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SEMICONDUCTOR



**eSiC Diode Selection Guide 2022**

Advanced Power Master Semiconductor's Silicon Carbide Technology

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# Advantage of eSiC Diode over Si Diode

## Features

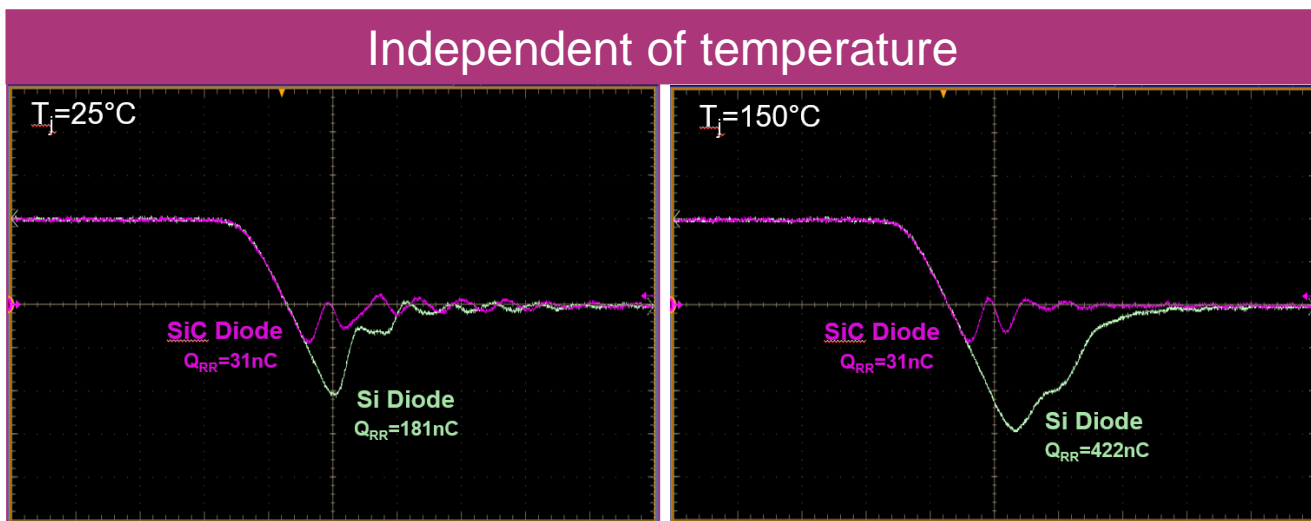
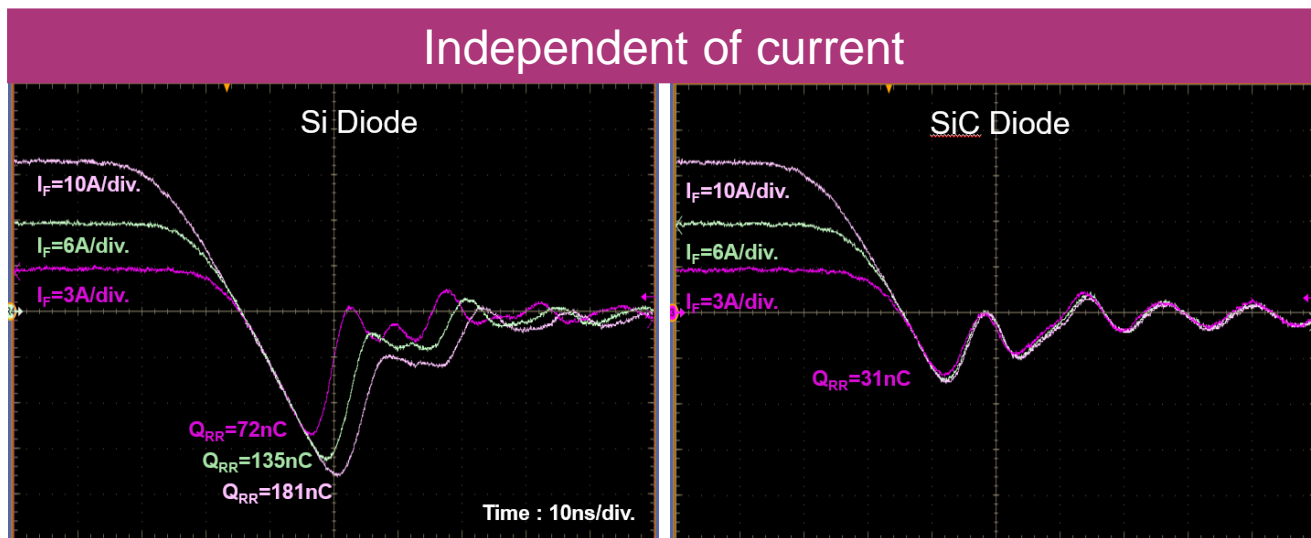
- Low forward voltage
- High surge current capability
- No reverse recovery current
- 175°C Max junction temperature
- Switching behavior independent of temp. and current

