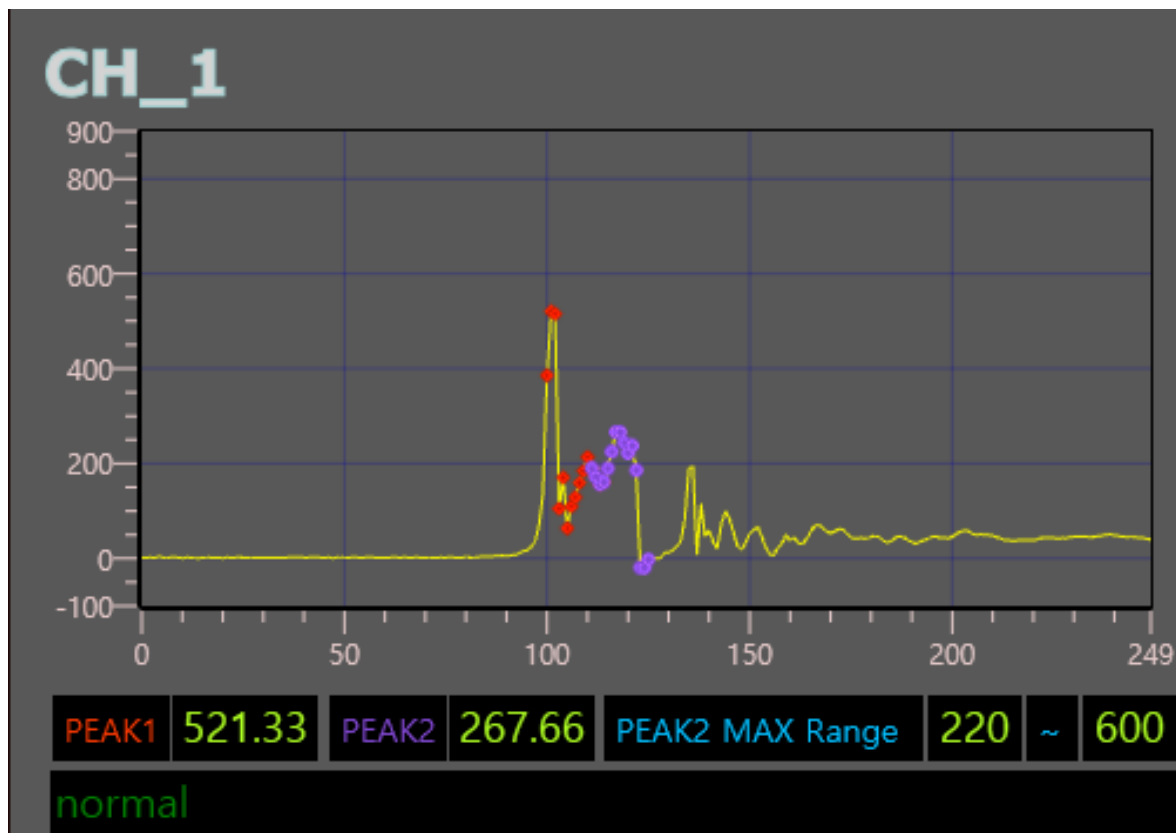


DUT - Spark plug

The core driving device of an engine that generates high-voltage current to cause spark discharge inside the engine.

DL950 Success Stories

Spark plug durability System – S/W Program



Waveform display(2M Sampling, Point-Point 2us)

1st peak measurement(red dot)

