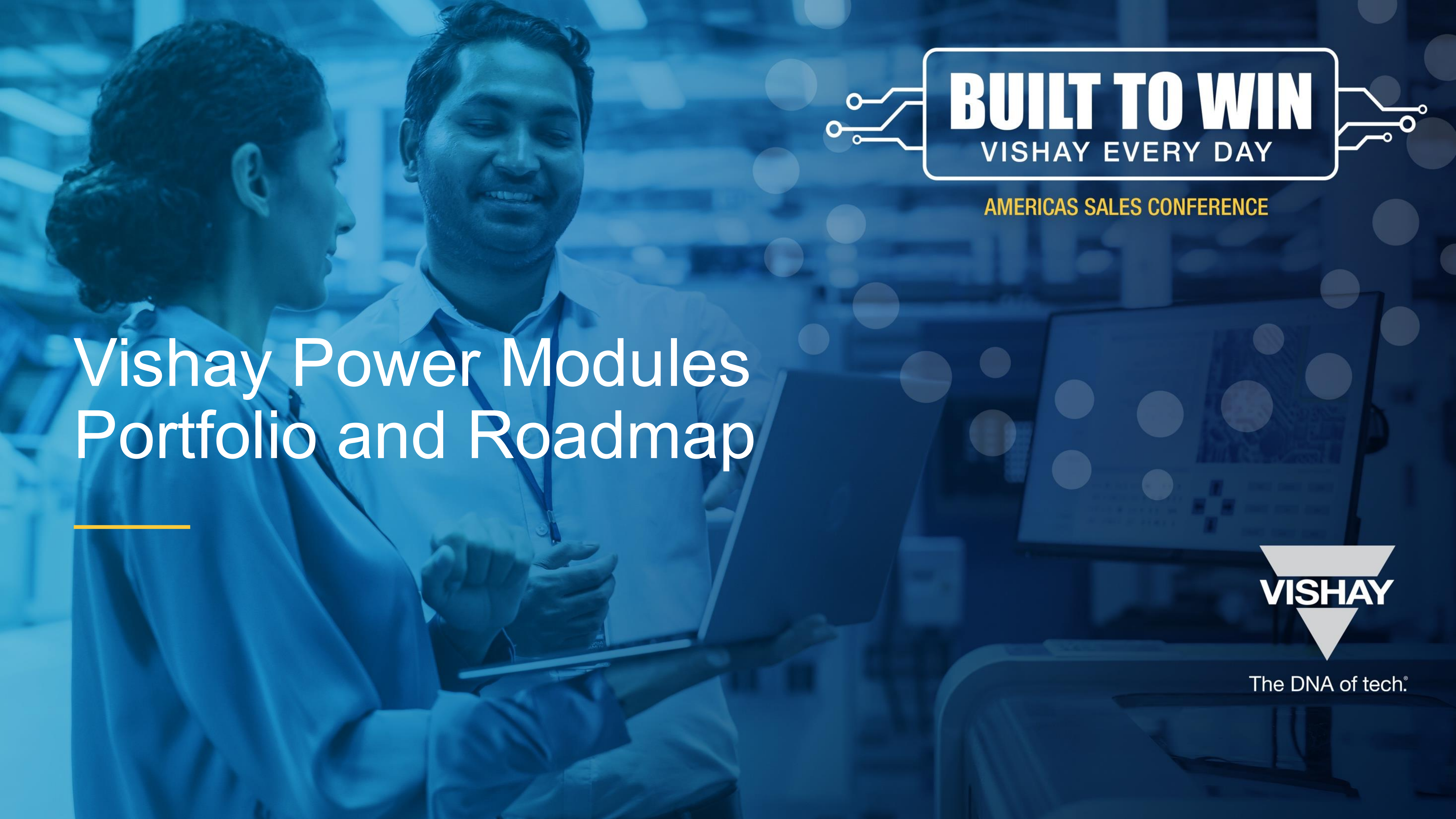


BUILT TO WIN
VISHAY EVERY DAY

AMERICAS SALES CONFERENCE

Vishay Power Modules Portfolio and Roadmap

VISHAY
The DNA of tech.®

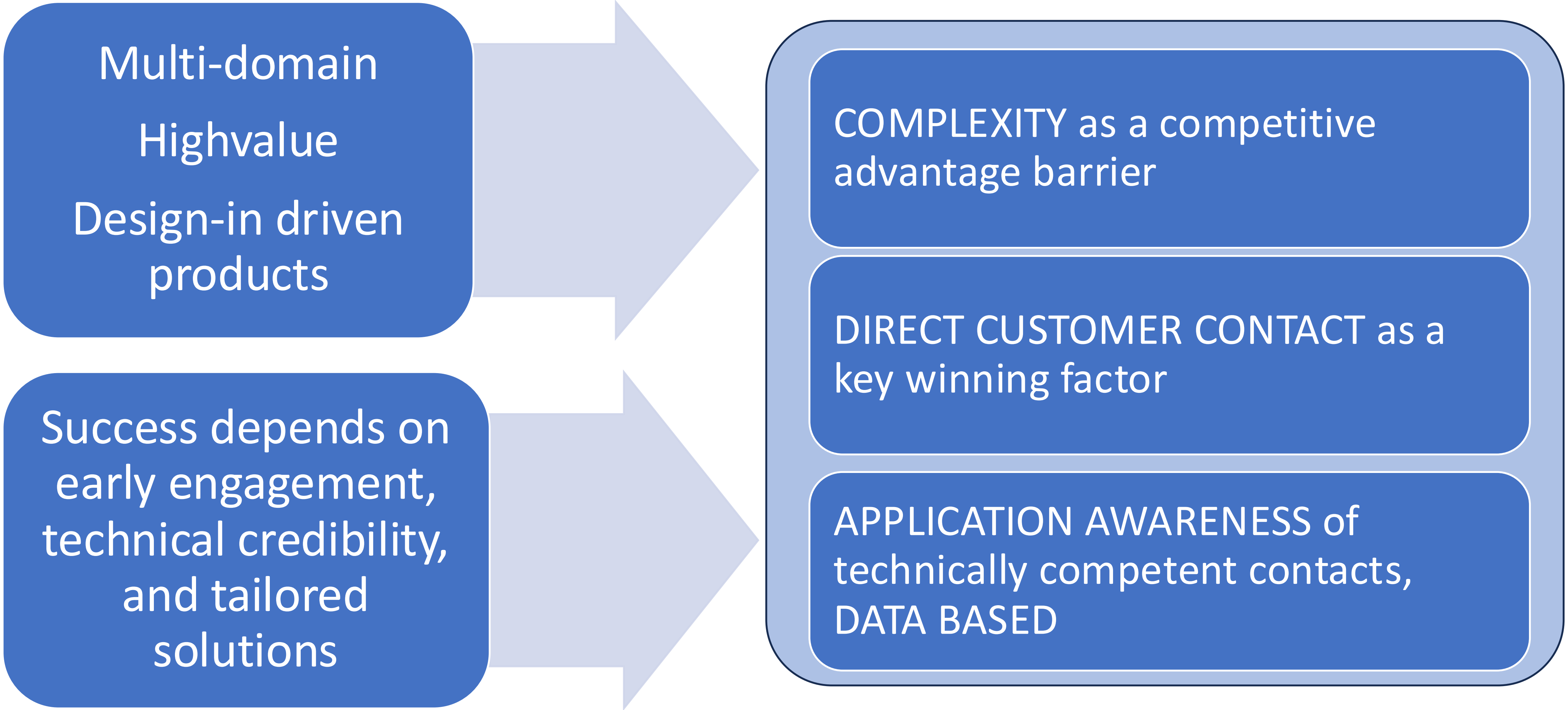
BUILT TO WIN
VISHAY EVERY DAY
AMERICAS SALES CONFERENCE

Solutions for High Voltage and Low Voltage Applications

Claudio Damilano
Director of Power Modules Marketing

THE MARKETING CONTEXT OF POWER MODULES

EXECUTIVE SUMMARY



Multi-domain

Highvalue

Design-in driven products

Success depends on early engagement, technical credibility, and tailored solutions

COMPLEXITY as a competitive advantage barrier

DIRECT CUSTOMER CONTACT as a key winning factor

APPLICATION AWARENESS of technically competent contacts, DATA BASED

MARKET SEGMENTATION AND GROWTH TARGETS

SEGMENTATION			2025	2030	SUMMARY		
MARKET SEGMENT	**SUB-SEGMENT**	**APPLICATIONS**	**TAM**	**TAM**	**TAM EST. GROWTH**	**TAM CAGR**	**GROWTH TARGETS FOR MS**
IN	IND HEATING AND WELDING	WELDING (MIG, MMA, TIG)	**$ 100.0**	**$ 150.0**	MEDIUM	**8.4 %**	CONSOLIDATION OF ACTIVE SOCKETS