## Advantages

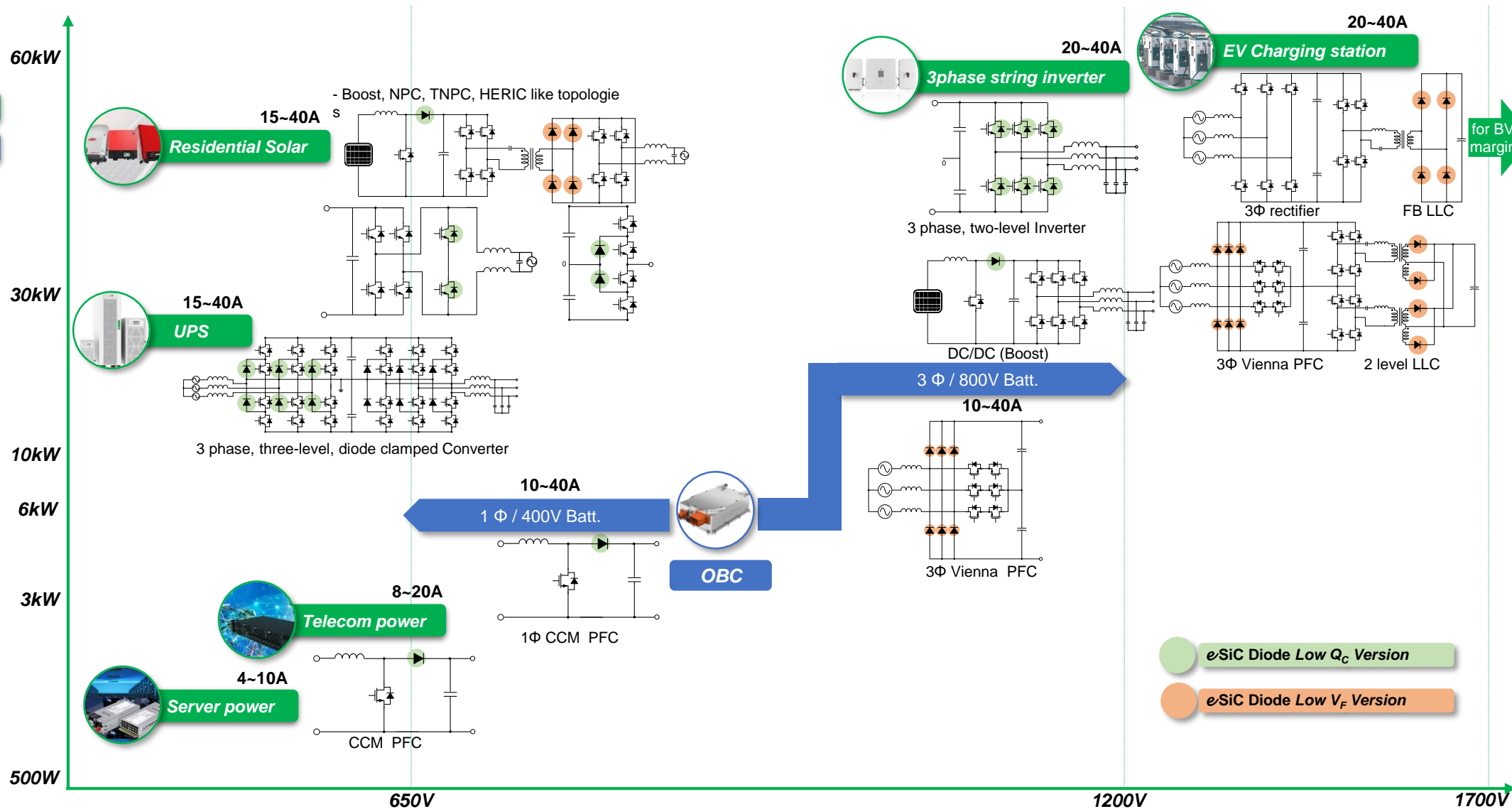
- Low Conduction loss
- High reliability capability
- Significant reduction of MOSFET or IGBT turn on loss
- Less Power loss at high temperature