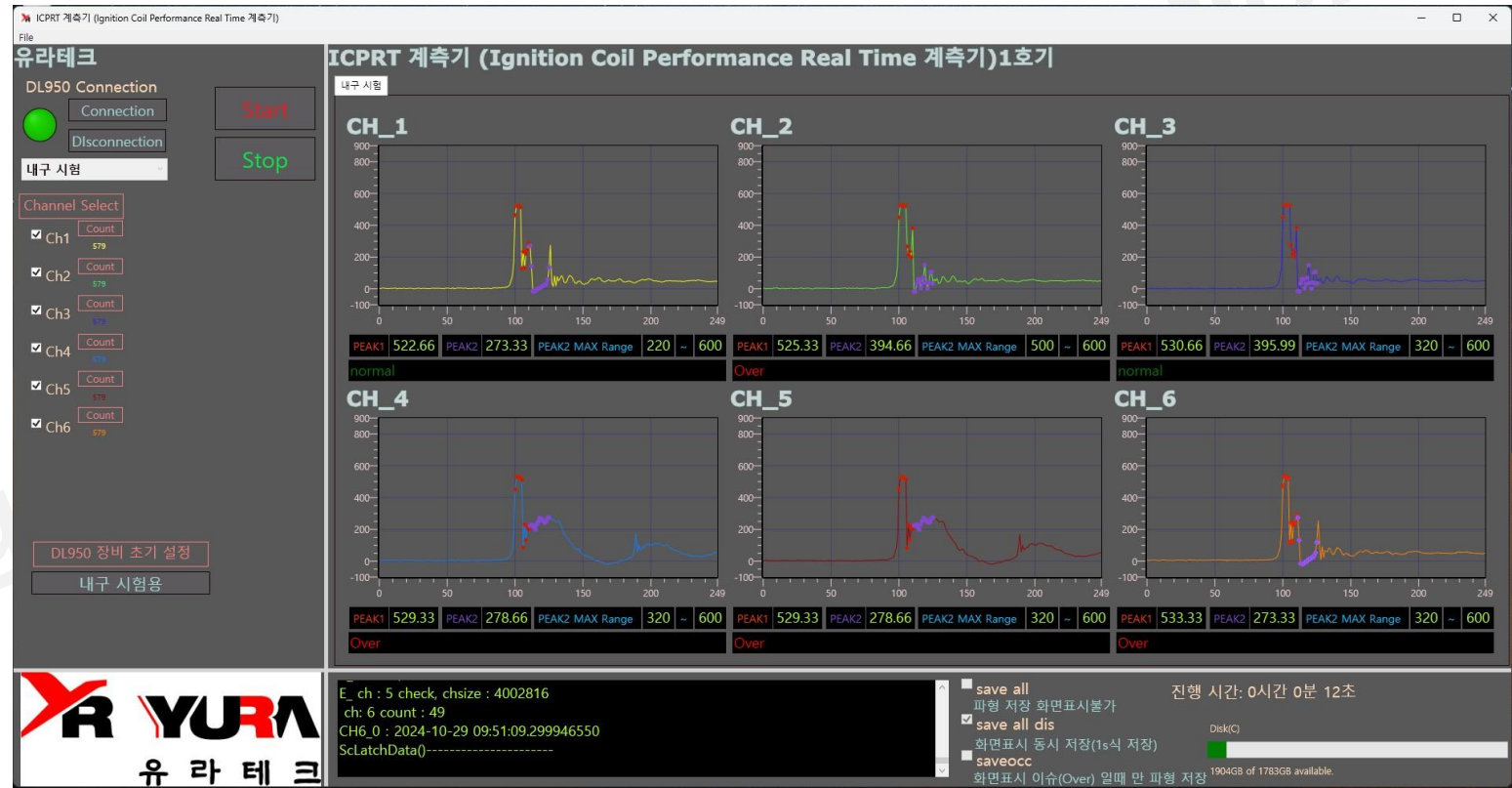
2nd peak measurement(purple dot)

2nd peak - Reading by range

- Normal range "normal" display
- "Over" display outside normal range
- 2nd peak Range: User configurable

DL950 Success Stories

Spark plug durability System - Drive photos



DL950 Success Stories

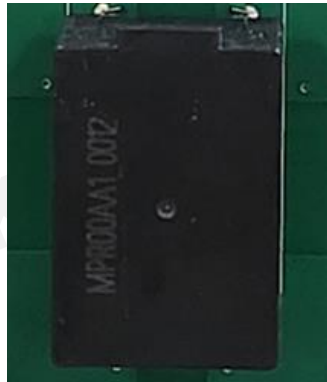
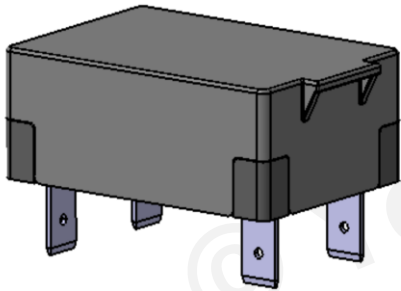
Spark plug durability System - On-site photos



Pre-charge Relay System

Customer Requirements

DC up to 24V (voltage programming)
3Ch (up to 50A expected when controlled simultaneously) or 6Ch (up to 100A expected)
Monitoring, data storage, operation On/Off repeat control, overcurrent/high temperature alarm function,
Voltage operation control required according to each temperature and humidity chamber pattern section