IN	POWER SUPPLIES	CHARGING STATIONS, ENERGY STORAGE ACTIVE FILTERS, UPS	**$ 325.0**	**$ 650.0**	HIGH	**14.9 %**	GROWTH IN NEW AREAS (AI DATA CENTERS, EV CHARGING, EN.STORAGE)
IN	SOLAR ENERGY	SOLAR CONVERTERS, STORAGE / BKP SYSTEMS	**$1700.0**	**$ 3600.0**	HIGH	**16.2 %**	START POSITIONING IN SELECTED SOCKETS (STRING)
IN	MOTORDRIVE	HIGH SPEED DRIVES (UF-IGBTS OR SIC MOSFET)	**$2723.0**	**$ 3000.0**	SLOW	**2.0 %**	START POSITIONING IN SELECTED SOCKETS (COMPRESSORS, HVAC)
AU	HEV / EV	UNIDIR OBC	**$ 170.0**	**$ 36.0**	DECLINE	**-26.7 %**	SELECTED DEV. DUE TO STRENGHT IN DIODES / SCR / SJM
AU	MHD, LS-EV	INVERTER P0/P1 + LSEV (M-MOBILITY)	**$ 450.0**	**$ 700.0**	MEDIUM	**9.2 %**	MHD, MICRO-MOB. 48 V – 96 V
AU	HEV / EV	OBC SIC (BIDIRECTIONAL)	**$ 460.0**	**$ 1700.0**	HIGH	**29.9 %**	TARGET DIRECTLY NEW SIC MOSFET TRENDS
AU	HEV / EV	HV TRACTION	**$2888.0**	**$ 8100.0**	HIGH	**22.9 %**	INITIALLY TARGET STD SOLUTIONS, SET BASIS FOR HIGHER POWER