## System Benefits

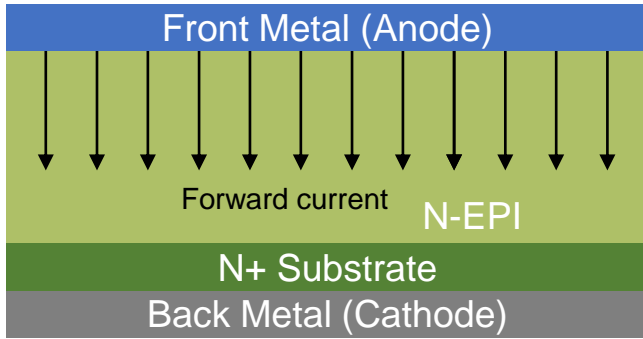
- Higher system efficiency (CCM PFC) than Si diodes
- High Performance/Cost Ratio
- High reliability capability
- Suitable for wide range of applications
- Reduction of EMI
- Reduction of cooling requirements



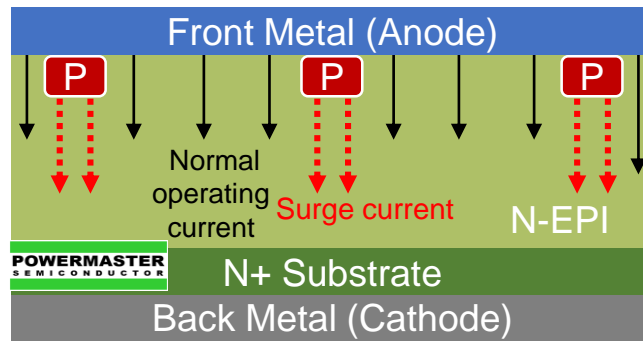
# eSiC Diode Application and Topology



# eSiC Diode - MPS (Merged PiN Schottky) Technology



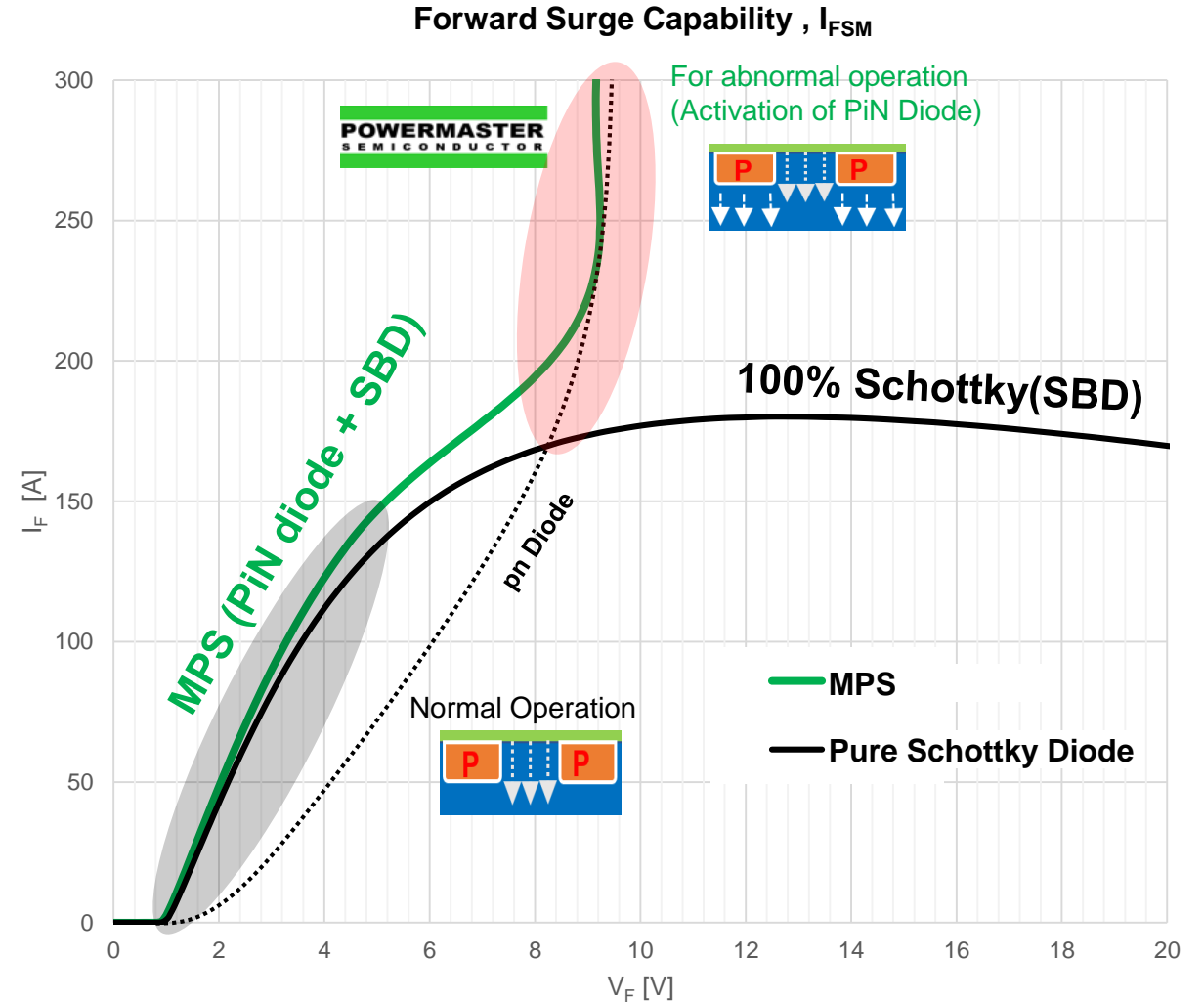
Pure Schottky Diode



MPS(Merged PiN Schottky) Diode

## MPS Diode Advantage

- High current capability