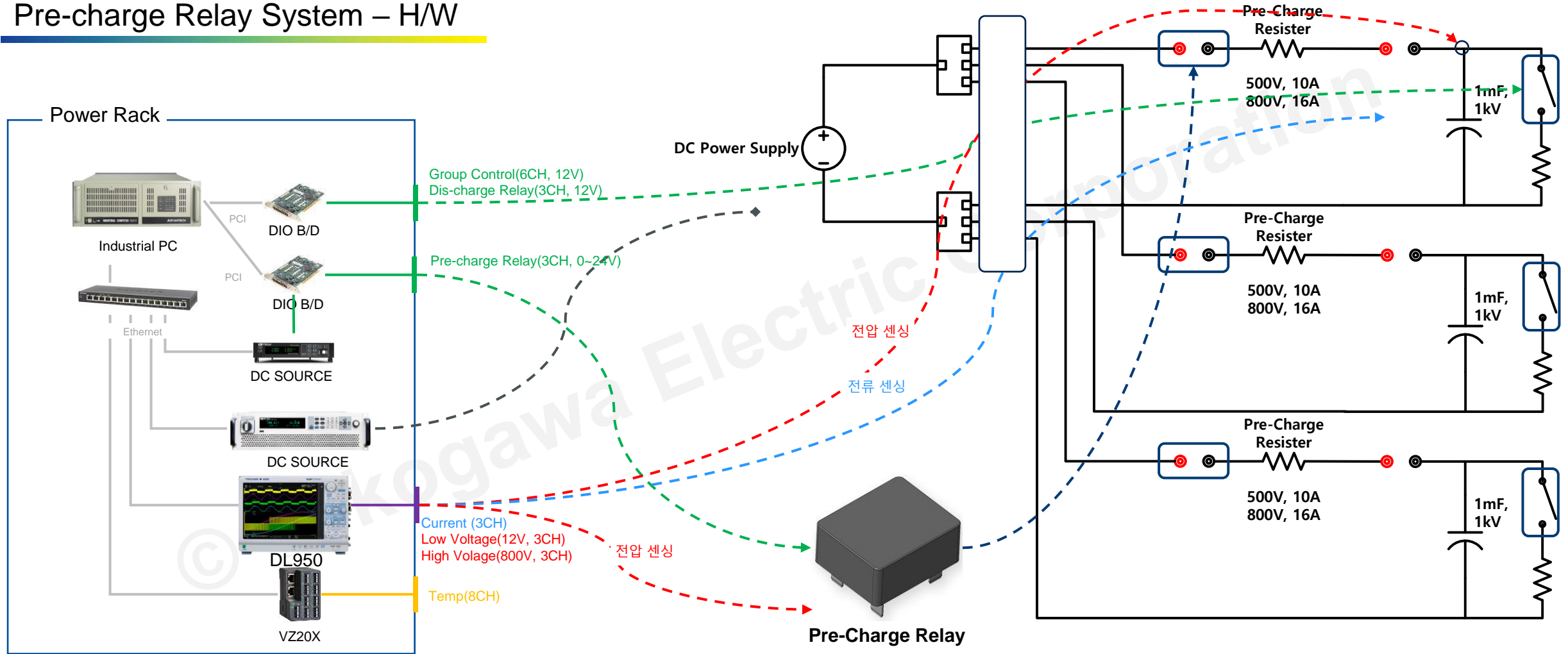


Key components that connect and disconnect electric vehicle (EV) batteries and inverters/chargers

