

Automotive EasyPACK™ 2B

FF300R08W2P2_B11A

Customer Connector



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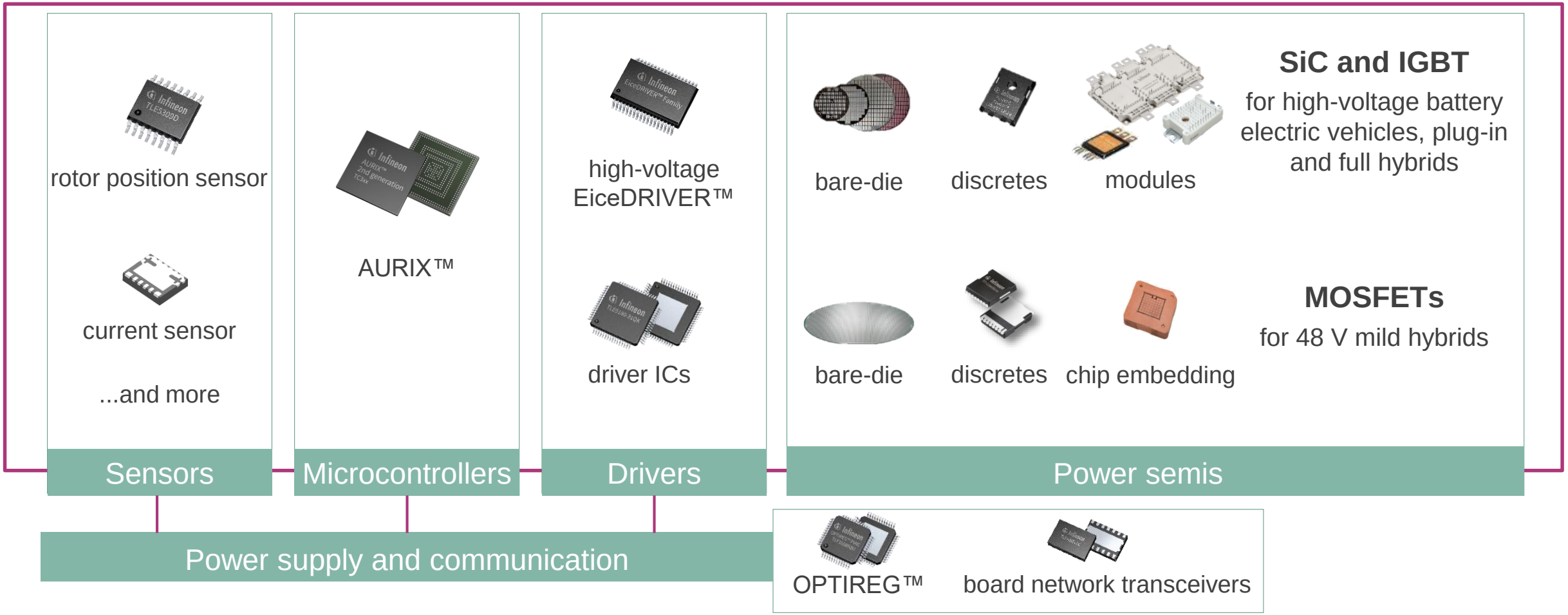
Infineon offers full system solutions addressing all xEV segments: pure EV and all types of hybrid EVs

Infineon offers full portfolio for the control loop of an electric car



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Infineon offers all components for **Traction Inverters**
The one-stop shop for competitive application solutions

Functional Safety

› Complementing and interoperable chip set
› ISO26262 compliance
› Harmonized Documentation

Traction Inverter

- Overview
- Products
- Documents
- Videos
- Training
- Support

Microcontrollers

IFX product offering	
› AURIX™	› Multi-core device › Safety & security › Scalable across xEV

Power Supply

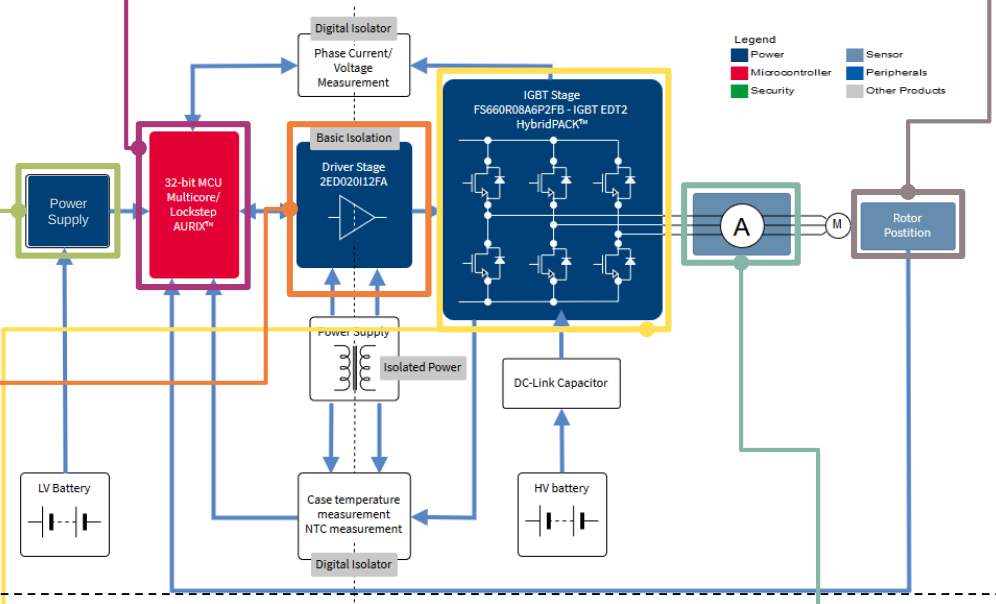
IFX product offering	
› OPTIREG™ PMIC	› Functional Safety › OPTIREG™ I-PMIC specific for Traction Inverter to reduce system cost