- Excellent  $I_R$  (leakage current) current

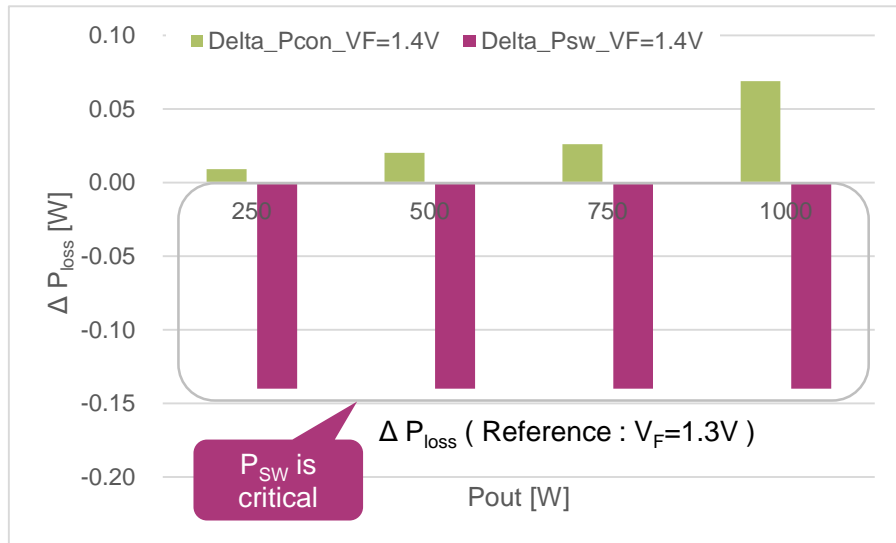


# eSiC Diode Series – Low $Q_C$ version & Low $V_F$ version

The eSiC Diode is an advanced Power Master Semiconductor’s silicon carbide diode family. This technology combines the benefits of excellent low forward voltage and high ruggedness for applications requiring high efficiency and reliability.

## eSiC Low $Q_C$ Version for high frequency application

$V_{AC} = 220V / F_{SW} = 100KHz$



$V_{F\_typ.} = 1.4V / Q_C = 32nC$



Telecom/Server (w. UPS)