DUT – Pre-Charge Relay

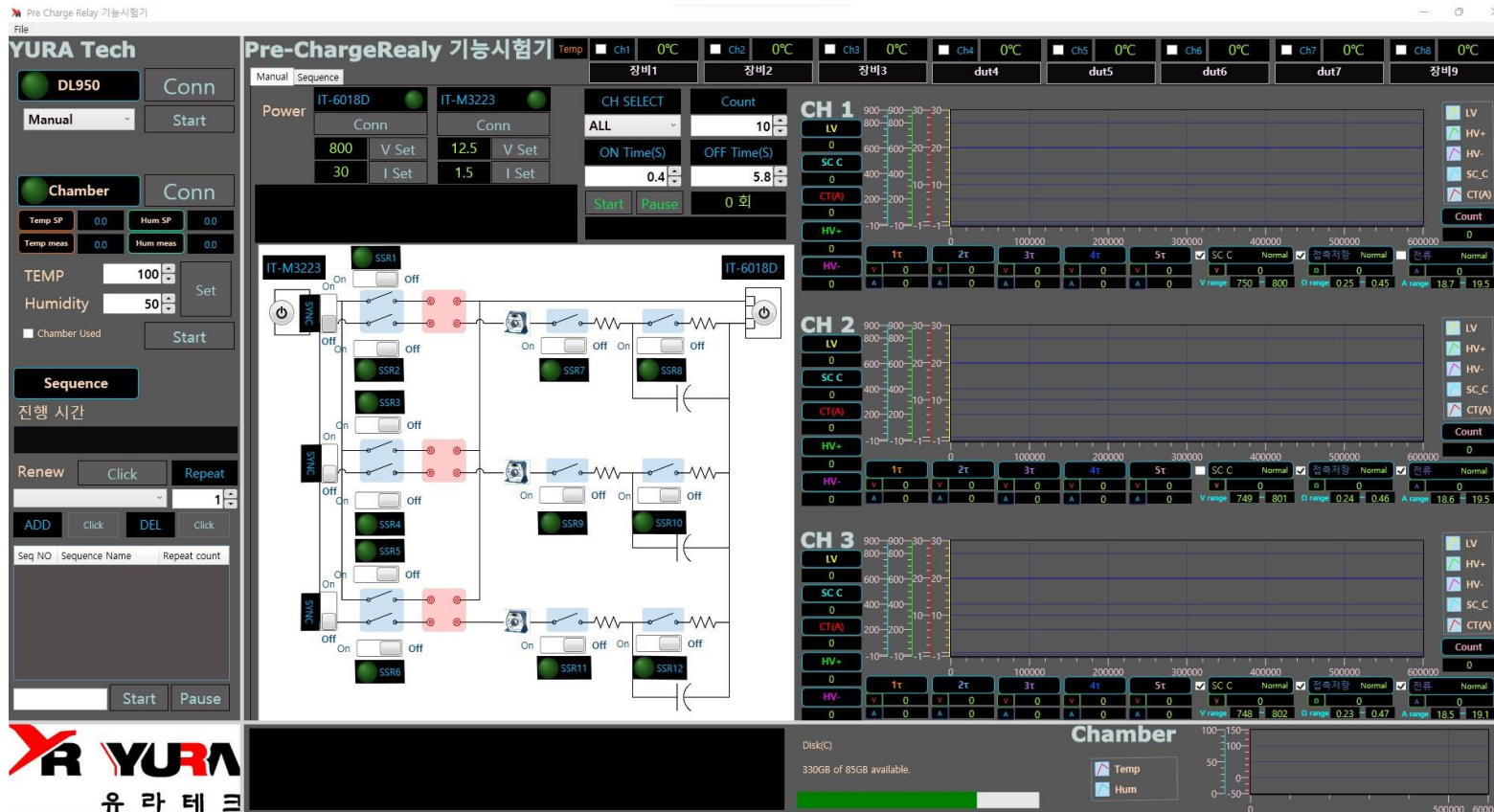
DL950 Success Stories

Pre-charge Relay System – H/W



DL950 Success Stories

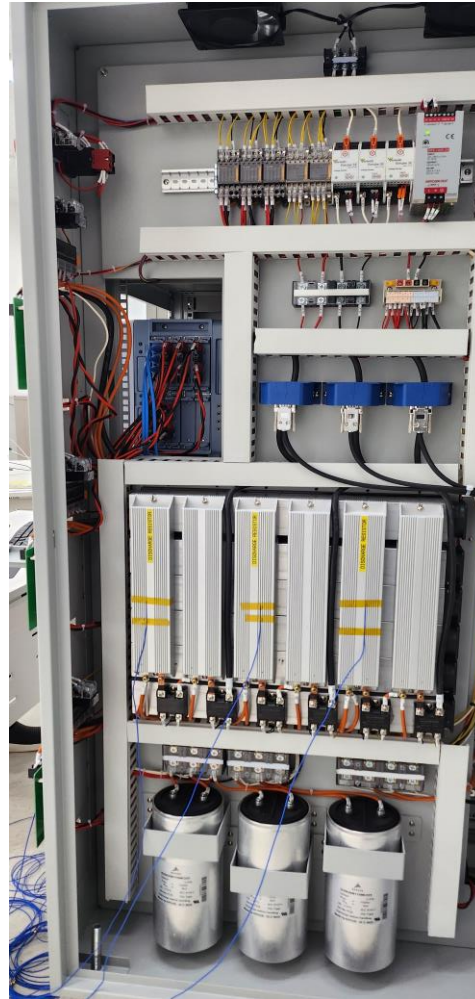
Pre-charge Relay System – S/W Program



- ON OFF TIME Control Operation
- Chamber Control
- Tau(Time constant) Calculation
- Contact resistance Calculation

DL950 Success Stories

Pre-charge Relay System - On-site photos



Self introduction



Profile

Name : Jung Seungbae(丁陞陪)
E-mail : seungbae.jung@yokogawa.com
Birthday : 1982.01.23
Place of birth : Yangsan-si,
Gyeongsangnam-do, Korea

Work(Assigned Task)

Programs Developer for PC Based
Application

Development Tools : LabVIEW, C#

Career

Pre-Charge Relay Tester

[Woojin](#)

Li-ion Battery Charge/Dis-Charge Tester

[KyungshinHoldings](#)

EOL Tester for BDU Function

[YURA Corporation](#)

EOL Tester for ICCB Function tester

[YURA Corporation](#)

■ Customer Information

Company title: Woojin Industry Company Ltd.



Establishment: May, 1966

CEO: Ryu Si Hyuck

Location: 248, Sandan-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Republic of Korea

Customers: **Hyundai, Kia, GM**, etc.

Products: Spark Plug, Oxygen Sensor, Glow Plug, etc.

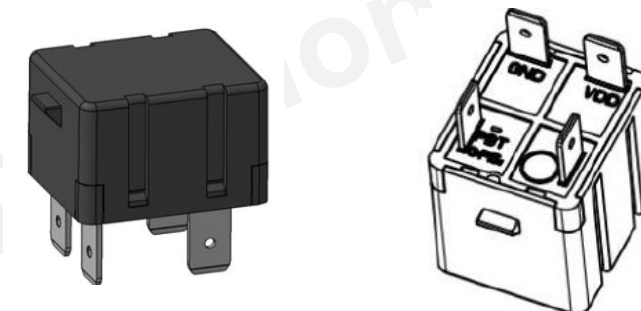
Sales: 218.66599 billion won

DL950 Success Stories

DUT(Device Under Test) Specifications

EPR, Electronic Pre-charge Relay

Item	Spec.	Remark
Coil Voltage	8~16Vdc	Max. 650 Vdc(Output)
Current Rating(Output)	11.25A	450Vdc, 40Ω, 1000uF(Output)
Pick Up Voltage	8Vdc Below	
Drop Out Voltage	3.1 +/- 0.5Vdc	12Vdc, 1kΩ @ 20°C(Output)
Operate Time	0.1 ~ 1.0ms	
Release Time	0.8 ~ 3.8ms	
Pickup current	5 ~40ms	
Contact Resistor(Output)	0.5 ~ 1.2Ω	12Vdc, 1A @ 20°C(Output)



EPR

As a PRA SUB part, it operates before the main relay operates and reduces the voltage difference within the circuit to prevent main relay overload.