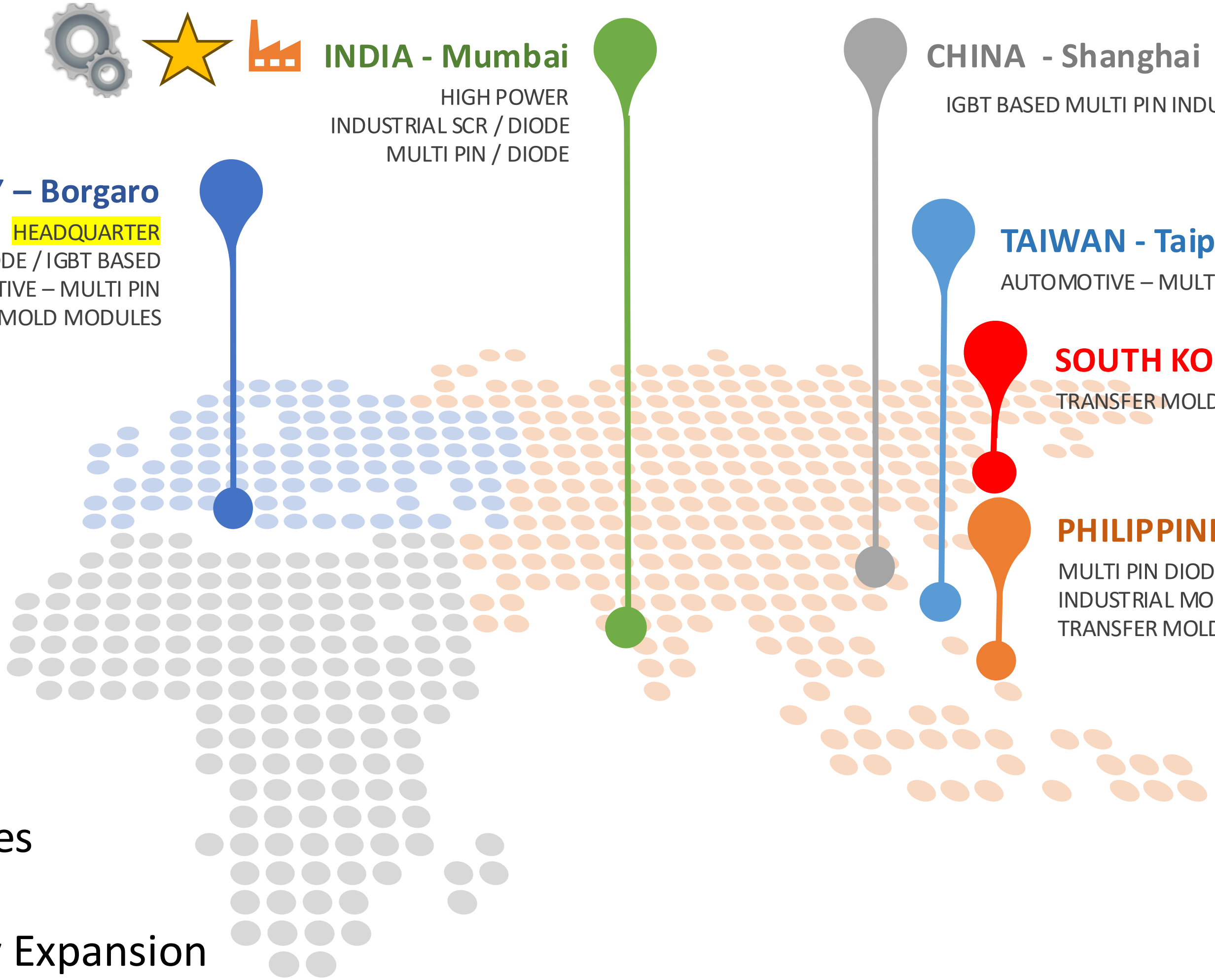
DATA SOURCEs FOR MKT ANALYSES: OMDIA 2023/24 , YOLE 2024/25

MARKET SEGMENTATION AND GROWTH TARGETS

MARKET SEGMENT	SUB-SEGMENT	APPLICATIONS	WHY	STRENGTH
IN	IND H. AND WELD	WELDING (MIG , MMA, TIG)	RELATIVELY STABLE MARKET, NOT TOO COMMODITIZED	EXISTING MARKET SHARE EXPERIENCE, FE / BE MIX
IN	POWER SUPPLIES	CHARGING STATIONS, ENERGY STORAGE ACTIVE FILTERS, UPS	GROWING MARKET	LEGACY BIPOLAR HIGH POWER SIC MOSFETS, EMIPAK
IN	SOLAR ENERGY	SOLAR CONVERTERS, STORAGE / BKP SYSTEMS	GROWING MARKET	HIGH SPEED IGBTS, FRED TECHNOLOGY + STD PACKAGES, CUSTOMIZATION & FLEXY
IN	IND. MOTORDRIVE	HIGH SPEED DRIVES (UF-IGBTS OR SIC MOSFETS)	SELECTED OPPORTUNITIES REQUIRE DIFFERENTIATION	HIGH SPEED IGBTS, FRED TECHNOLOGY + STD PACKAGES, FLEXIBILITY FOR SMALLER SCALE APPLICATIONS IN A COMMODITY WORLD
AU	HYBRID AND ELECTRIC VEHICLES	UNIDIR OBC	OVERALL DECLINING MARKET, MICRO-MOBILITY IS GROWING	BROAD PORTFOLIO OF DIODES, SJM
AU	MHD, LS-EV	INVERTER P0/P1 + LSEV (M-MOBILITY)	HV RISE SLOWER THAN EXP., MHD IS A FASTER ALTERNATIVE, MICRO-MOBILITY IS GROWING, SIMPLER ASSY TECHNOLOGY THAN HV	LVM PORTFOLIO + TRANSFER MOLD TECHNOLOGY
AU	HEV / EV	OBC SIC (BIDIRECTIONAL)	GROWTH MARKET, SIC TECHNOLOGY ADOPTED	OBC EXPERIENCE, SIC TECHNOLOGY, TRANSFER MOLD PACKAGES
AU	HEV / EV	HV TRACTION	GROWTH MARKET, SIC TECHNOLOGY ADOPTED	R&D PAST EXPERIENCES COMBINATION WITH OTHER SEGMENTS ON TECHNOLOGY

GROSS REVENUE
DATA SOURCEs FOR MKT ANALYSES: OMDIA 2023/4 , YOLE 2024

POWER MODULES PRODUCTION SITES



⚙ ★ 🏭 **INDIA - Mumbai**
HIGH POWER
INDUSTRIAL SCR / DIODE
MULTI PIN / DIODE

CHINA - Shanghai 🏭
IGBT BASED MULTI PIN INDUSTRIAL

★ 🚗 🏭 **ITALY – Borgaro**
⚙
HEADQUARTER
INDUSTRIAL SCR / DIODE / IGBT BASED
AUTOMOTIVE – MULTI PIN
TRANSFER MOLD MODULES

TAIWAN - Taipei 🚗 ★
AUTOMOTIVE – MULTI PIN

SOUTH KOREA - Seoul 🚗 ★ ⚙
TRANSFER MOLD MODULES

PHILIPPINES - Manila 🏭 🚗 ★ ⚙
MULTI PIN DIODES & IGBT
INDUSTRIAL MOLDED HIGH CURRENT
TRANSFER MOLD MODULES

★ • New Product Releases

⚙ • Capability / Capacity Expansion

Confidential – Distribution and Copy is forbidden without written approval by Vishay

