Digitale Interoperabilität in kollaborativen Wertschöpfungsnetzwerken der Industrie 4.0

Submodel Seminconductor Datasheet - Final Presentation of Results

Dr. Jens F. Lachenmaier, Ferdinand-Steinbeis-Institut, 05.07.2023

Ein Projekt gefördert vom

Bundesministerium für Wirtschaft und Klimaschutz

Durchgeführt von

Steinbeis Europa Zentrum

Fraunhofer IPA

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Agenda

Interopera
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- About Interopera – Facts & Figures
- About the Semiconductor Datasheet Project – Facts & Figures
- Ferdinand-Steinbeis-Institut – Our Expertise
- Use Case “Semiconductor Datasheet“ - Scope
- Project Results – The Asset Administration Shell for Power Semiconductors
- Discussion

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About Interopera – Facts & Figures

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About Interopera – Facts & Figures

Interopera
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Goal: The development of 50 submodels of the Asset Administration Shell (AAS) across the Referenzarchitekturmodell Industrie 4.0 (RAMI 4.0) for a variety of business processes.

Duration: 03/2021 – 12/2023

Consortium:

- Steinbeis Europa Zentrum,
- Fraunhofer-Institut für Produktionstechnik und Automatisierung IPA,
- Standardization Council Industrie 4.0 des VDE DKE in Kooperation mit der Plattform Industrie 4.0 und ihrer Partner ZVEI, VDMA, und Bitkom

Funding:

Funded by the Bundesministerium für Wirtschaft und Klimaschutz (BMWK)

Interopera - Approach

Seperation of method/AAS experts and users

1. Step: Open Call and selection of Use Cases
2. Step: Open Call and selection of qualified AAS expert
3. Step: Consitute project teams (open for everyone to join)
4. Step: Implementation: Develop an AAS-Template for the Use Case (using eClass)

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About the Semiconductor Datasheet Project – Facts & Figures

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About the Semiconductor Datasheet Project – Facts & Figures

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Duration: 21.11.2022 - 21.06.2023

Meetings: 2 on premise meetings in Stuttgart and 3 online meetings

Focus: Properties of Power Semiconductors

Involved Companies: PE-Systems, Bosch, Dynex Semiconductors, Fronius, Hitachi Energy, Infineon, Rohm Semiconductors, Silicon Austria, Semikron-Danfoss, SwissSem, Wolfspeed, Ferdinand-Steinbeis-Institut

Ferdinand-Steinbeis-Institute – Our Expertise

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Steinbeis Stiftung - Overview

Ferdinand-Steinbeis-Institut

Transfer of knowledge into companies and society

Steinbeis Transferzentren

- About 1.100 companies
- Focus on consulting, quailfiaction, etc.
- about 5.000 employees[1]
- Turnover ca.160 Mio. €[1]

Steinbeis Universiy

- Bachelor, Master, PhD-Programs
- about 6.000 students
- Technology & Engineering, Leadership & Management, Business & Economics

Ferdinand Steinbeis Institute

- Research Institute about the transformation of busienss and society
- Principle of dual scientic research
- Founded in 2015
- About 30 employees
- Located in Stuttgart & Heilbronn
- Industrial IoT & Digital Twin Consortium

Zahlen aus 2018

Building digital Twins within Business Ecosystems (Selected projects)

Ferdinand-Steinbeis-Institut

- Trade
- Customer Services
- Restraurants / Hotels
- Risk mitigation
- Milk
- Craft
- Additive Manufacturing
- Additive Manufacturing 2
- Industry
- Mobility
- Building Information Modeling (BIM)
- Cooling and lubrication
- Agriculture
- Scheduling
- Industrial Service
- Smart Living
- Care
- Production - PPMP
- Sustainable Logistics
- Wood
- Pay per Part
- Smart Water
- Eating out
- Harbour
- Digital Plattform Transport
- Craft
- Intralogistic

gefördert
abgeschlossen
laufend

Use Case “Semiconductor Datasheet“ - Scope

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Technical product data sheets