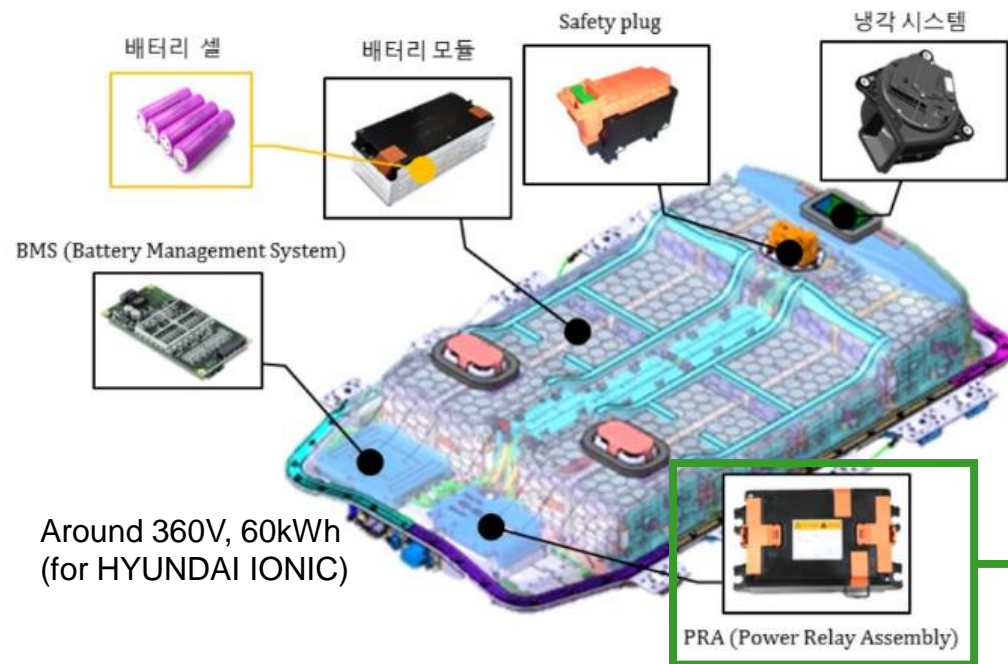


Test Specification

[Durability test](#), [Environment reliability test](#) and [Mechanical reliability test](#) for EPR
HYUNDAI MOTOR Engineering Standard

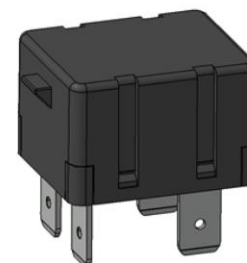
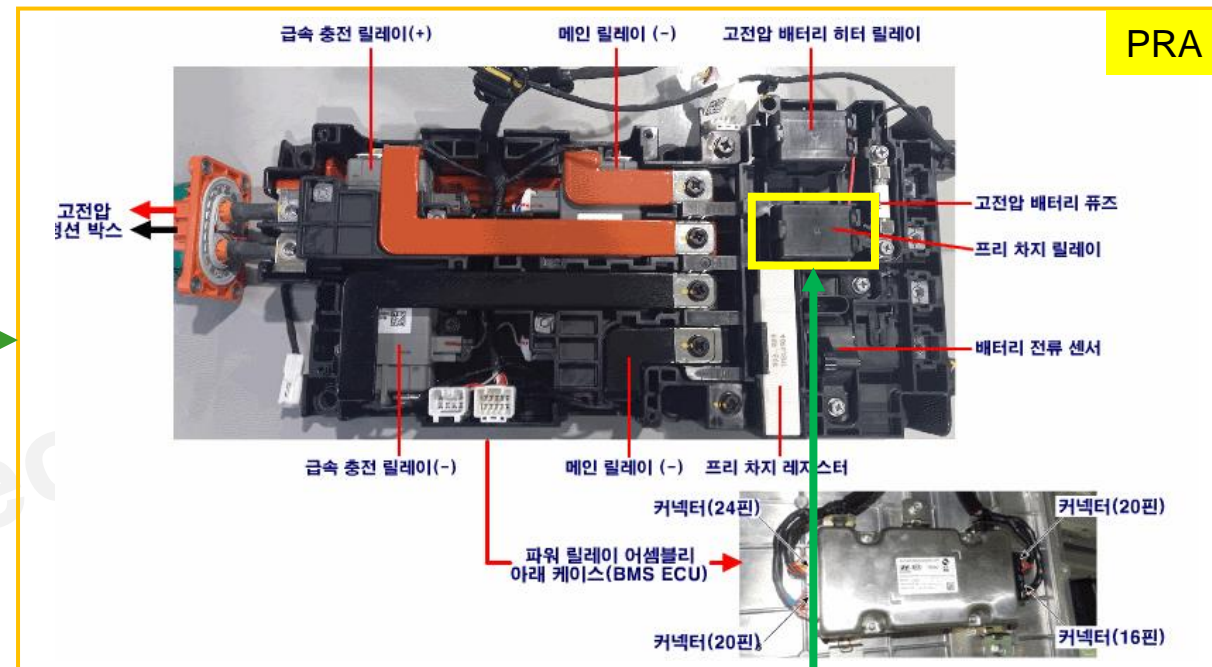
DL950 Success Stories

