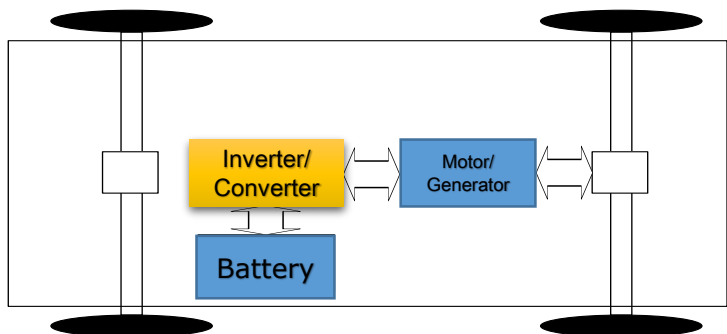


Introduction to Isolation System DM-8000

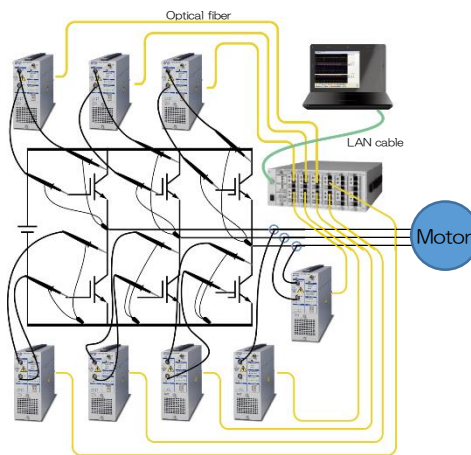
Measurement of Car Power Inverters waveforms



The Isolation System is needed to measure accurately gate signals (V_{ge}) of inverters which have big common mode noises.

----- DM-8000 Isolation System -----

Measuring High Side Gate Voltages (V_{ge}) of a three-phase-inverter which drives a motor, we used differential probes so far. We sometimes experienced that it was difficult to keep the sufficient bandwidth for such a measurement because waveforms are fluctuated by CMRR or by the limit of withstand common mode voltage. The Isolation System we introduce here enables us to observe the accurate signals with optical fiber technology without the influences given above.



Isolation Measurement

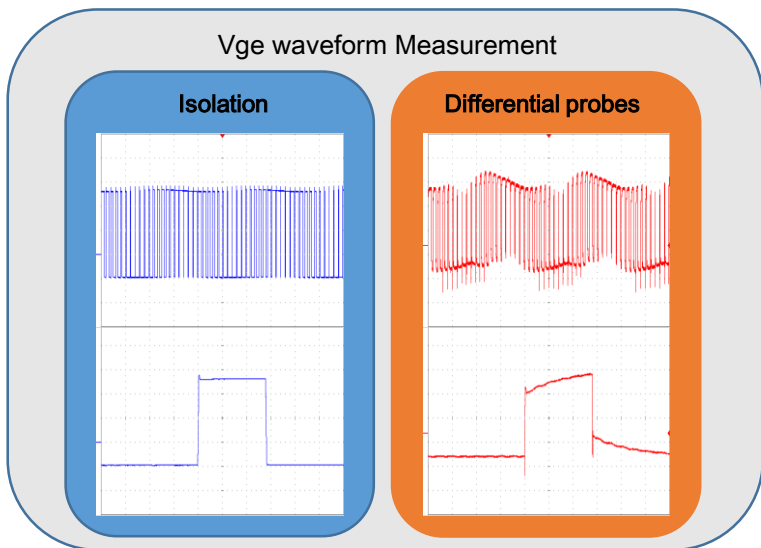
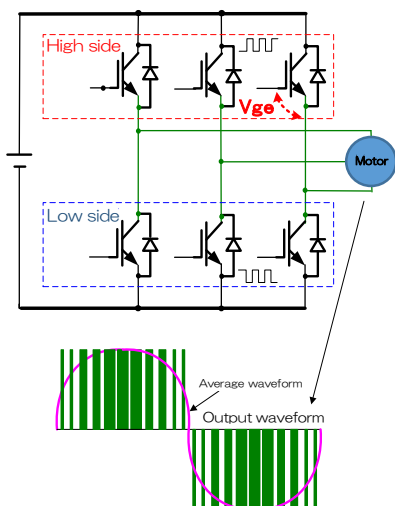
Simultaneous Voltage measurements up to Max. 12 channels are available.