POWER MODULES – FOCUS PRODUCTS

EXISTING / HIGH RUNNING RUGGED PLATFORMS – INDUSTRIAL MARKET

Features

- Industry-standard package
  - As versatile as a discrete
  - Thermals as good as a module
- Compact insulated solution
  - Just 28 mm x 35 mm
  - High current
- “Workhorse” product family for Vishay
  - +58 % business growth within the last 10 years
- Why choose Vishay?
  - Broad product family with best in class technology (Gen 5 FREDs, SiC MOSFETs and Diodes, latest trench IGBT generation)
  - Plan to continue expanding the portfolio: new technologies available in the same package
  - COO Philippines

SOT-227

Product Technologies

- 1200 V SiC MOSFETs
- 650 V, 1200 V SiC Diodes
- 650 V, 1200 V IGBTs
- 200 V to 1200 V FREDs
- 100 V to 200 V TMBS
- 100 V to 500 V SJ MOSFETs
- 1200 V to 1600 V Thyristors
- 1200 V Soft-Recovery Diodes

… more to be released

Promotional Material

New Product Introduction

1200 V SiC MOSFETs in SOT-227
650 V, 1200 V SiC Diodes in SOT-227
600 V and 1200 V Gen 5 FREDs in SOT-227
100 V TMBS in SOT-227

POWER MODULES – FOCUS PRODUCTS

EXISTING / HIGH RUNNING RUGGED PLATFORMS – INDUSTRIAL MARKET

Features

- Industry-standard product
  - Widely adopted into welding, power supplies (UPS), and BWMS markets
- Non-insulated package
  - Baseplate electrically connected to diode cathodes for better power dissipation
- "Highlander"
  - > 30 years of history of business stability
  - +28 % revenue growth within the last 10 years
- Why choose Vishay?
  - Product proliferation with the newest technology (FRED, Gen 2 TMBS)
  - COO India

TO-244

Product Technologies

- 30 V to 200 V Schottky Diodes
- 200 V to 600 V FREDs Diodes

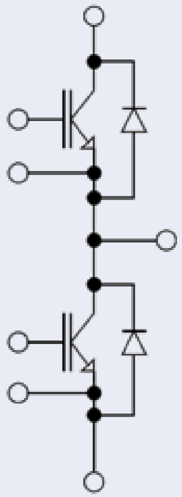
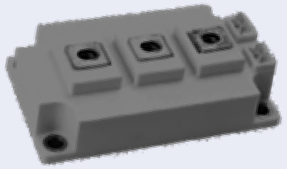
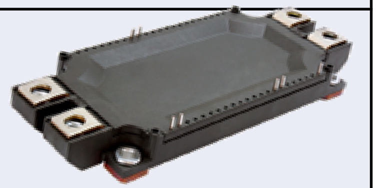
Promotional Material

New Product Introductions

600 V Gen 5 FREDs in TO-244

ADDITIONAL PRODUCT PORTFOLIO – 650 V and 1200 V IGBTs

ENG samples ready!
Full production: Q4 2026

PART NUMBER	VOLTAGE (V)	NOM CURRENT (A)	ELECTRICAL CONFIGURATION	TECHNOLOGY		
VS-GT100TR065N	**650**	**100**	PHASE LEG 	IGBT – LOW VCE	IAP	
VS-GT150TR065N		**150**				
VS-GT200TR065N		**200**				
VS-GT100TR065S	**650**	**100**		IGBT - FAST		
VS-GT150TR065S		**150**				
VS-GT200TR065S		**200**				
VS-GT100TR120N	1200	100		IGBT - FAST		
VS-GT150TR120N		150				
VS-GT200TR120N		200				
VS-GT200TD120N	1200	200		IGBT - FAST	DIAP	
VS-GT300TD120N		300				
VS-GT400TD120N		400				
VS-GT300TX120U	**1200**	**300**		IGBT - FAST	XMAP	
VS-GT450TX120U		**450**				
VS-GT600TX120U		**600**				

The DNA of tech.®

Restricted – limited circulation in Vishay

COO INDIA

POWER MODULES – FOCUS PRODUCTS

EXISTING / HIGH RUNNING RUGGED PLATFORMS – INDUSTRIAL MARKET

Features

- **Standard multi-pin package with matrix approach**
  - ➢ Complex circuits may be hosted inside
- **Born industrial, running automotive**
  - ➢ More than 5M pcs produced within the last 10 years
  - ➢ ~80 % of 2025 generated automotive revenue for power modules
- **Why choose Vishay?**
  - ➢ Industrial portfolio expansion using the latest technology (SiC MOSFETs, Trench IGBTs)
  - ➢ Open to developing tailored products for relevant opportunities
  - ➢ COO Italy

EMIPAK 1B

EMIPAK 2B

Product Technologies

- 650 V to 1200 V SiC Diodes
- 650 V FREDs
- 650 V SJ MOSFETs
- 1200 V Thyristors
- 1200 V Soft-Recovery Diodes
- 600V Trench IGBTs

… more is coming
(SiC MOSFETs, latest IGBT technology)

Promotional Material

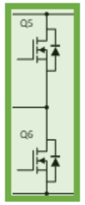
New Product Introductions

[EMIPAK 1B qualified according to AQG-324]

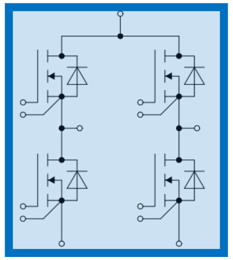
1200 V SILICON CARBIDE DEVICES IN EMIPAK 1B

PART NUMBER	VOLTAGE (V)	$R_{DS(on)}$ (mΩ)	T_j MAX. (°C)	ELECTRICAL CONFIGURATION	PACKAGE	TECHNOLOGY
VS-ENT009P120	1200	9	175	2-pack	EMIPAK 1B	Vishay planar SiC MOSFET
VS-ENT011P120	1200	11				
VS-ENT015P120	1200	15				
VS-ENY023P120	1200	23	175	4-pack (open emitter)		
VS-ENY045P120	1200	45				
VS-ENX045P120	1200	45	175	6-pack (open emitter)		