What is the EPR?



The **Power Relay Assembly (PRA)** is a component that supplies and cuts off power for discharging or charging the high-voltage battery. It is installed in the high-voltage battery system assembly (BSA) and electrically connects the battery and the inverter.

Applicable components include main relay, pre-charge relay, resistor, current sensor, temperature sensor, bus bar, etc.



Pre-Charge Relay

As a PRA SUB part, it operates before the main relay operates. It reduces the voltage difference within the circuit to prevent main relay overload.

100

720268 High Voltage Module 1MS/s



DSP1950



701265 High-Precision Temperature Input Module

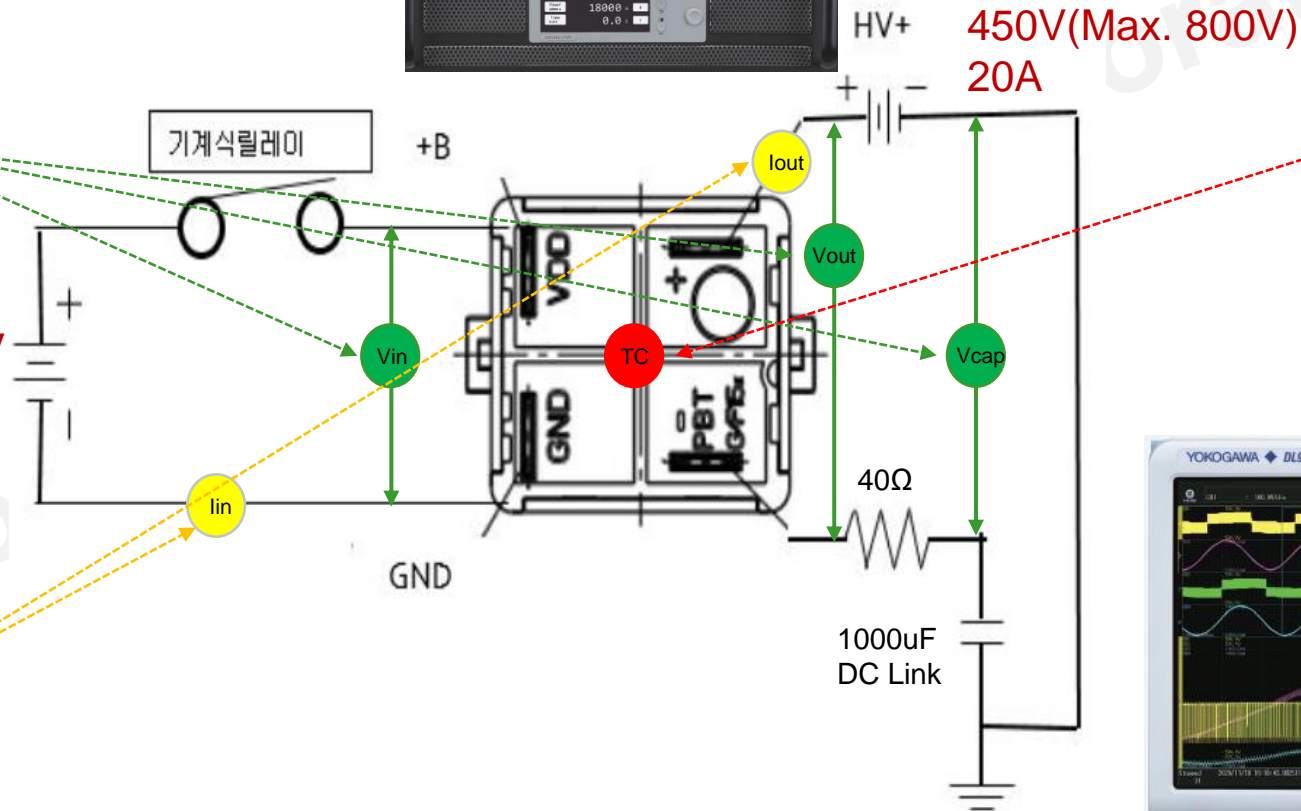


BP4610



12V
1A

701251 Analog Voltage Input Module

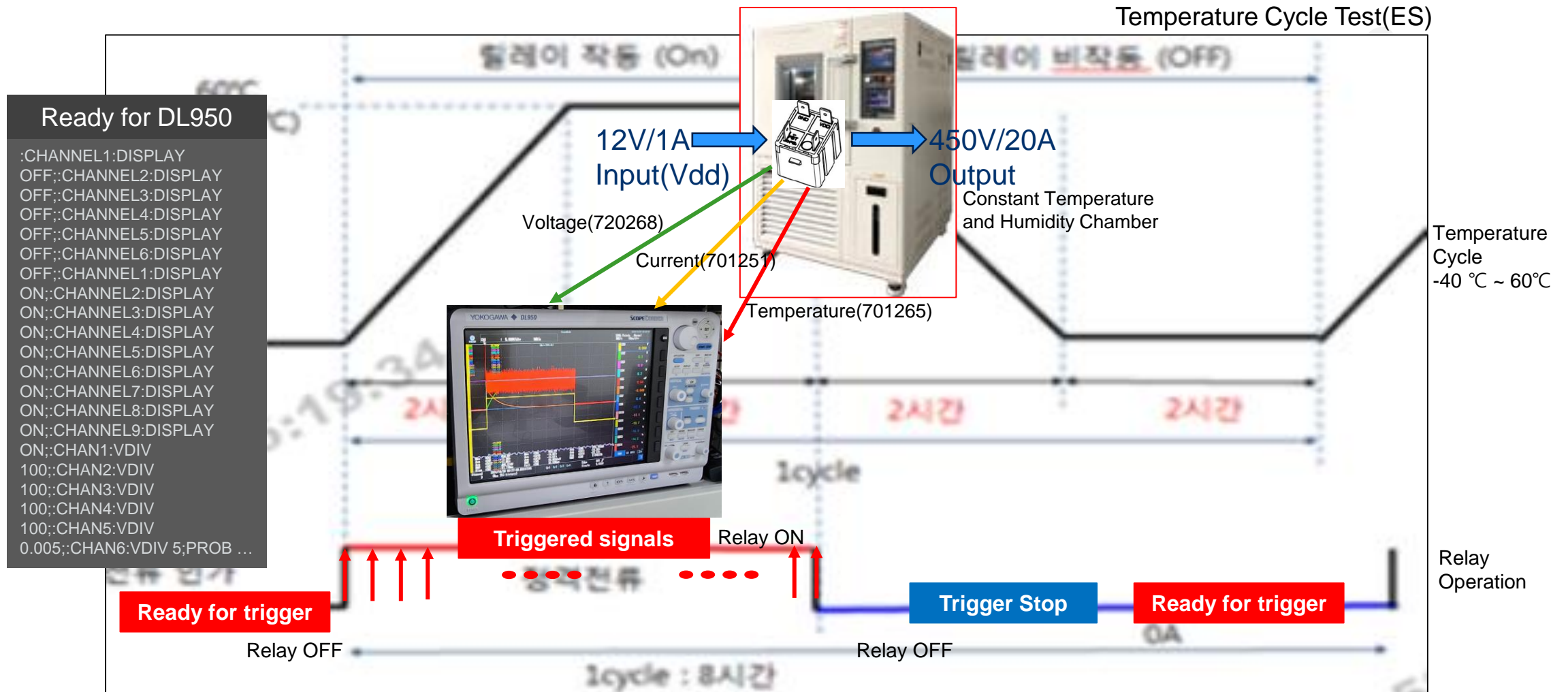


DL950



DL950 Success Stories

DL950 Solution for ES Test of High Voltage Relay



Mechanical & Environment Test, 2EA

Test System



DL950 Modules used

720268 High Voltage Module
1MS/s



X 2

701265 High-Precision Temperature
Input Module



X 2

701251 Analog Voltage Input Module



X 1

702916 Current Probe 120 MHz/ 0.5
ARMS, 5 ARMS, 30 ARMS



X 1

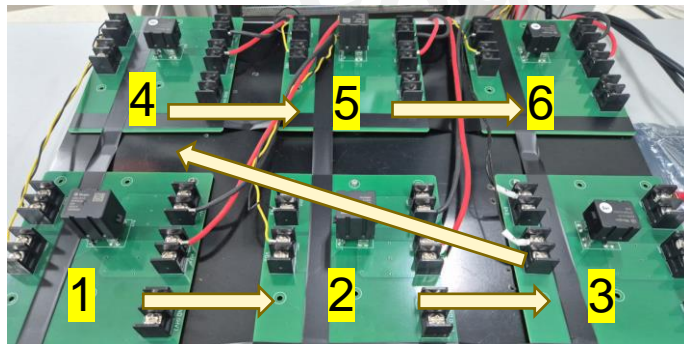
Durability Test, 1EA

Test System



DUT
6EA

Switching



DL950 Modules used

720268 High Voltage Module
1MS/s



X 2

701265 High-Precision Temperature
Input Module



X 3

701251 Analog Voltage Input Module



X 1

702916 Current Probe 120 MHz/ 0.5