Gate Driver

IFX product offering	
› EiceDRIVER™	› Increase system efficiency and lifetime › Reduction of system cost

Position sensors

IFX product offering	
› XENSIV™	› Integrated end-of-shaft rotor position sensing solution › More compact design



Power Switches

IFX product offering	
› Modules, Discretes, Bare Dies	› Broad product family › Leading Chip technologies (Si, SiC) › High volume experience

Current sensors

IFX product offering	
› XENSIV™	› AC current measurement › ADC interface › Standalone sensor

Automotive Power Modules

› HybridPACK™
› EasyPACK™

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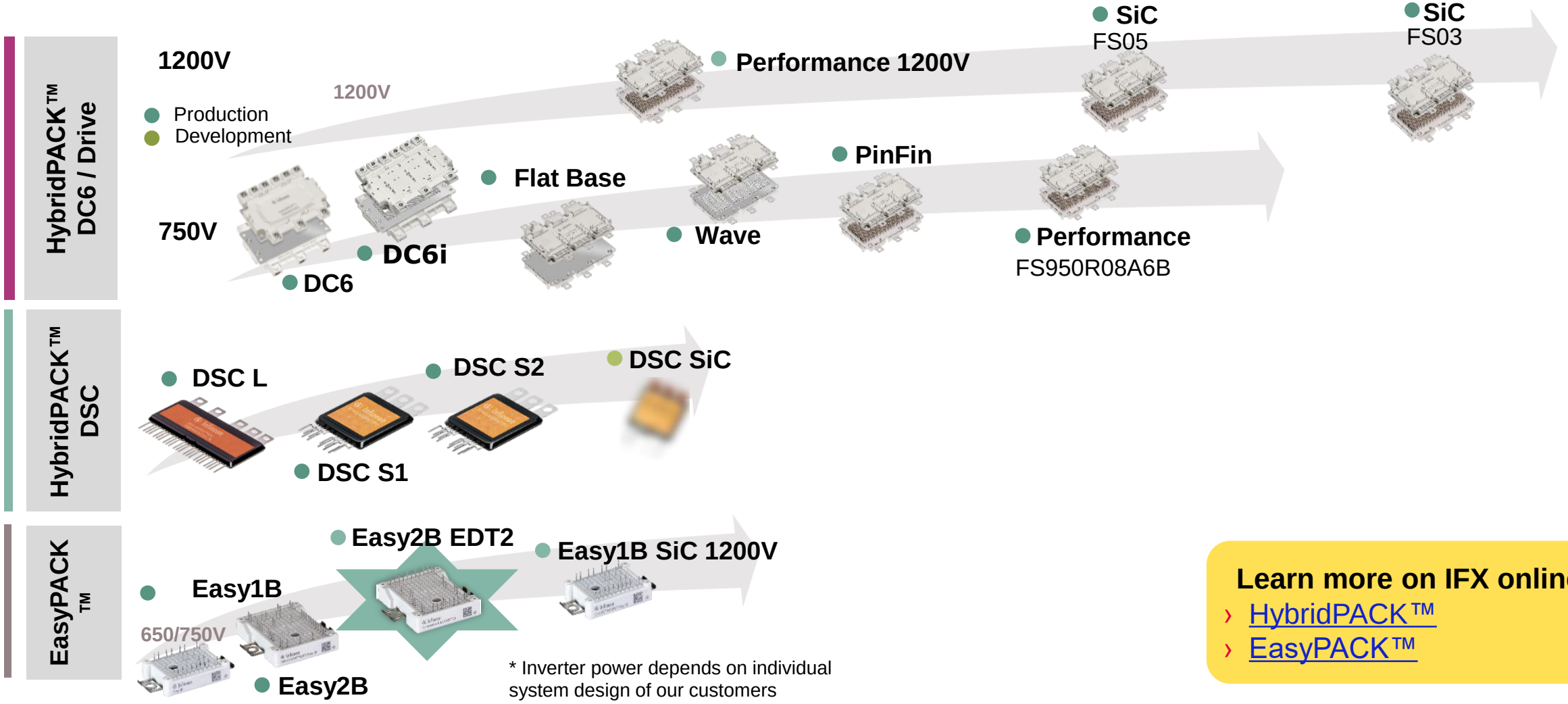
Scalable portfolio (Si/SiC) - HybridPACK™ and EasyPACK™

~ Power Class*	Medium		High			Ultra High
	<60 kW	80 kW	120 kW	150 kW	180 kW	>180 kW



* Inverter power depends on individual system design of our customers

Learn more on IFX online

- HybridPACK™
- EasyPACK™

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Expanding the strong footprint of Infineon automotive EiceDRIVER™ in xEV main inverter

2009 **2015** **2021**

Automotive EiceDRIVER™ as integral part of the Infineon main inverter chipset solution

1st Generation

Early Market Entry:

Automotive HV gate drivers for xEV applications in volume production **since 2009**



2nd Generation

Field Proven:

Millions HV gate drivers shipped in numerous (PH)EV platforms worldwide



3rd Generation

Continuous Optimization:

Expand Infineon main inverter chipset solution for further significant **system optimizations**



Coreless transformer galvanic isolation technology is robust and certified.

EiceDRIVER™ 1EDI302x/3xAS launched in 2021!