Multiple channels

Max. 24 channels

Wide Bandwidth

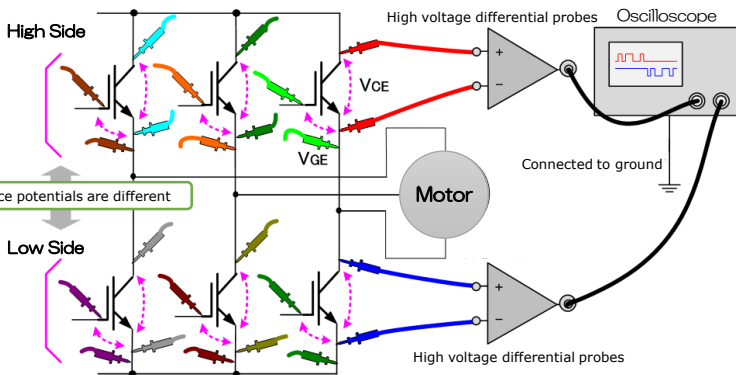
DC to 500MHz



Measurement of Inverter High side waveform

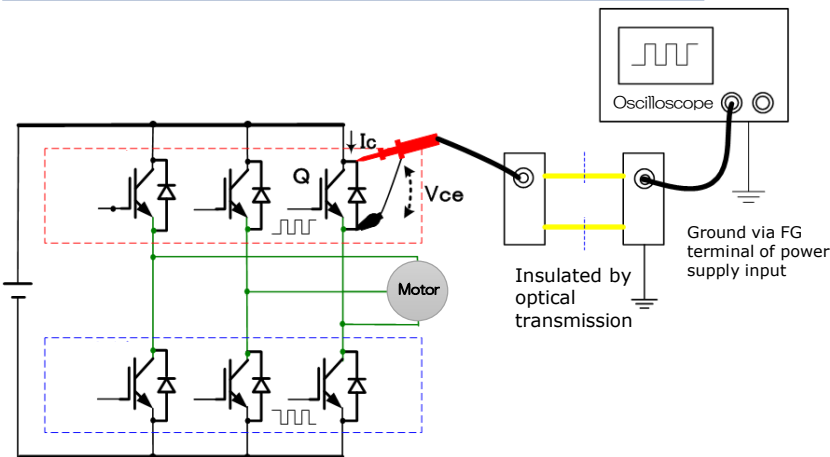
Using the Isolation System, you can measure High and Low sides simultaneously.

When high voltage differential probes and oscilloscopes are used



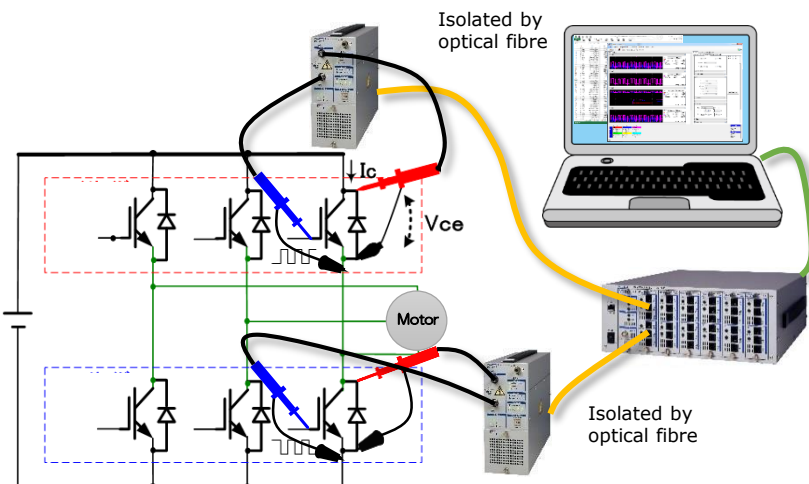
- NG** Common Mode Rejection Ratio(CMRR) affects the measurement.
- NG** Difficult to take impedance matching at the measuring point.
- NG** Frequency bandwidth is DC to 100MHz at a maximum.

When Optical Isolation amplifiers and oscilloscopes are used



- Good** Safety measurements for high voltages
- Good** Not so easily affected by electric and magnetic fields noises from outside
- Good** Little influence by common mode noise
- NG** Frequency bandwidth is DC to 20MHz at a maximum.

