IGBT・FRD

How to use PLECS Half Bridge 1Phase Inverter

Introduction

This document explains how to use the Half_Bridge_1Phase_Inverter with the PLECS device model of Renesas IGBT and FRD products.

Contents

1. Preparations

1.1 PLECS Model Installation

To use Half_Bridge_1Phase_Inverter, the PLECS model of Renesas IGBTs must be installed.

For installation, please refer to "How to install PLECS IGBTFRD model".

As shown in Figure 1-1, if the "Renesas Component - date" category is found in the library browser and device models are available to use.

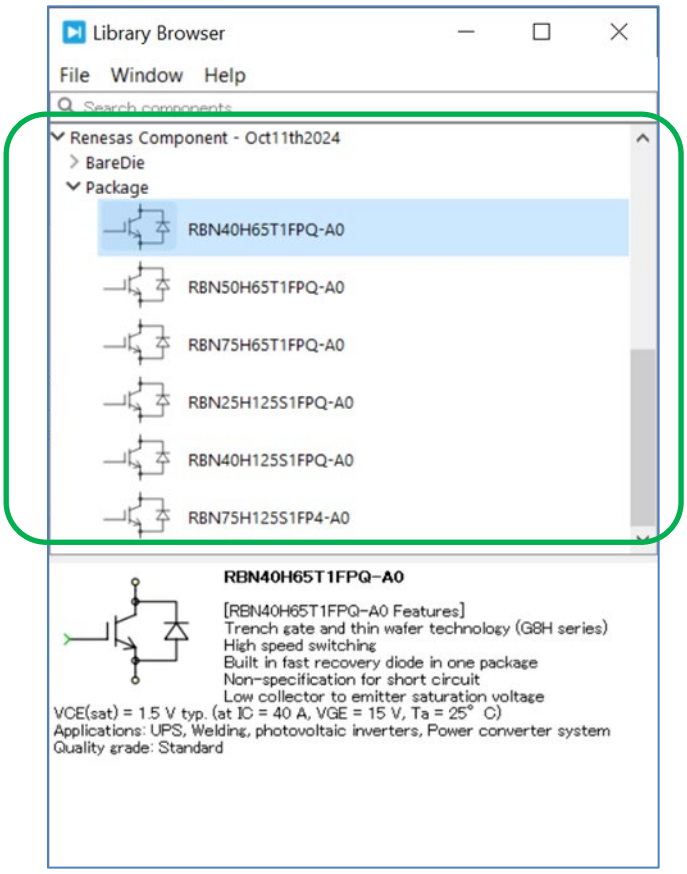

Figure 1-1 PLECS Component Library

2. How to use three-phase inverter models

2.1 Open the 1-phase inverter model

Open the downloaded 1-phase inverter model. (Figure 2-1)

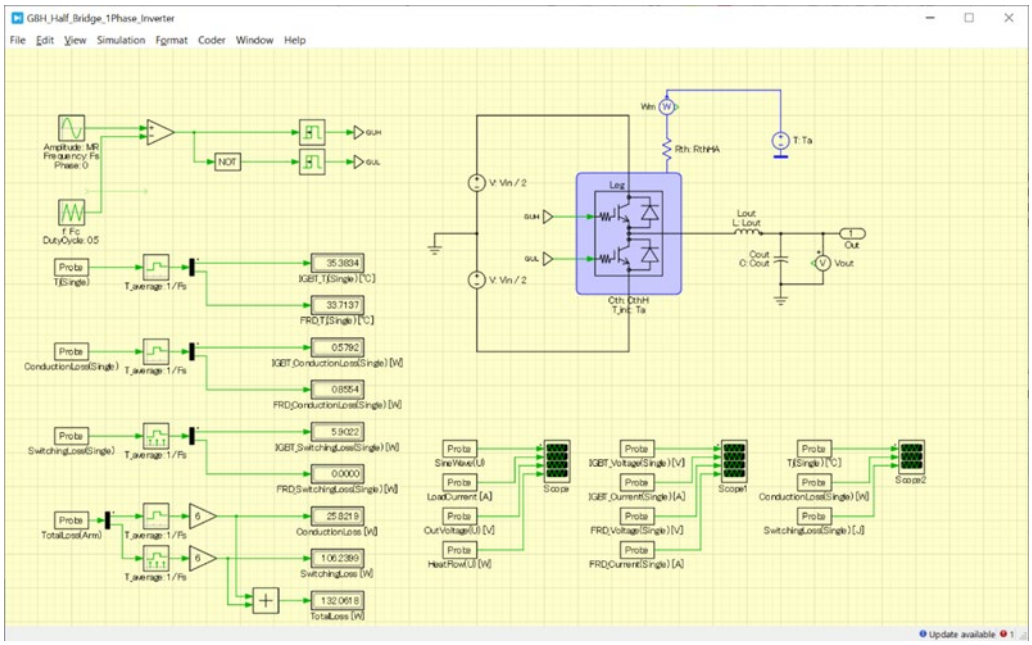

Figure 2-1 1-phase inverter model

2.2 Selecting a device model

Right-click on the Leg of the 1-phase inverter model and select the device model you want to use from the Device model pull-down menu of the Parameters. (Figure 2-2)