- Pin-compatible product variants for IGBT & SiC MOSFETs
- Easy to use, no programming
- ASIL-B (D) compliant with advanced safety features
- Comprehensive support material available on MyICP (i.e. Spice + Simetrix models, AppNote, Calculator,)
- Suiting various HV xEV applications:



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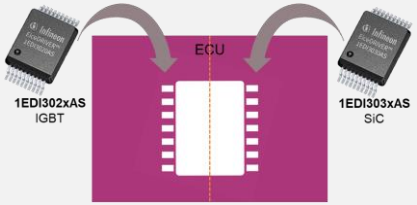
Launching soon: EiceDRIVER™ 1EDI302xAS / 1EDI303xAS

Customer benefits

Easy to use

- Plug & play, no programming needed, diagnosis readout via PWM
- **Leanest ISO 26262 ASIL-B(D) compliant** driver on the market
- 6 different pin compatible variants
  - Using **one PCB design driving IGBT or SiC MOSFETs**
  - Using ASC & ADC variant in one



Advanced BOM reduction

- Integrated powerful output stage
- Integrated strong active miller clamp for unipolar switching w/o additional components
- ADC + current source included in IC (temp. & DC-link measurements)
- Several other features minimizing external BOM (e.g. gate monitoring w/o additional components)

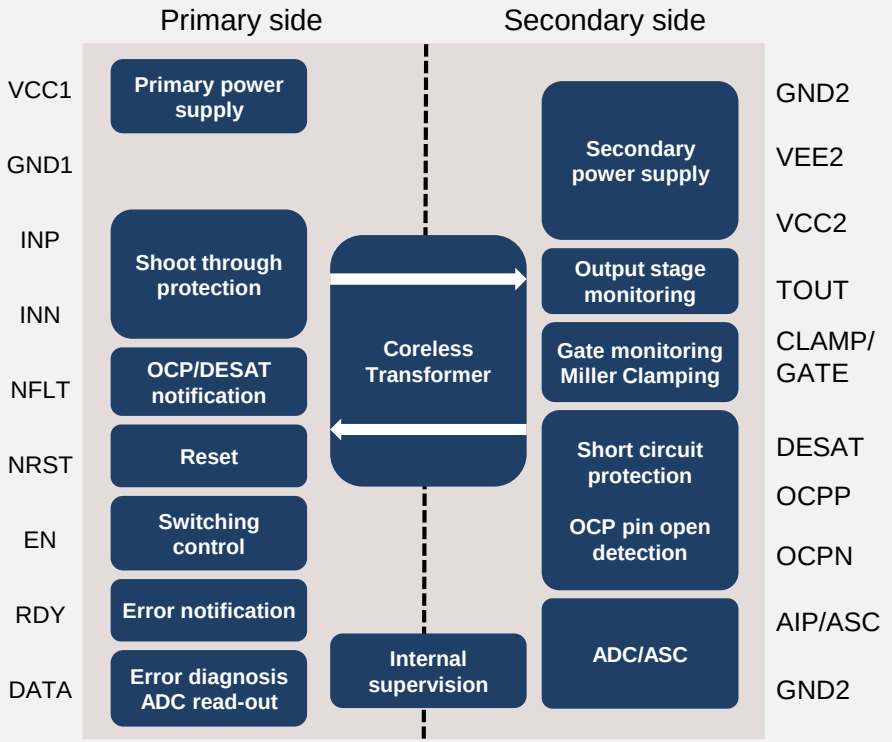
Dependability

- Simplified ASIL C/D compliant system integration through:
  - ISO 26262-compliant components
  - Harmonized Infineon safety documentation and optimized chipset
- Full compatibility with Infineon main inverter chipset saving verification and design effort
- Proven high quality and product robustness from extensive field-experience

ISO 26262 compliant

AEC Qualified

Block diagram



Product variant	IGBT/SiC	ADC/ASC
1EDI3020AS	IGBT	ADC for Temperature Diode
1EDI3021AS	IGBT	ASC
1EDI3023AS	IGBT	ADC for NTC & DC-Link
1EDI3030AS	SiC	ADC for Temperature Diode
1EDI3031AS	SiC	ASC
1EDI3033AS	SiC	ADC for NTC & DC-Link

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All traction motor inverter topologies are addressed by AURIX™ - the MCU market leader

AURIX™ addresses all traction motor inverter topologies

48V Mild Hybrid



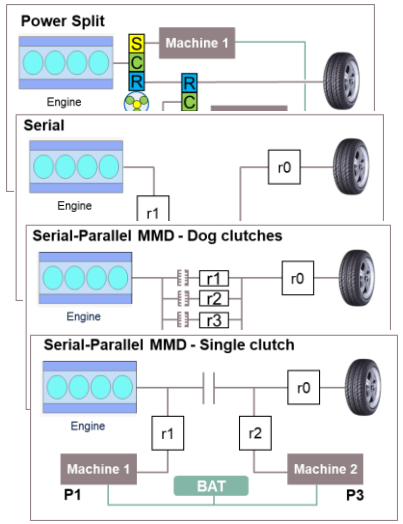
P2



P0 BSG

AURIX™ #1: Market leader

Full Hybrid & PHEV

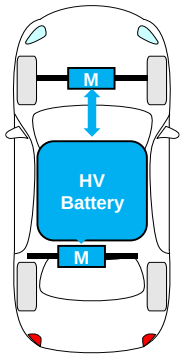


Power Split, Serial & Serial-Parallel

AURIX™ #2: Growing strongly

BEV & FCEV

Front eAxle



Rear eAxle

AURIX™ will be #1: in next 3-5 years

Why AURIX™?

#1

30-40% inverter market share by 2025

- **Strong position at EU & US OEMs** who increase their inverter competence
- **Scalable family concept** enables re-use across different inverter types
- **Strong product roadmap** provides access to innovation
- **Proven quality & powertrain knowhow** from conventional applications

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AURIX™ microcontroller & OPTIREG™ PMIC teaming up for Functional Safety



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TLF35584 / TLF35585 (in development)
OPTIREG™ Functional Safety PMIC