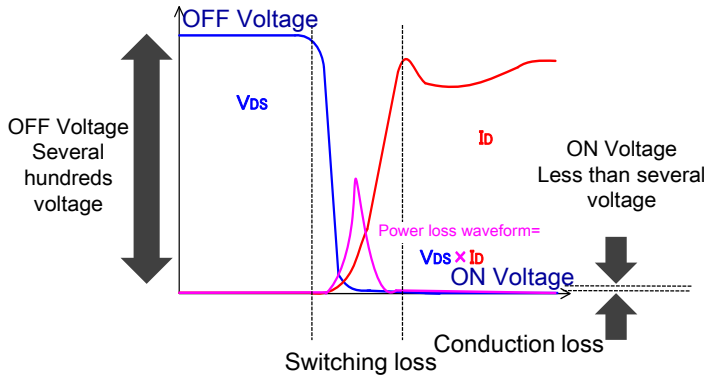
When Isolation System is used



- Good** Safety measurements for high voltages
- Good** Not so easily affected by electric and magnetic fields noises from outside
- Good** Little influence by common mode noise
- Good** Wide bandwidth DC to 500MHz
- Good** Simultaneous measurement for various voltages on multiple channels are available.

Efficiency Measurement of Power Supplies & Inverters

Switching and Conduction losses in operation can be measured.



In Power semi-conductor loss measurement, oscilloscopes have been used for years because transient period is so short that it takes several ten to several hundreds nano seconds even if repeated cycle is not high speed.

Since the vertical resolution of oscilloscopes is usually 8 bits, it is difficult to measure ON voltage accurately. For example, in order to measure a switching waveform whose OFF voltage is 600V, the vertical range is set to 100V/div (Full scale 800V). In this case, the vertical resolution is,

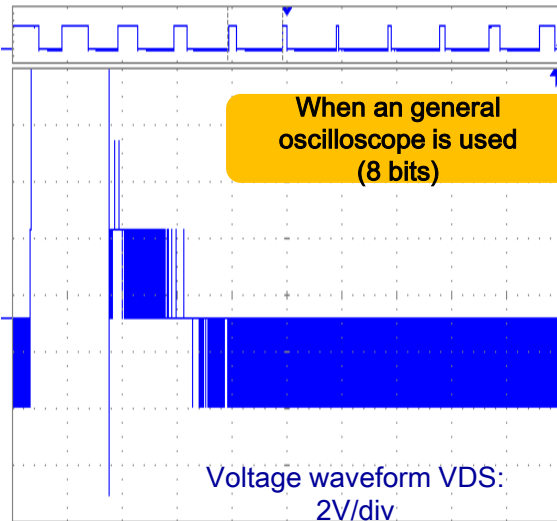
$$800V / 256 (8bit) = \text{Approx. } 3.1V$$



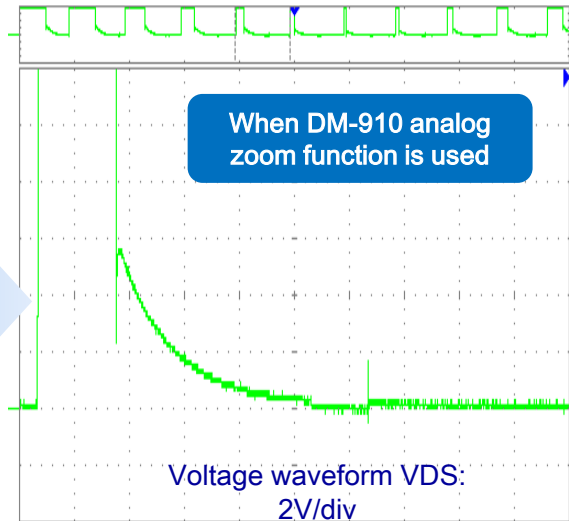
High resolution Unit DM-910
(The product is covered by an insulation cover.)



Using High resolution Unit DM-910, you can solve the problem you were not able to do with oscilloscopes.



Enable you to measure the waveform Max. 20 times against the current scope.



The above shows an example of measurement of MOSFET VDS(Drain-Source-Voltage) with a general oscilloscope (Vertical resolution: 8 bits) . The waveform was captured at 100V/div range and ON voltage was observed at 2V/div. There is approx. 3.1 voltage quantization error at the vertical axis.

Hard to measure ON voltage accurately.