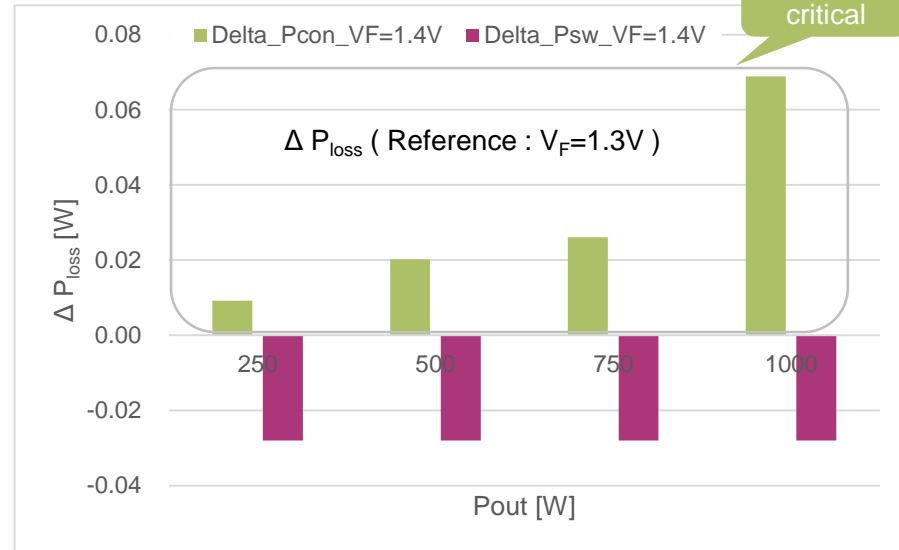
Solar Inverter



TV&LED lighting

## eSiC Low $V_F$ Version for low frequency application

$V_{AC} = 220V / F_{SW} = 20KHz$