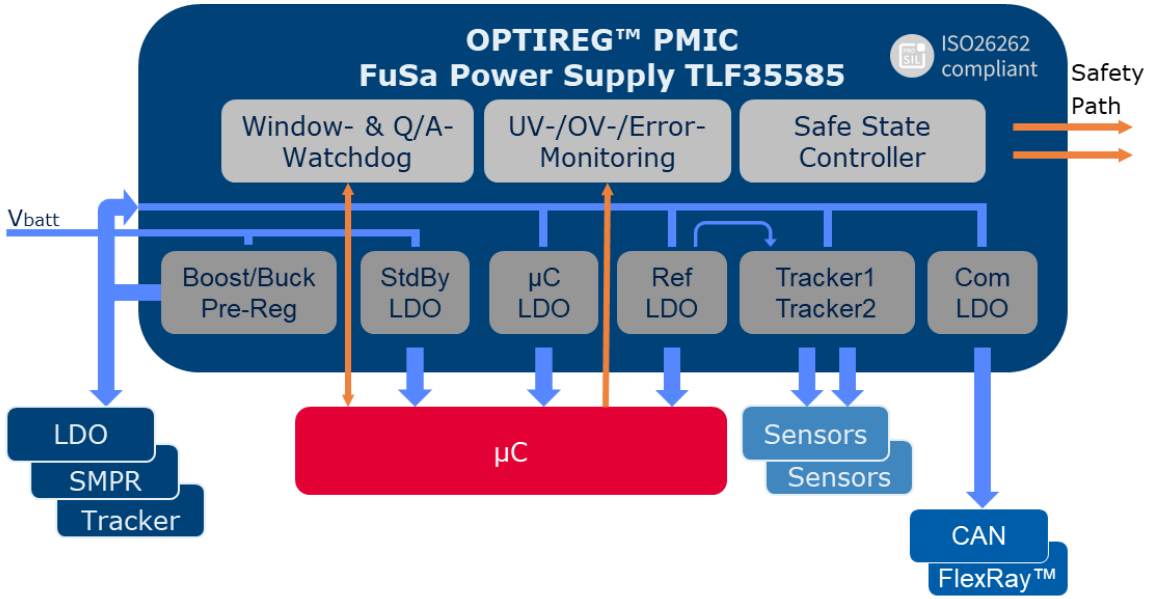
Key Features

- Buck/Boost-Pre-Regulator
  - IQ = 1.3A (1.5A for TLF35585); f: 300kHz-2.5MHz
- µC-Supply: 3.3V/5V @ 600mA
- Reference-LDO: 5V @ 150mA (±1%)
- Communication-Supply: 5V @ 200mA
- 2x Tracker: 5V @ 150mA
- StandBy-LDO: 3.3V/5V @ 10mA

- EN/Wake (T15 and CAN/FlexRay)
- SPI
- TLF35585 enhancement vs. TLF35584
  - E.g. features: additional diagnostics information, extended timer functionality
  - Ultra low current consumption (<10-15µA)
- Safety Features
  - Multiple bandgap (supply vs V-monitoring)
  - UV/OV-Monitoring, ERR-Monitoring
  - Functional-WD & Window-WD
  - Safe State Control / Secondary Safety Path
  - Protected safety area
  - Built In Self Test
  - Development acc. ISO26262

ISO26262 compliant

Block Diagram



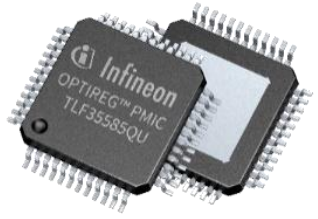
Package

AEC Qualified

RoHS



PG-VQFN-48 (TLF35584 & TLF35585)



PG-TQFP-48 (TLF35585)



PG-LQFP-64 (TLF35584)

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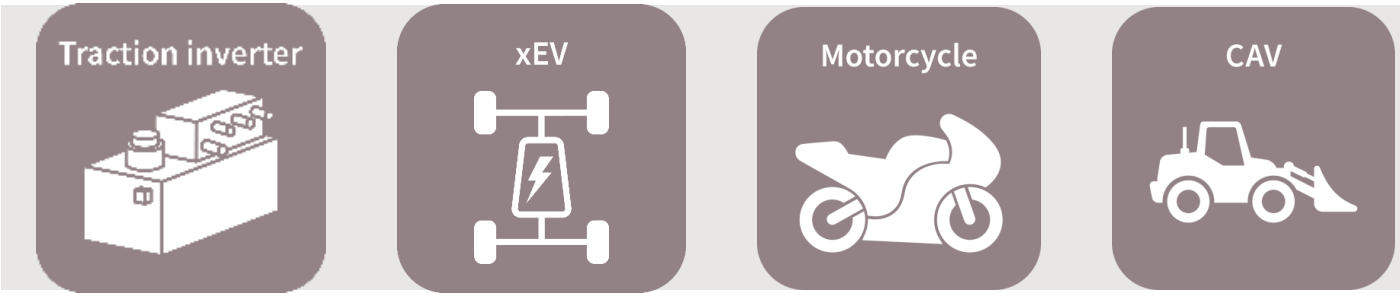
Target applications

Automotive EasyPACK™ 2B Half Bridge
Flexible, compact and cost efficient solution



Motivation	› Offer an automotive qualified, flexible, integrated yet cost efficient power module for the traction inverter market of xEV and beyond, using proven technologies (EDT2 IGBT, EasyPACK™, PressFIT Pins)
Product description	› Latest Infineon EDT2 IGBT chip technology, which allows for higher efficiency at low-load conditions. It is able to ensure significantly less losses, even outperforming Infineon's previous chip generation by 20%. › EasyPACK™: cost effective, reliable power module with proven high volume manufacturing experience with over 50 Million modules sold. › PressFIT contact technology allows in fact for reduced mounting time. That means compared to classical through-hole discrete packages as well as HybridPACK™ 1, no soldering of the pins is required anymore. › This half-bridge module can reach a maximum performance of up to 50 kilowatts and 230 Arms, depending on inverter conditions.