Example 1 – Hitachi Energy

HITACHI
Inspire the Next

Data sheet TS-MD/342/21 Jun 22

5SED 0890T2260

60Pak rectifier diode module

- V_{RRM} = 2200 V
- I_{FAVm} = 889 A
- I_{FSM} = 22000 A
- V_{T0} = 0.782 V
- r_T = 0.209 mΩ
- Insulated baseplate by AIN ceramic
- Precision pressure contacts for high reliability
- Industry standard housing

Maximum rated values [1]

Parameter	Symbol	Conditions	Min.	Max.	Unit
Repetitive peak reverse voltage	V_{RRM}	T_j = -40 ÷ 160 °C		2200	V

Source: ABB Library - Halbleiter

Example 2 – Swiss Sem

SwissSEM

DATASHEET

SISD0750ED120i20

ED-Type phase leg IGBT module

V_{CE} = 1200 V
I_C = 2 x 750 A

- *i20* ultra-low loss fine pattern Trench IGBT chipset
- Baseplate isolation with efficient Al_2O_3 ceramic
- Cu baseplate for low thermal resistance
- Industry standard package

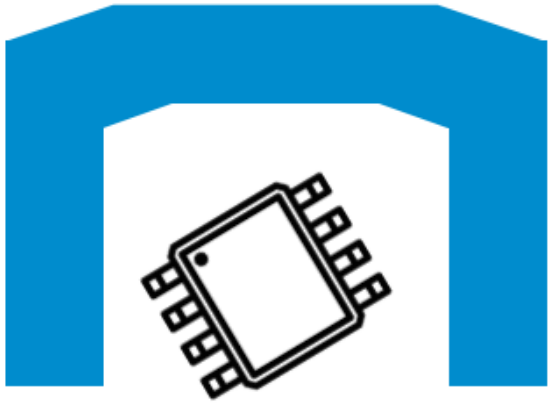
Maximum ratings[1]

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNIT
Collector-emitter voltage	V_{CES}	V_{GE} = 0 V, T_{vj} = 25 °C		1200	V
DC collector current	I_C	T_C = 110 °C, T_{vj} = 175 °C		750	A

Source: 750A - SwissSEM (CH) (swiss-sem.com)

Use Case im Detail

Asset Administration Shell (AAS)



Virtual Product Data Sheet

Basic Properties

Geometrical Properties
Electrical Properties
Thermal Properties

Objectives:
Comparability of semiconductors (from different manufacturers) for the customers

- Assessment of relevant properties
- Transferring properties into AAS
- Assessment of additional requirements for the AAS features and AAS editor

R&D → Production → Assembly → Usage

Processdata (out of scope)

Livedata (out of scope)

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Project Results – The Asset Administration Shell for Power Semiconductors

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Project Results – The Asset Administration Shell for Power Semiconductors