$V_{F\_typ.} = 1.3V / Q_C = 39nC$



EV Charging Station



Solar Inverter

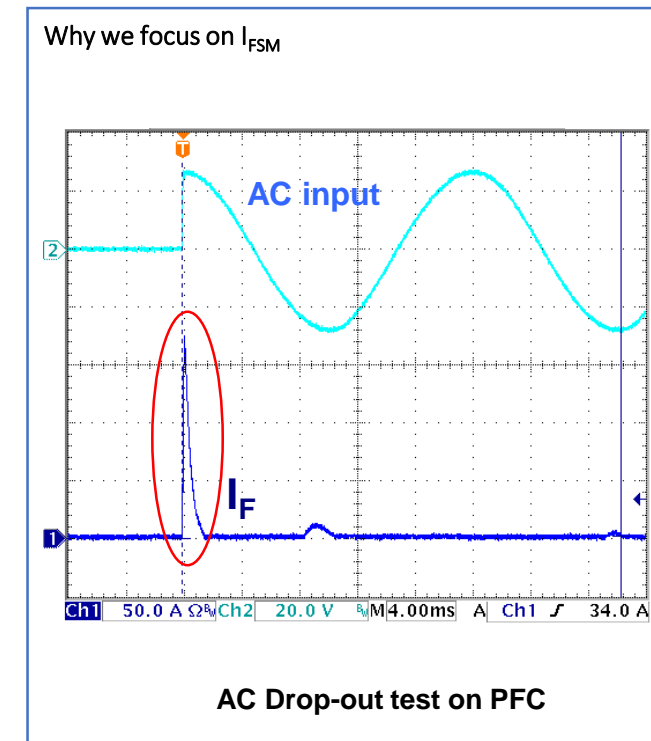
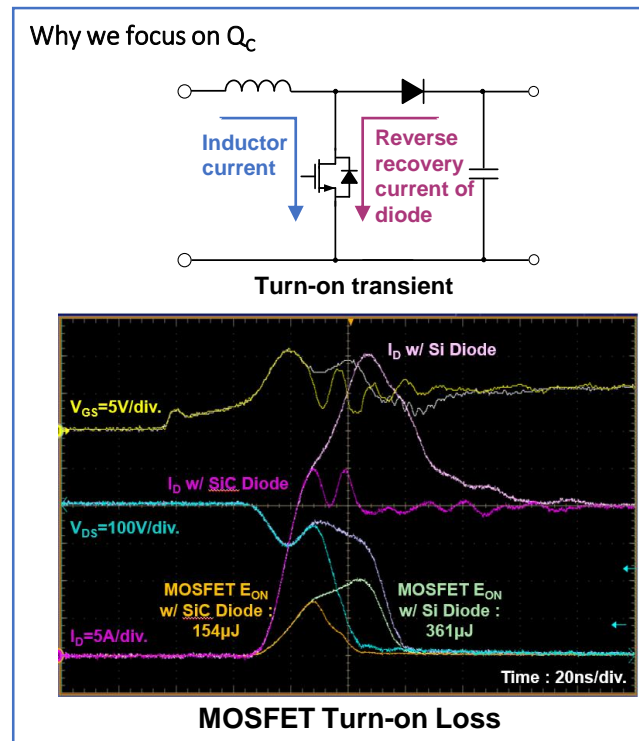
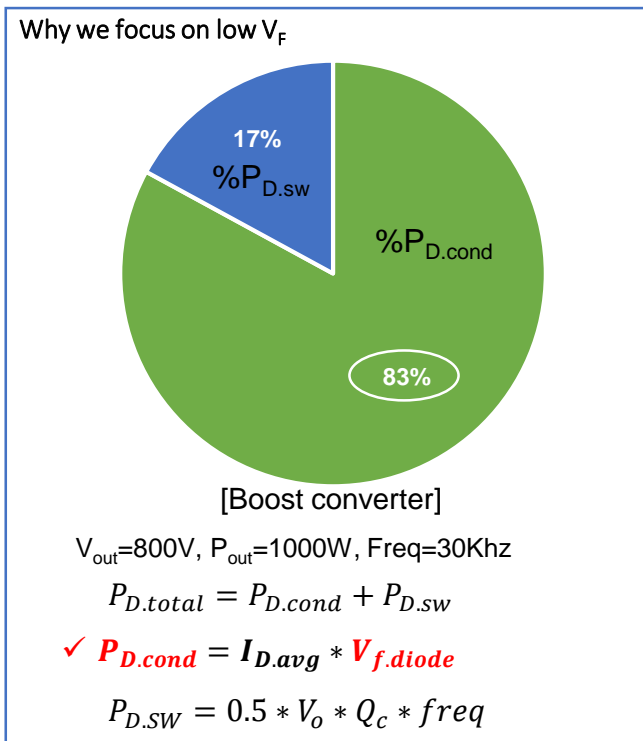