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Key features and benefits of EasyPACK™ 2B EDT2 Half Bridge

● Available

FF300R08W2P2_B11A

Key features	Key benefits	Value
Half-bridge module	› Enables different inverter geometries and further motor integration	Flexibility
30% smaller size than HybridPACK™1 (3x Half Bridges vs. 1x B6-Bridge)	› Very compact and cost efficient inverter designs	Size and weight reduction
750 V EDT2 IGBT technology	› High power density and low switching losses especially at light load conditions	Efficiency
Low stray inductance of 8nH (-70% lower than HybridPACK™1)	› Fast switching for reduced switching losses	
Integrated isolation	› No selective pin soldering and isolation foil placement → Faster and easier assembly processes	Optimized total costs
Press-fit pins for the signal terminals		

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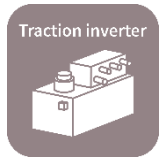
FF300R08W2P2_B11A: Easy-to-handle and efficient automotive qualified module for power inverters up to 50kW*

Key product features:



- Half-bridge module
- Allowing up to 500$V_{DC\text{-}link}$ and up to 230Arms for power inverters up to 50kW

Infineon's EDT2 IGBT technology:

- Benchmark efficiency and ruggedness for the Automotive electric drive train
- Increased V_{br} of 750V



Infineon's Automotive EasyPACK™

- Cost-effective and yet reliable module
- High volume manufacturing experience (over 50 Million modules sold)

Key product benefits:

Flexible half-bridge module
➔ enables different inverter geometries and further motor integration

Module with integrated isolation and NTC
➔ Ease of design and assembly for compact inverters

Benchmark current density combined with short circuit ruggedness and increased blocking voltage
➔ Highest reliability

Press-Fit Pins for easy PCB assembly
➔ Saving time and cost during assembly (no soldering required)

* Infineon estimation. Final result depends on customer's inverter design.

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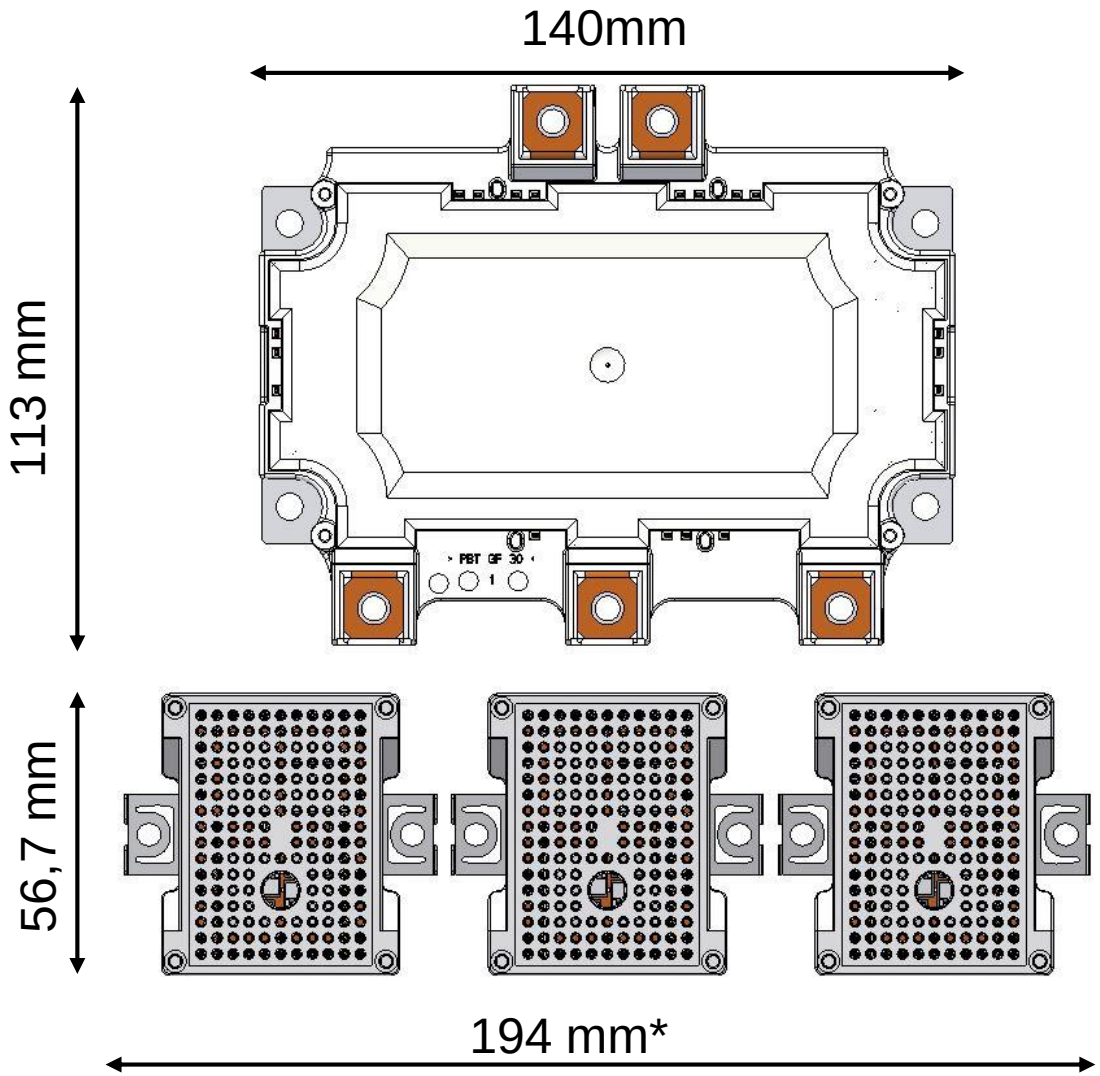
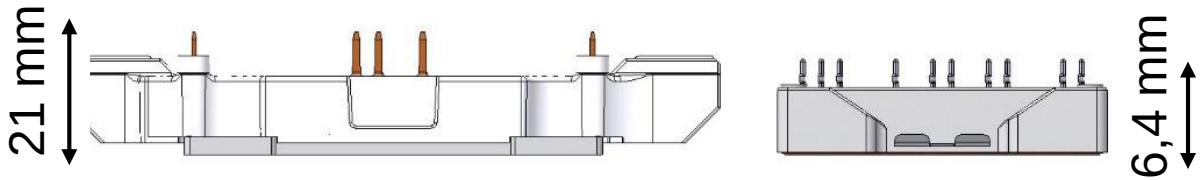
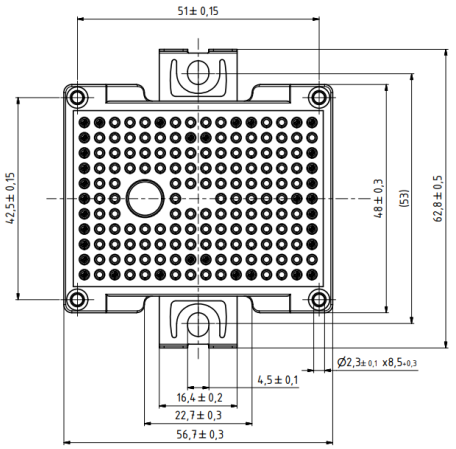
EasyPACK™2B enabling compact designs - Size comparison 3x EasyPACK™2B vs. 1xHybridPACK™1