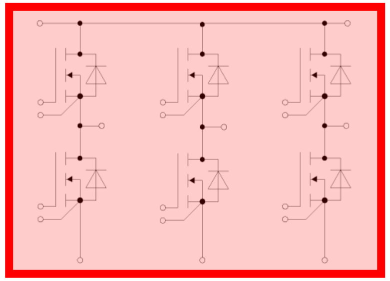
PART NUMBER	VOLTAGE (V)	I_o (A)	T_j MAX. (°C)	ELECTRICAL CONFIGURATION	PACKAGE	TECHNOLOGY
VS-ENW30S120B	1200	30	175	Full-bridge	EMIPAK 1B	SiC diode



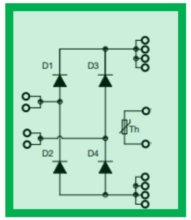
2-PACK



4-PACK (OE)



6-PACK (OE)



Full-Bridge

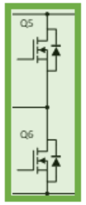
Project Approved – Feasibility Stage

- **B-samples: now ready!**
- **Release for production: Q3 2026**

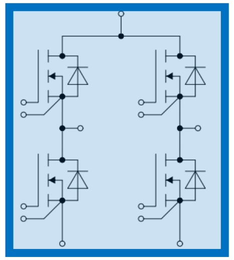
The DNA of tech.®

1200 V SILICON CARBIDE DEVICES IN EMIPAK 2B

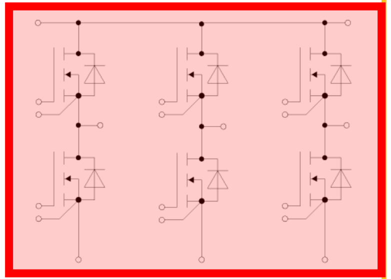
PART NUMBER	VOLTAGE (V)	$R_{DS(on)}$ (mΩ)	T_j MAX. (°C)	ELECTRICAL CONFIGURATION	PACKAGE	TECHNOLOGY
VS-ETT006P120	1200	6	175	2-pack	EMIPAK 2B	Vishay planar SiC MOSFET
VS-ETT008P120	1200	8				
VS-ETY015P120	1200	15	175	4-pack (open emitter)		
VS-ETY023P120	1200	23				
VS-ETX023P120	1200	23	175	6-pack (open emitter)		



2-PACK



4-PACK (OE)



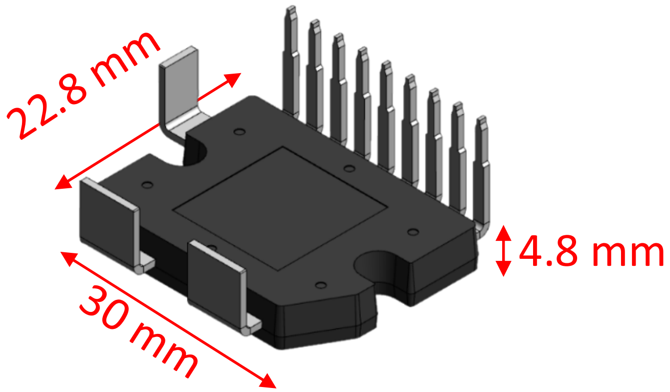
6-PACK (OE)

Project Approved – Feasibility Stage

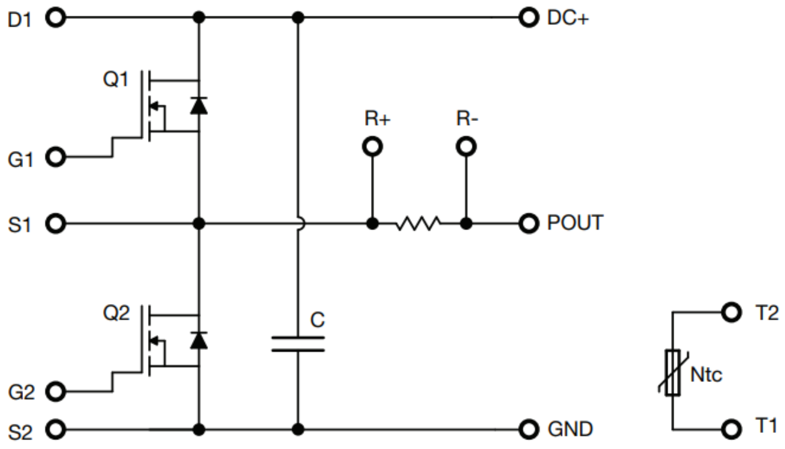
- **B-samples: now ready!**
- **Release for production: Q3 2026**

FLATPACK HC0: 3 kW – 6 kW+

FLATPAK – HC0



- 80 V, 100 V, 150 V silicon MOSFETs
- Target application: 48 V and 96 V, 3 kW – 6 kW inverter HEV and LS-EV
- Driver products
  - 80 V MOSFETs, 0.5 mΩ (available) and 0.70 mΩ (target)
  - 150 V MOSFETs, 1.80 mΩ (samples Q2-25)
- Compact insulated module: 23 mm x 30 mm x 4.8 mm
- Dual PCB ready (power thick copper + signal multilayer) to simplify design and optimize space

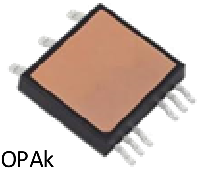


- Configurations:
  - MOSFET phase leg, custom possible
  - **Vishay components** integrated: a shunt resistor for current sensing, an NTC, and DC-Link capacitors