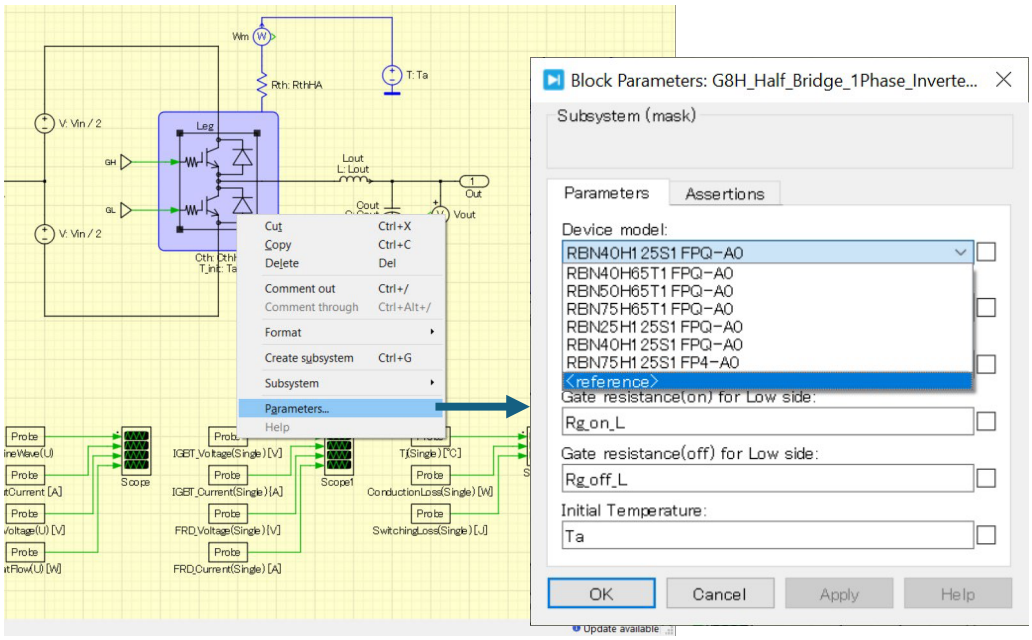

Figure 2-2 Selecting a device model

2.3 Setting Simulation Parameters

Select Simulation → Simulation parameters to open the Simulation Parameters window, as shown in Figure 2-3, and set the parameters in the Initialization tab.