* incl. usual spacing in between the Easy modules (optimization possible)

- ➢30% smaller area foot print
- ➢46% smaller volume





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EasyPACK™: ATV qualified, highly integrated module solution for easy design & assembly

› Today our Infineon EasyPACK™ modules are used in a wide range of applications (DC-DC, OBC, PTC,…) by >10 OEMs and Tier1s

Our customers chose **Easy power module** because of

✓ **Cost-effective assembly**
Easy PCB mounting (PressFit)

✓ **Easy design**
Highly integrated “all-in-one” module solution with optimized thermal capabilities

✓ **Reliability**
Integrated isolation / creepage

✓ **Flexibility**
Platform for different technologies and topologies

Our customers chose **Infineon EasyPACK™** because of

✓ **High volume manufacturing experience**
Over 50 million EasyPACK™ sold

✓ **Seamless traceability**
Given for every individual module

✓ **Leader in Quality**
Field proven quality
Reuse of successful technologies

✓ **Technical leader**
Market innovator with extensive local technical support

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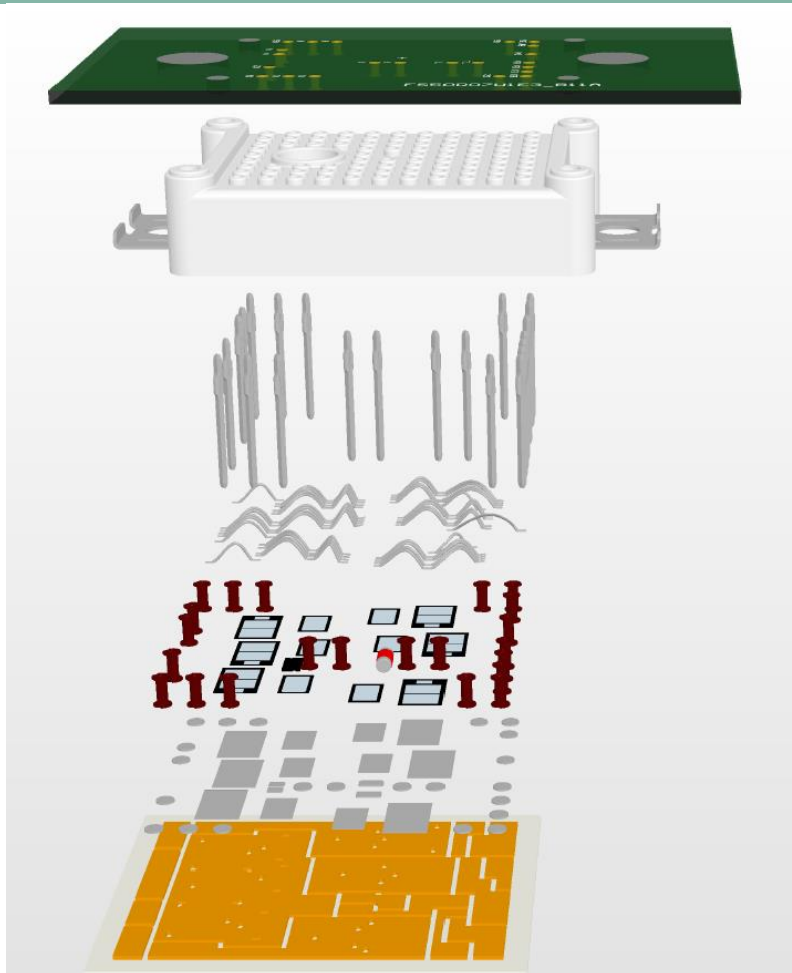
EasyPACK™ offers ease of use and flexibility at high reliability for xEV High Voltage Systems

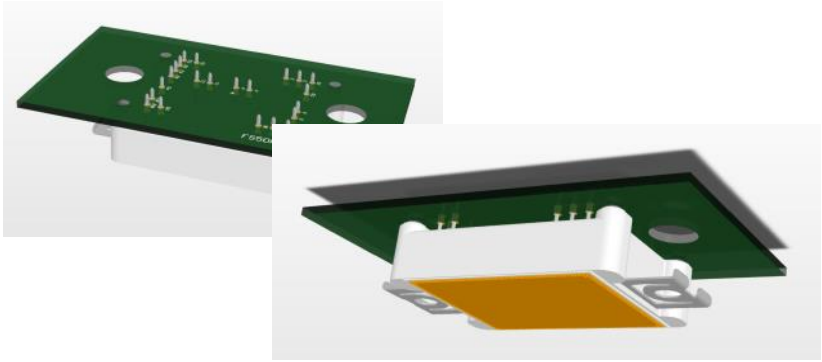
Module Construction



Explosion view of Easy 1B

Module Benefits

- Easy mounting processes
- PressFIT technology
- Reliable isolation (creepage)
- Automotive quality & reliability (high power cycling capability)
- Seamless traceability
- NTC for temperature sensing
- Low stray inductance (module & system)
- Platform for different topologies