ARMS, 5 ARMS, 30 ARMS



X 1

For 80A Test

701930 Current Probe,
150Arms,DC to 10MHz



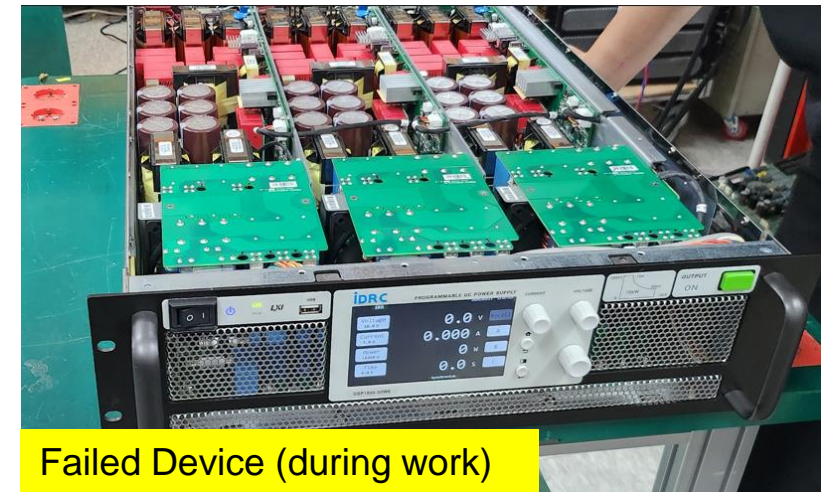
X 1

DL950 Success Stories

For Delivery



Failed Sample (during work)



Failed Device (during work)

DL950 Success Stories

System solutions for installed customer sites

[DL950 Movie](#)



Expectations for DL950 Application

T&M System

It is expected to be a device that can replace NI DAQ products based on noise processing and isolation.

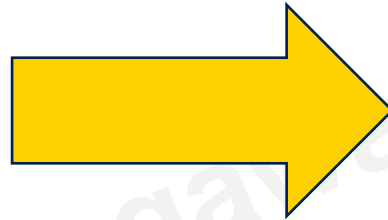


NI compactDAQ



NI PXI

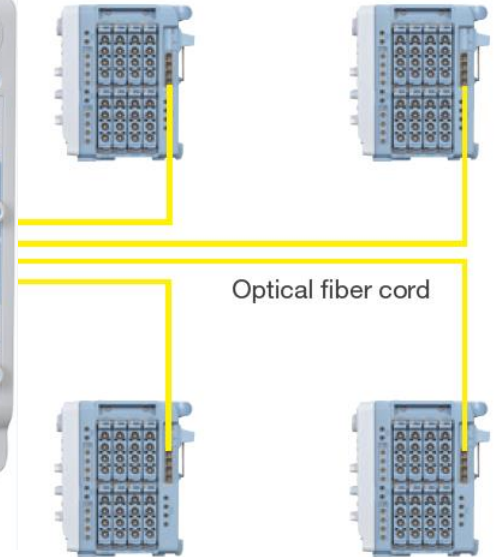
Replacement for
Test Solution



Applications

- Battery cell evaluation
- Multi-point vibration analysis
- Multi-point strain test

*Please use the Optical Transceiver Module 720941 and the Optical Fiber Cord 720942.



Sales opportunity of DL950

■ Samsung MX Division (Mobile)

- 1 unit
- Circuit board duration & current test

■ Stats Chip pack Korea

- 1 unit
- Semiconductor duration & looping test

■ Posco

- 2 units
- Electricity quality monitoring for electrical substation in steel plant

■ Keyang Electric Machinery

- 1 unit
- Vehicle sunroof motor test

Request for YMI Product (Sales)

■ Physical Layer Analysis

- CAN/CANFD or other serial signal physical layer decoding function like DLM series

■ Integrated Printer

- Integrated printer support instantaneous data output to tangible paper
- Heavy industry customers (Shipbuilding) started to change DL950 to other high speed DAQ with printer
- The market size that can sell DL950 in the maintenance market is bigger. However, the market is being lost due to the absence of a printer. A printer function that can be set up simply and printed is needed.

■ Weight

- Too heavy to carry to the test site

Request for YMI Product (Sales)

■ USB C Interface

- USB C interface should be applied(EX : replace VGA to USB C, USB C cable to External SSD)

■ Measure values order

- Measure values order that are displayed in the screen cannot be changed
- The order should be edited by user for the better analysis

■ Integrated DC power

- Integrated DC power helps not to carry external power bank or source.

■ Display size expansion

- The screen is relatively smaller than the DLM series. Display size expansion is required.

Request for YMI Product (Engineer)

■ Remote mode key Lock

- While in remote mode entire key locked, make us difficult to analysis the trend
- At least time axis should be changeable so that trend analysis will be possible

■ Data acquisition while waiting for Trigger

- In some cases, 720221, 701261 are used in same time with voltage input modules
- While waiting trigger, there is no way to gather temperature data

■ LabVIEW Driver

- Some commands are missing in LabVIEW driver
- The driver should support most of the functions in the communication commands

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