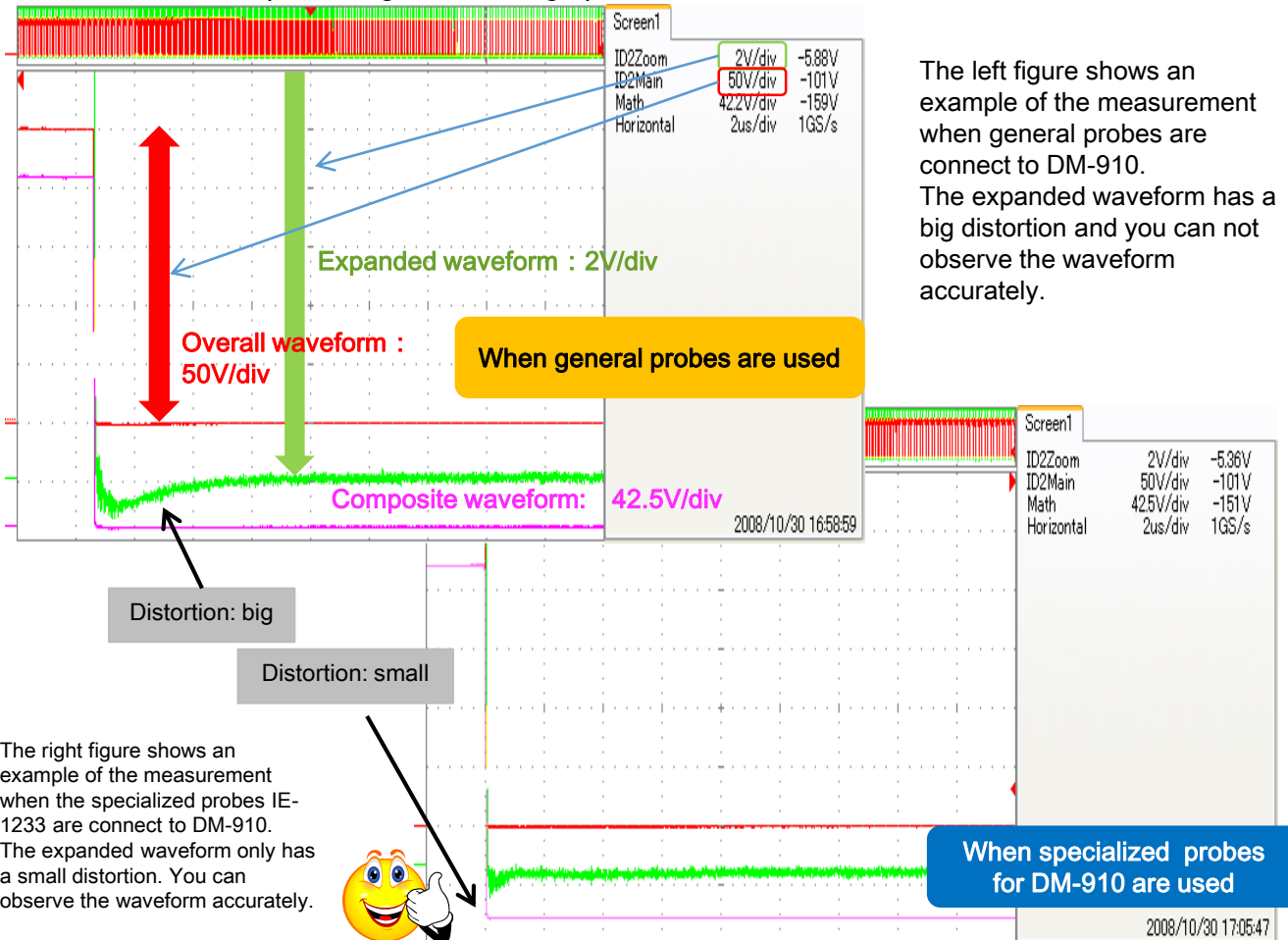
Enable you to measure ON voltage accurately.

Conduction loss Measurement

The specialized probes are needed when high resolution measurement is performed.

The specialized probes are a must when the accurate dynamic measurement by the analog zoom function is performed!

The specialized probe IE-1233 improves the waveform distortion and the temperature characteristics compared to general voltage probes.



IE-1233 Specifications

Input RC	33MΩ±5% // 6pF±1pF
Damping ratio	100:1±less than1%(Probe only)
Frequency bandwidth	DC to 10MHz±0.2dB, 350MHz -3dB
Input capacity waveform compensation	14pF to 8pF
Input withstand voltage	1kV (DC + Peak AC)
Cable length	Approx. 2.0m
Accessories(Quantity)	Arrow tip(1), Ground tip(1), Earth attachment(1), IC test tip(1), Mark band(Blue, Green, Yellow, Purple(2 each)), Screw driver(1)



IE-1233