Industrial Motors

# eSiC Diode – Key Parameters

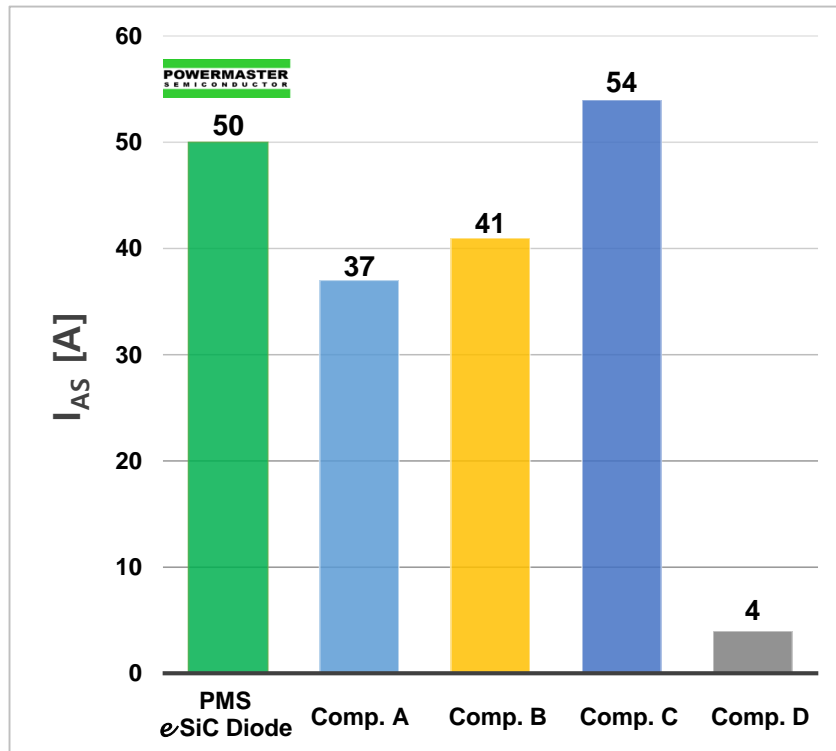
	Players	PMS eSiC	Comp. A	Comp. B	Comp. C	Comp. D	Comp. F
	1200V / 20A SiC Diode						
key parameter #1	$V_F @ T_C=25^\circ\text{C}$	1.39 V ●	1.43 V ●	1.53 V ●	1.48 V ●	1.31 V ●	1.38 V ●
key parameter #2	$Q_C @ V_r=800\text{V}$	121 nC ●	102 nC ●	78 nC ●	92 nC ●	137 nC ●	111 nC ●
key parameter #3	$I_{FSM} @ 10\text{ms}$	210 A ●	220 A ●	304 A ●	104 A ●	216 A ●	235 A ●
key parameter #4	$I_R @ T_C=175^\circ\text{C}$	3 $\mu\text{A}$ ●	415 $\mu\text{A}$ ●	148 $\mu\text{A}$ ●	42 $\mu\text{A}$ ●	11 $\mu\text{A}$ ●	100 $\mu\text{A}$ ●