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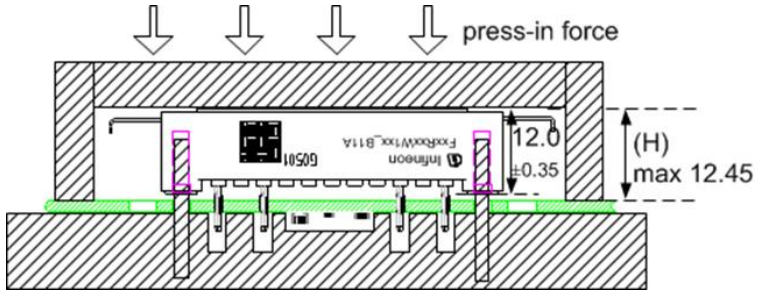
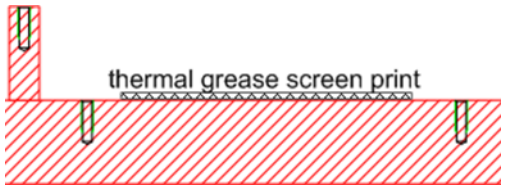
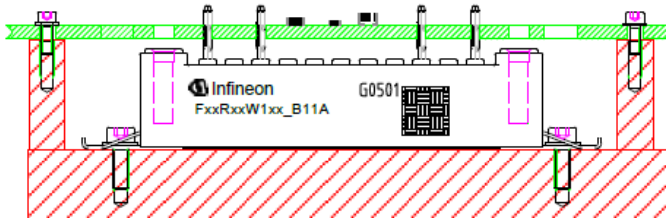
EasyPACK™ Mounting examples









1. **Press the EASY module into the already pre-assembled PCB.**
   (No soldering, no preparation of the EASY modules)

2. **Add the thermal grease. Either to the module or to the cooling device.**
   (No isolation foil)

3. **Mount the whole PCB into the case.**
   (fully automated)

See Application Note

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Comprehensive support material and strong direct support facilitate R&D efforts and accelerate time2market

Collaterals

- Product Brief
- Product picture



Technical Material

- Datasheet
- 3D-Model
- Application Note
- Power simulation (IPOSIM)



Videos / Trainings

- Automotive EasyPACK™ Product Training
- Automotive EasyPACK™ Video for Social Media
- Automotive power module portfolio



All material is available via Infineon webpage www.infineon.com/Easyinverter and links above

* PDF Handouts available for download for the Trainings in success factors

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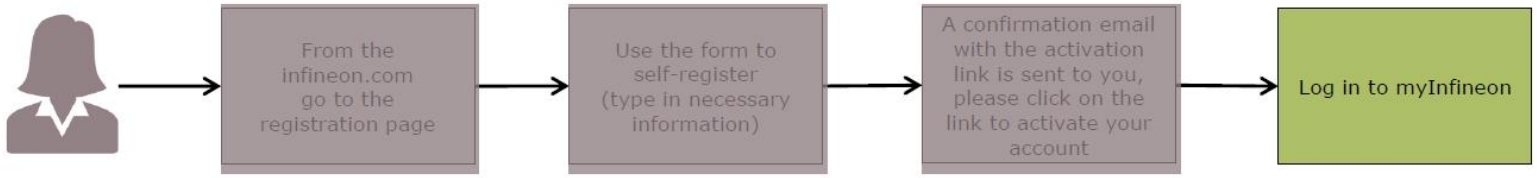
MyInfineon





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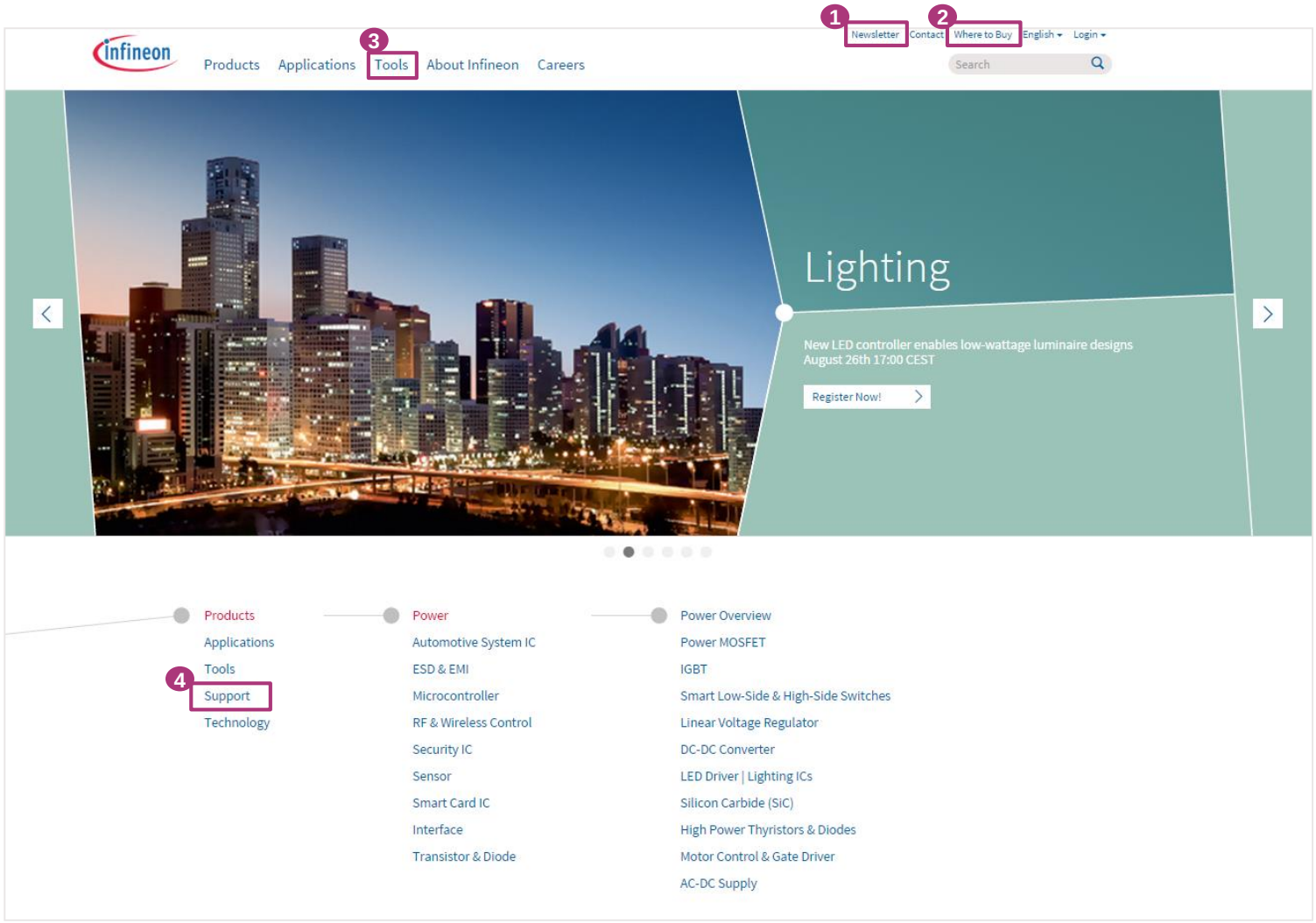
Support
Online tools and services