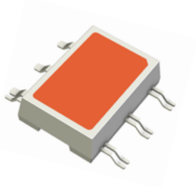
PACKAGE PORTFOLIO FOR ON-BOARD CHARGERS – RATIONALE

SCALABILITY

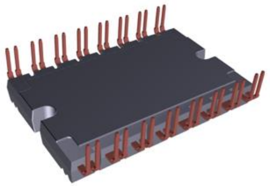
INTEGRATION



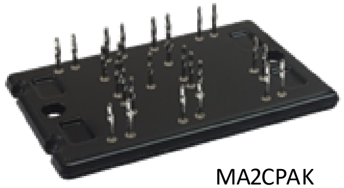
QUADROPAk



MINIPAk



FLATPAK-HV32



MA2CPAK

	QUADROPAK / MINIPAK	FLATPAK-HV32	MA^{2}CPAK
ELECTRICAL CONNECTION	SURFACE-MOUNT	THROUGH-HOLE	PRESSFIT
MECHANICAL ASSEMBLY	PCB PRESSURE	SCREW (2)	SCREW (2)
SUPPORTED CIRCUITs	HALF-BRIDGE / DIODE BRIDGE	FOURPACK / SIXPACK	FULL CUSTOM
DIMENSIONs (mm)	20 x 22 x 5.5 15 x 22 x 5.5	44 x 28 x 6	34 x 52 x 3.8

EVOLUTION OF OBC POWER MODULE PACKAGES

2008

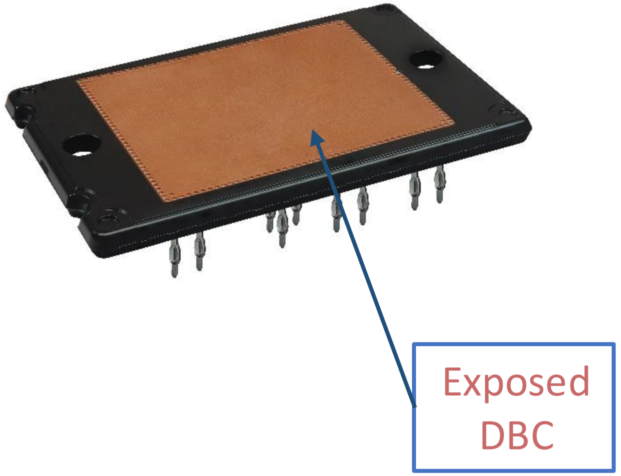
2016

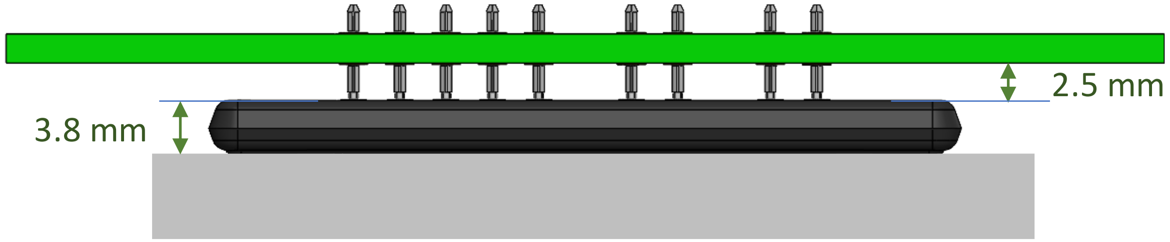
2024

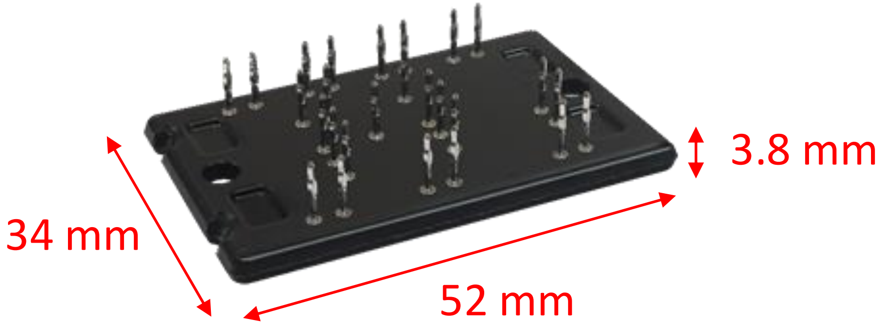
MTP	EMIPAK-1B	MA^{2}CPAK
SOLDER PIN	PRESSFIT PIN	PRESSFIT PIN
COPPER BASE	DBC EXPOSED	ISOLATION EXPOSED
2-PART BOX + GEL	SINGLE BOX + GEL	TRANSFER MOLD
INDUSTRIAL PART WITH EXTENDED QUALIFICATION TESTS	INDUSTRIAL STANDARD WITH DESIGN FOR EXTRA AUTO-REL	DESIGNED FOR AQG-324
16 mm HEIGHT	12 mm HEIGHT	6.3 mm HEIGHT

MA^{2}CPAK – TRASFER MOLD TECHNOLOGY

- AQG-324 qualified – automotive applications ready
- PressFit pins – easy assembly
- Pinout and int. layout - design flexibility
- Rugged transfer mold construction
- Low Rth – high performance (-20 % vs prev. tech.)
- Latest semiconductor technologies – high efficiency
- Reduced stray inductance vs legacy solutions (-50 %)
- Extended lifetime (IOL 7x)

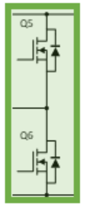




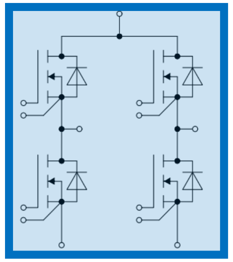


1200 V SILICON CARBIDE DEVICES IN MAACPAK FOR AUTOMOTIVE

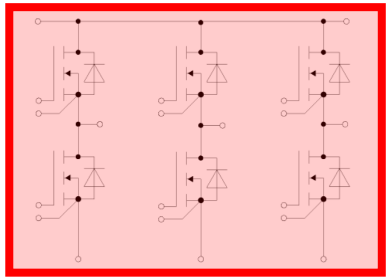
PART NUMBER	VOLTAGE (V)	$R_{DS(on)}$ (mΩ)	T_j MAX. (°C)	ELECTRICAL CONFIGURATION	PACKAGE	TECHNOLOGY
VS-MPT009P120	1200	9	175	2-pack	MAACPAK	Planar SiC MOSFET
VS-MPT011P120	1200	11	175			
VS-MPY023P120	1200	23	175	4-pack (open emitter)		
VS-MPY045P120	1200	45				
VS-MPX045P120	1200	45	175	6-pack (open emitter)		