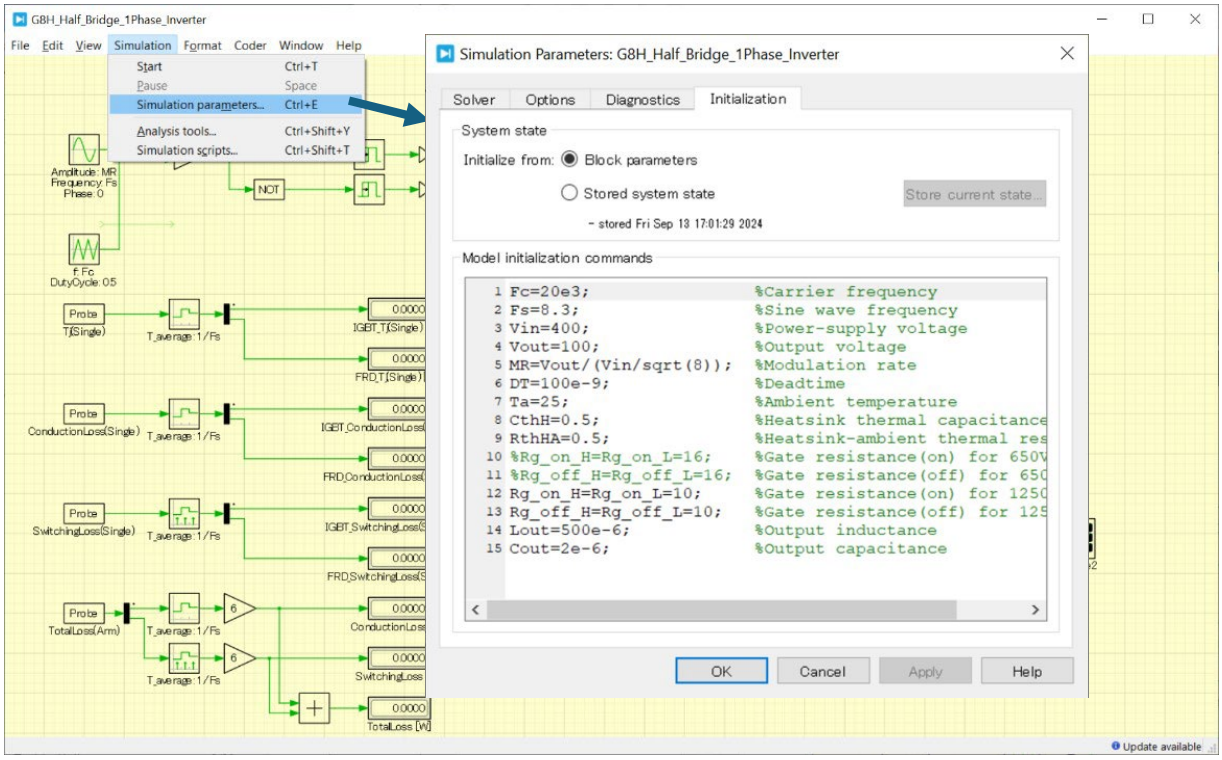

Figure 2-3 Simulation Parameters

The simulation parameters are as follows.

Fc	Carrier frequency
Fs	Sine wave frequency
MR	Modulation rate
PF	Power Factor
DT	Deadtime
Vin	Power-supply voltage
Vout	Output voltage
Ta	Ambient temperature
CthH	Heatsink thermal capacitance
RthHA	Heatsink-ambient thermal resistance
Rg_on_H	Gate resistance (on) for high side
Rg_off_H	Gate resistance (off) for high side
Rg_on_L	Gate resistance (on) for low side
Rg_off_L	Gate resistance (off) for low side
Lout	Output inductance
Cout	Output capacitance

In this model, one device is connected on each of the high and low sides of the inverter, so a total of 2 devices are connected to one inverter.

The parameters CthH and RthHA are values for one inverter circuit, so please set appropriate values according to the number of devices included in the inverter.

2.4 Simulation Execution

Select Simulation → Start to run the simulation. (Figure 2-4)

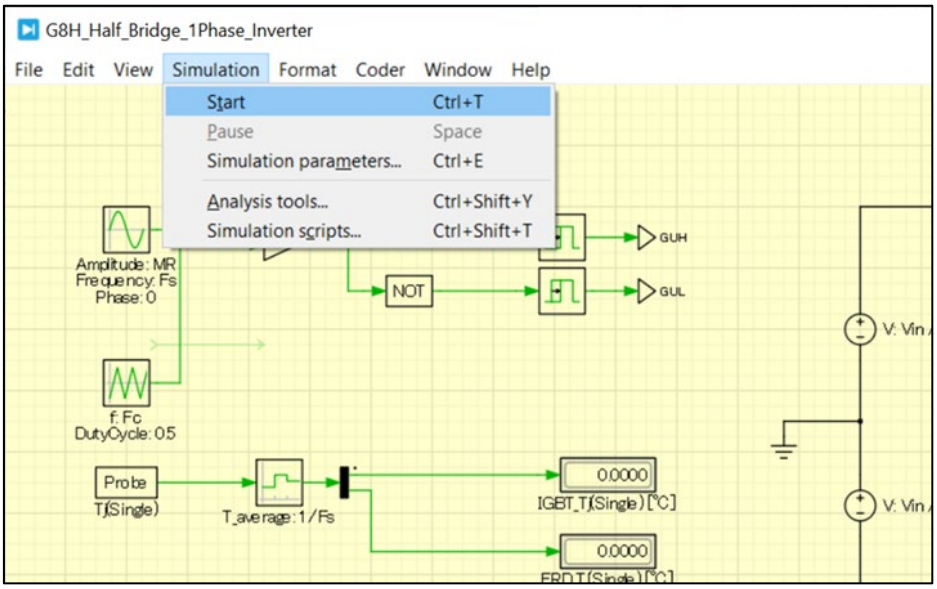

Figure 2-4 Star Simulation

2.5 Monitoring the simulation results

Once the simulation is started, the simulation time is displayed in real time on the junction temperature and loss monitor in Figure 2-5.