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Infineon is the dependable partner offering value that goes beyond the product

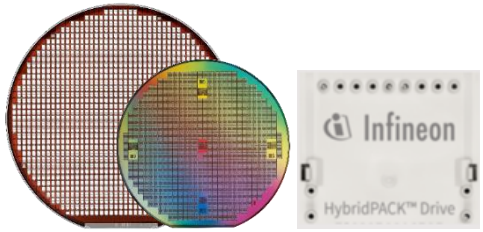


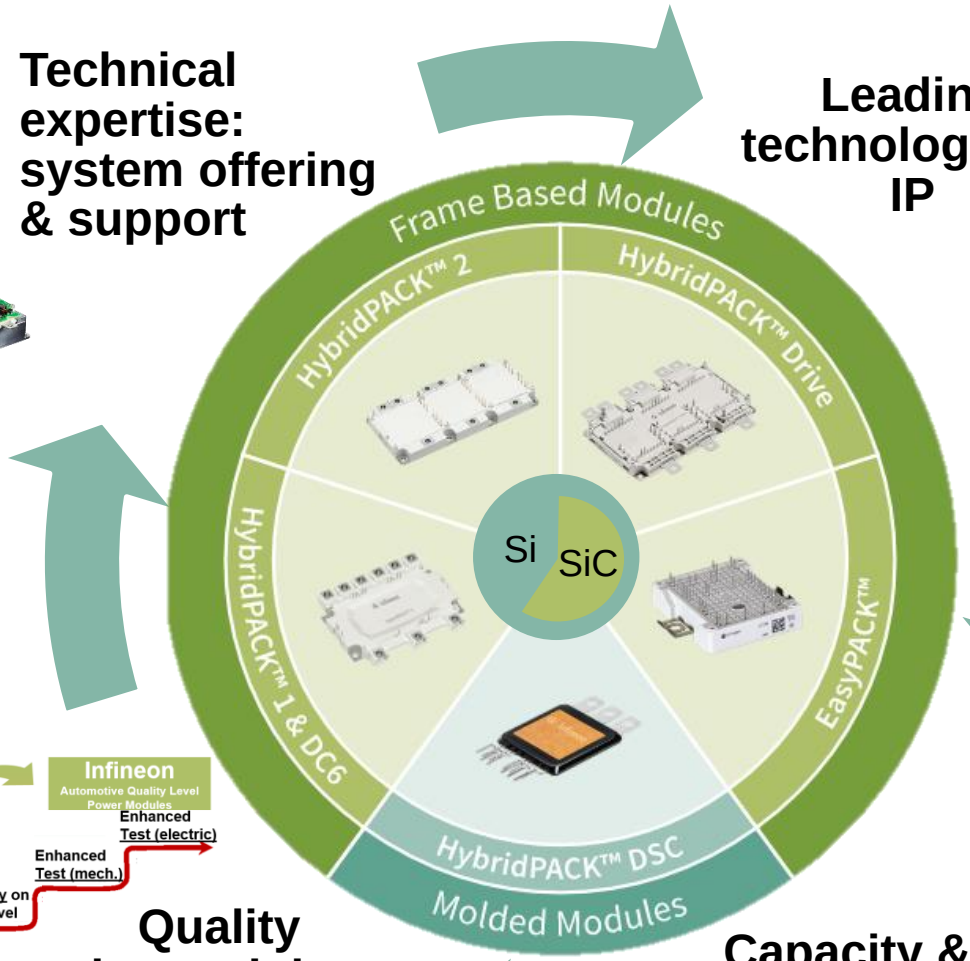
Technical expertise: system offering & support

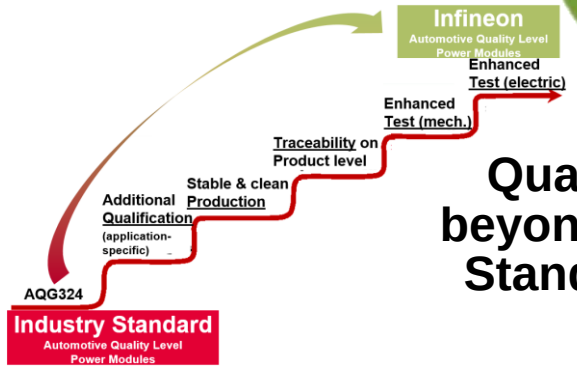
Leading technologies & IP

15+ years

experience in electromobility







Quality beyond the Standard

Capacity & ramp experience

18 Mio

pcs Automotive Power Modules shipped to date

15 out of 20

top-selling NEV of 2019 powered by Infineon

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Part of your life. Part of tomorrow.