2-PACK



4-PACK (OE)



6-PACK (OE)

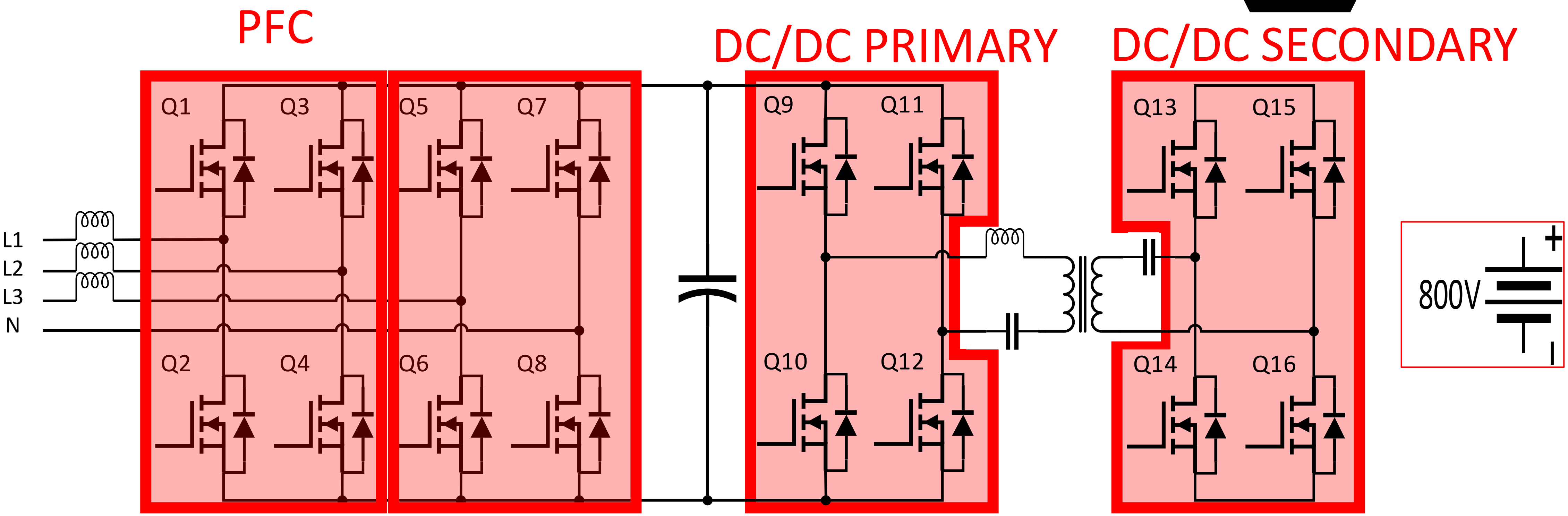
Project Approved – Feasibility Stage

- **B-samples: now ready!**
- **Release for production: Q2 2026**

SiC MOSFET

AQG324

22 kW BIDIRECTIONAL OBC:


PFC

DC/DC PRIMARY

DC/DC SECONDARY

4-Pack SiC MOSFET
20 mΩ; 1200 V

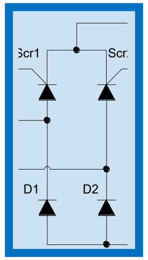
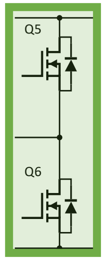
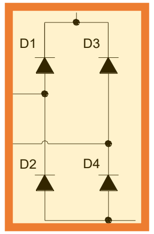
4-Pack SiC MOSFET
20 mΩ; 1200 V

4-Pack SiC MOSFET
20 mΩ; 1200 V

4-Pack SiC MOSFET
20 mΩ; 1200 V

QUADROPAK – ON-BOARD CHARGER & DC/DC

RECTIFIERS AND SIC MOSFETS

	 Input Bridge w/ SCR	 MOSFET 2-Papck	 Ultrafast / SiC Bridge
	Up to 1200 V 60 A*	_Up to_ _40 mΩ*_	Up to 1200 V 60 A*

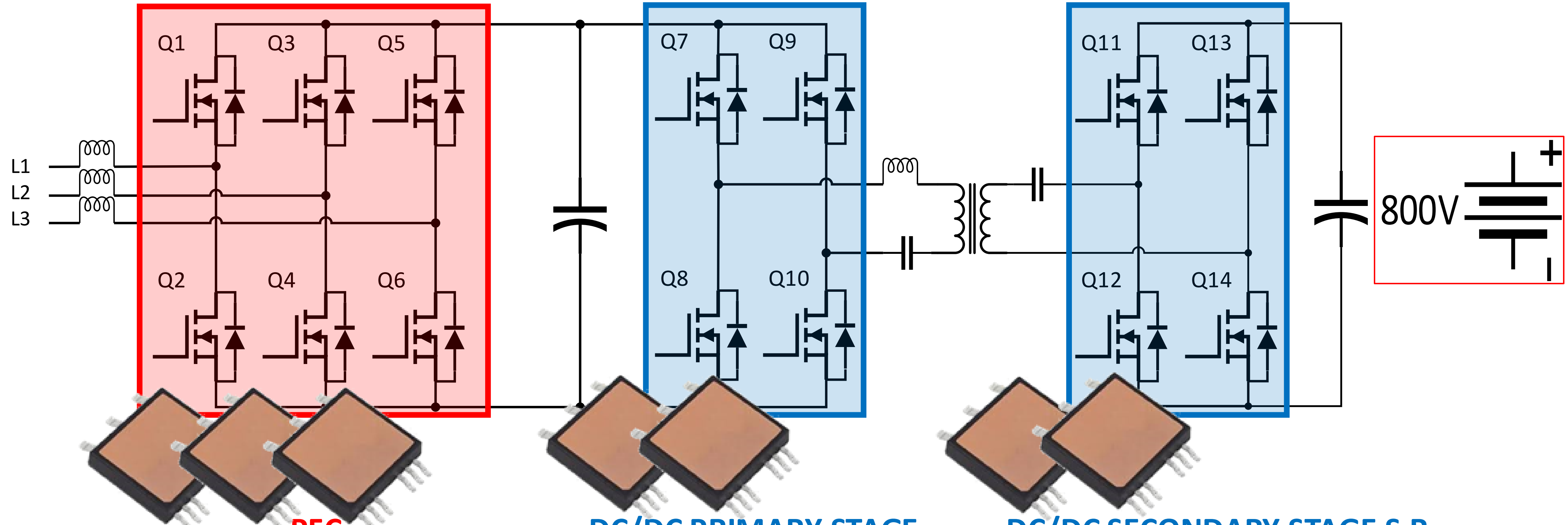
* Current / $R_{DS(on)}$ ratings depend on VBR rating