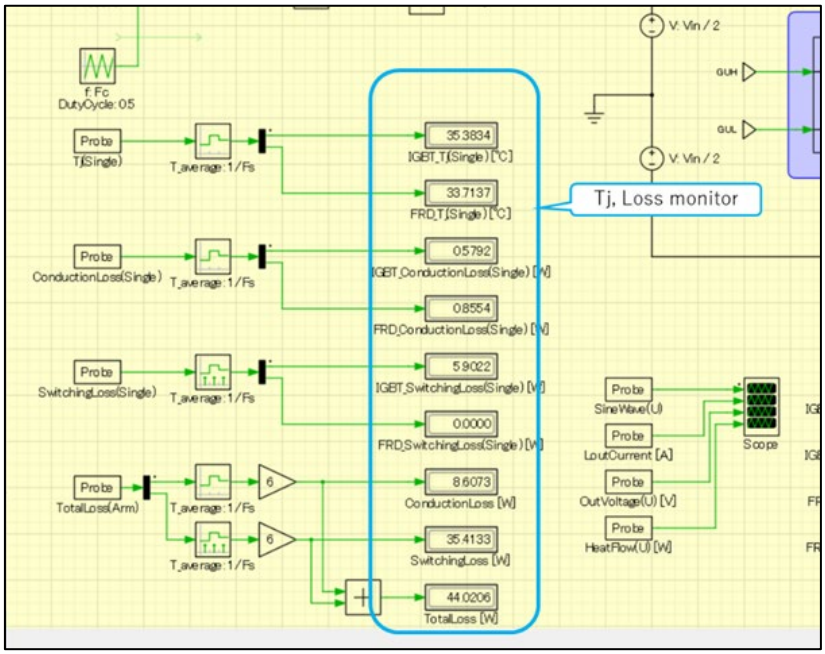

Figure 2-5 Simulation result monitor

2.6 Simulation Result Waveform

The simulation result waveforms can be seen by the scope shown in Figure 2-6.

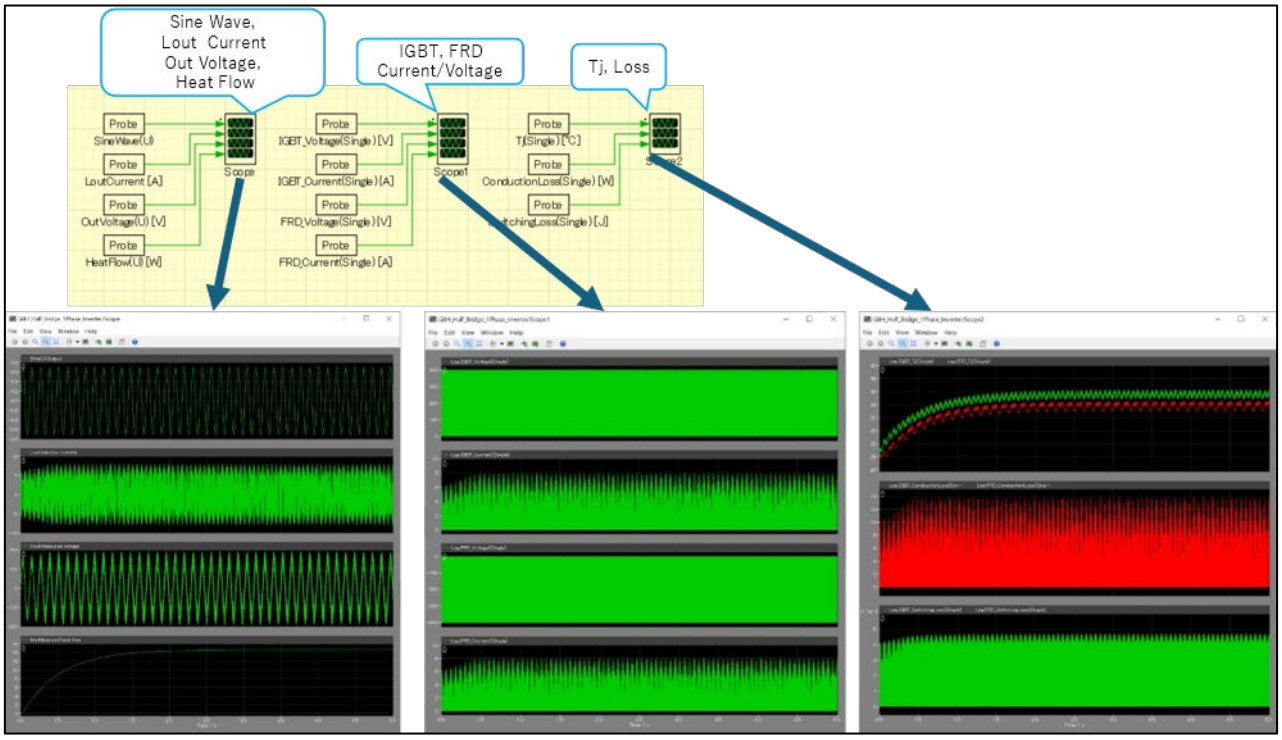

Figure 2-6 Waveform Results

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct.11.24	-	First edition

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