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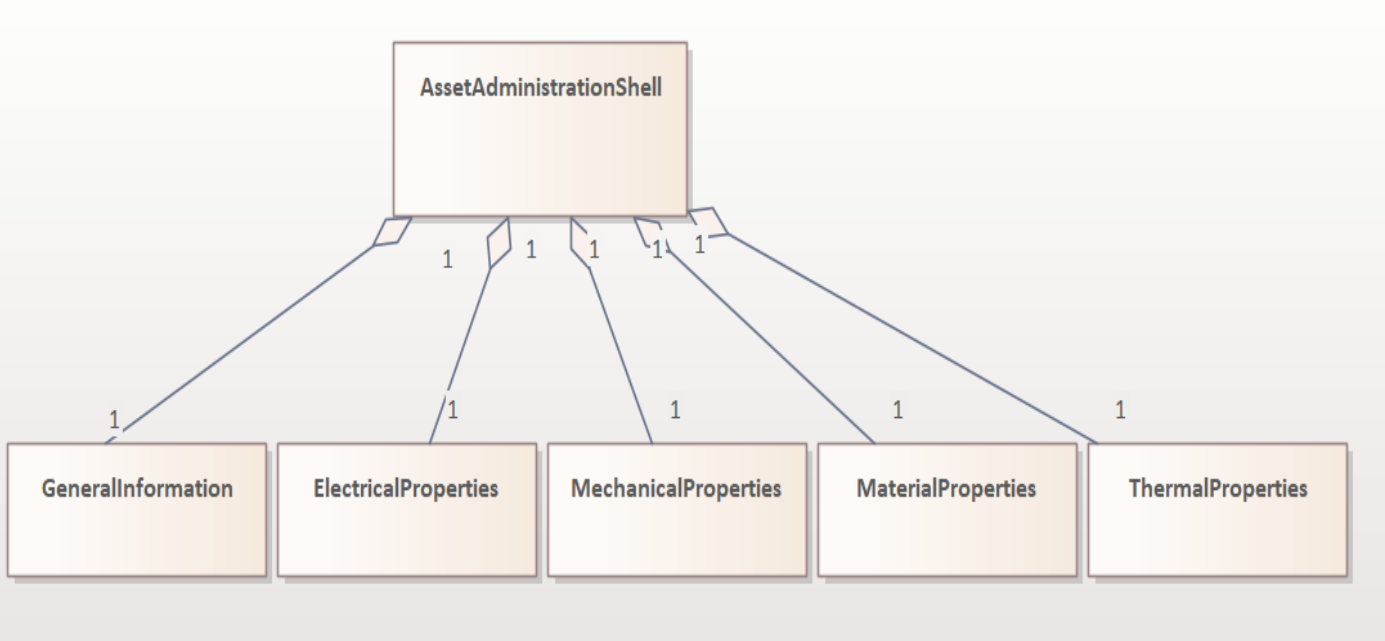

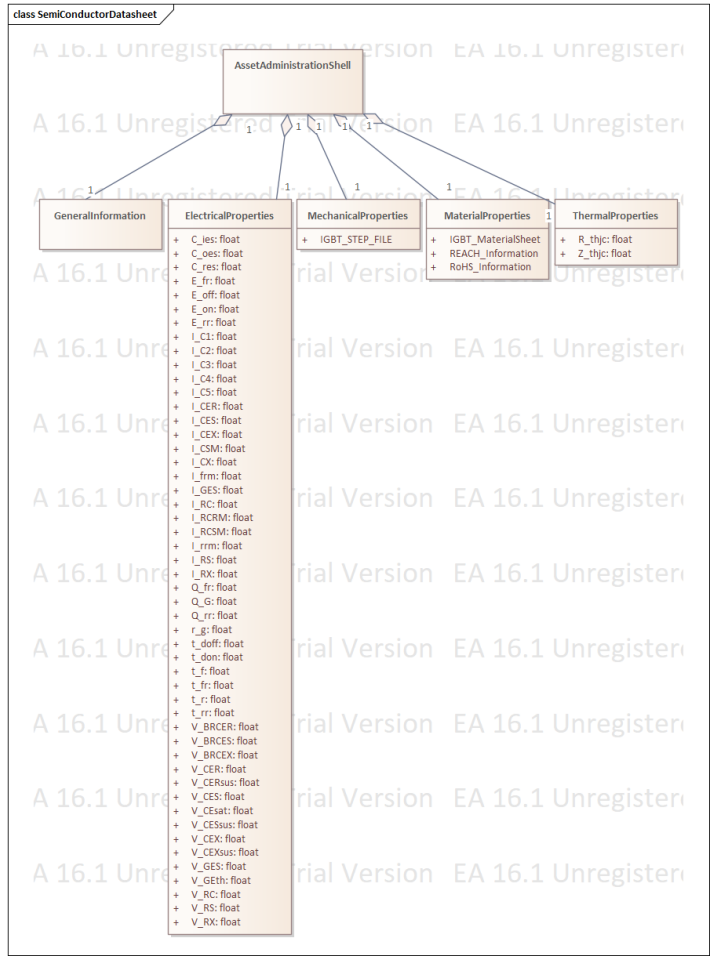

Live Demonstration / Access the AAS-Template

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Live Demo

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Discussion

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Danke für Ihr Kommen!

www.interopera.de

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