TARGET PRODUCT

Target 11 kW and 22 kW on-board chargers
Surface-mount, simple building block, maximum scalability

11kW ON-BOARD CHARGER – SIC 1200 V PLATFORM

BIDIRECTIONAL TOPOLOGY



PFC
6-Pack
1200 V, 80 mΩ SiC MOSFET

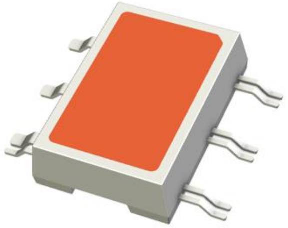
DC/DC PRIMARY STAGE
4-Pack
1200 V, 40 mΩ SiC MOSFET

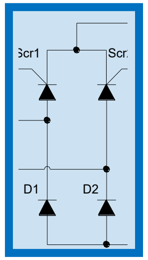
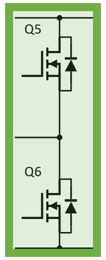
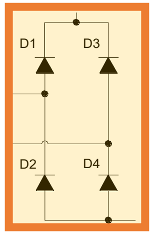
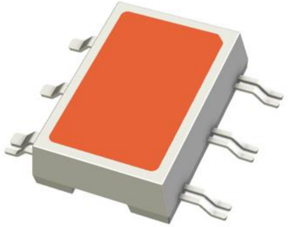
DC/DC SECONDARY STAGE S.R.
4-Pack
1200 V, 40 mΩ SiC MOSFET

TARGET PRODUCT

MINIPAK – ON-BOARD CHARGER AND DC/DC

RECTIFIERS AND SIC MOSFETS



	 Input Bridge w/ SCR	 MOSFET 2-Pack	 Ultrafast / SiC Bridge
	TBD 1200 V 30 A*	*750 V* *1200 V* *30 mΩ* *40 mΩ* *40 mΩ* *60 mΩ* *50 mΩ* *80 mΩ*	TBD 1200 V 30 A*

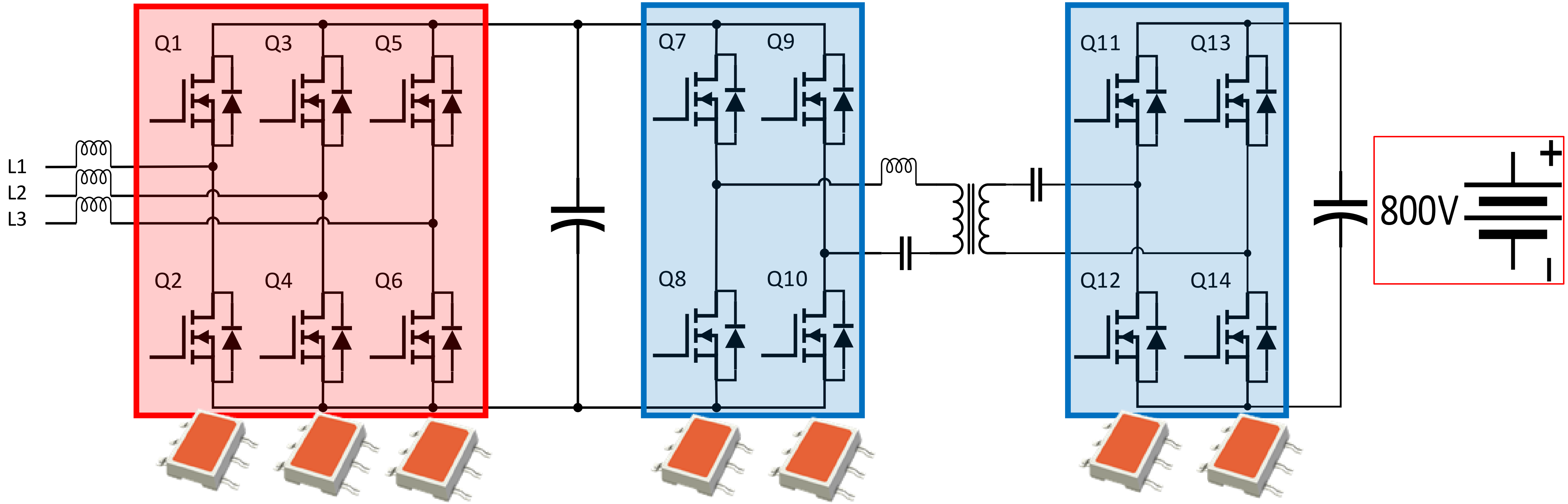
* Current / $R_{DS(ON)}$ ratings depend on VBR rating

TARGET PRODUCT

Target 11 kW and 22 kW on-board chargers
Surface-mount, simple building block, maximum scalability

11+KW ON-BOARD CHARGER – SIC 1200 V PLATFORM

BIDIRECTIONAL TOPOLOGY



PFC
6-Pack
1200 V, 40 mΩ SiC MOSFET

DC/DC PRIMARY STAGE
4-Pack
1200 V, 40 mΩ SiC MOSFET

DC/DC SECONDARY STAGE S.R.
4-Pack
1200 V, 40 mΩ SiC MOSFET

TARGET PRODUCT

VISHAY
The DNA of tech.®

BUILT TO WIN
VISHAY EVERY DAY

AMERICAS SALES CONFERENCE