Well Balanced Performance

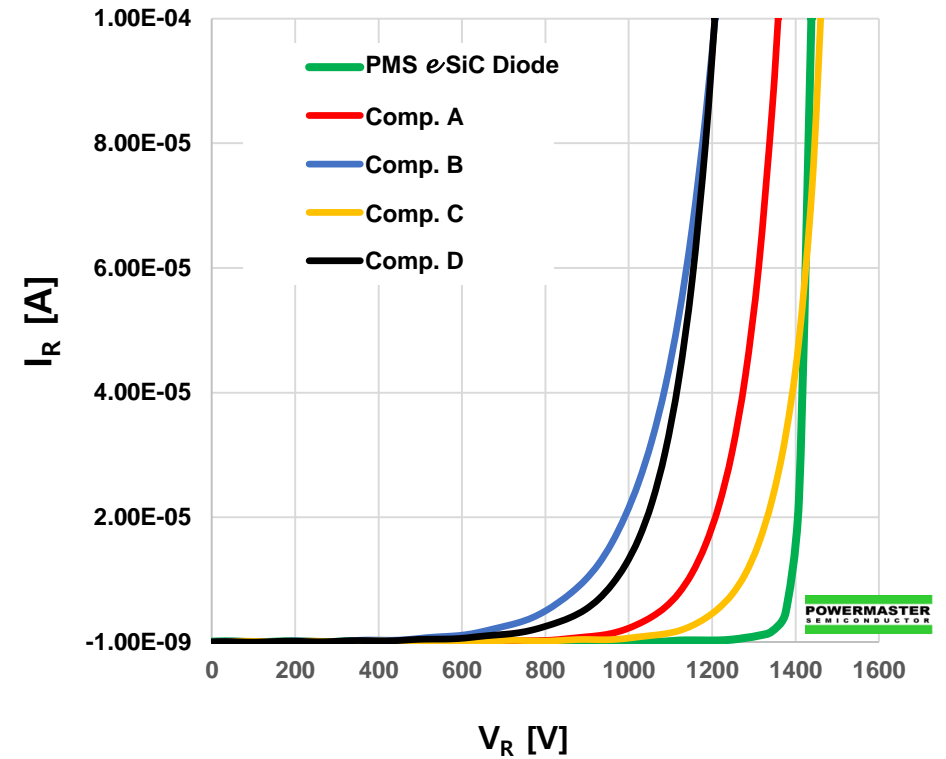


# eSiC Diode – Excellent Ruggedness and Lowest Leakage

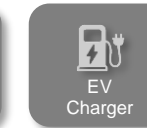
High UIS capability @ low coil (  $L=350\mu\text{H}$  )



Extremely low Leakage @ High Temp



# 650V eSiC Diode Portfolio



**Low  $V_F$**   
for Low Freq. Applications

$I_F$ / PKG	Die	DPAK	D2PAK	PQFN88	TO-220F 2L	TO-220 2L	TO-247 2L	TO-247 3L
40A								PCW65D40D1
30A								PCW65D30D1
20A	PCO65S20D1		PCB65S20D1		PCF65S20D1	PCH65S20D1	PCA65S20D1	PCW65D20D1
16A	PCO65S16D1					PCH65S16D1		PCW65D16D1
12A	PCO65S12D1			*PCL65S12D1	PCF65S12D1	PCH65S12D1		
10A	PCO65S10D1	*PCD65S10D1	PCB65S10D1		PCF65S10D1	PCH65S10D1		
8A	PCO65S08D1		PCB65S08D1		PCF65S08D1	PCH65S08D1		
6A	PCO65S06D1				PCF65S06D1	PCH65S06D1		
4A	PCO65S04D1				PCF65S04D1	PCH65S04D1		

**Low  $Q_C$**   
for High Freq. Applications

40A								*PCW65D40D1Q
30A								*PCW65D30D1Q
20A	PCO65S20D1Q		PCB65S20D1Q		PCF65S20D1Q	PCH65S20D1Q	PCA65S20D1Q	PCW65D20D1Q
16A	PCO65S16D1Q					PCH65S16D1Q		PCW65D16D1Q
12A	PCO65S12D1Q		PCB65S12D1Q		PCF65S12D1Q	PCH65S12D1Q		
10A	PCO65S10D1Q				PCF65S10D1Q	PCH65S10D1Q		
8A	PCO65S08D1Q				PCF65S08D1Q	PCH65S08D1Q		
6A	PCO65S06D1Q				PCF65S06D1Q	PCH65S06D1Q		




\* Coming soon



# 1200V / 1700V eSiC Diode Portfolio



1200V

I <sub>F</sub> \ PKG	Die	D2PAK	TO-220 2L	TO-247 2L	TO-247 3L
					
40A	PCO120S40D1			PCA120S40D1	PCW120D40D1
30A	PCO120S30D1			PCA120S30D1 *PCA120S30D1Q	PCW120D30D1
20A	PCO120S20D1	PCB120S20D1	PCH120S20D1	PCA120S20D1	PCW120D20D1
15A	PCO120S15D1		PCH120S15D1	PCA120S15D1	PCW120D15D1
10A	PCO120S10D1	PCB120S10D1	PCH120S10D1	PCA120S10D1	PCW120D10D1
8A	PCO120S08D1		PCH120S08D1		
5A	PCO120S05D1		PCH120S05D1		

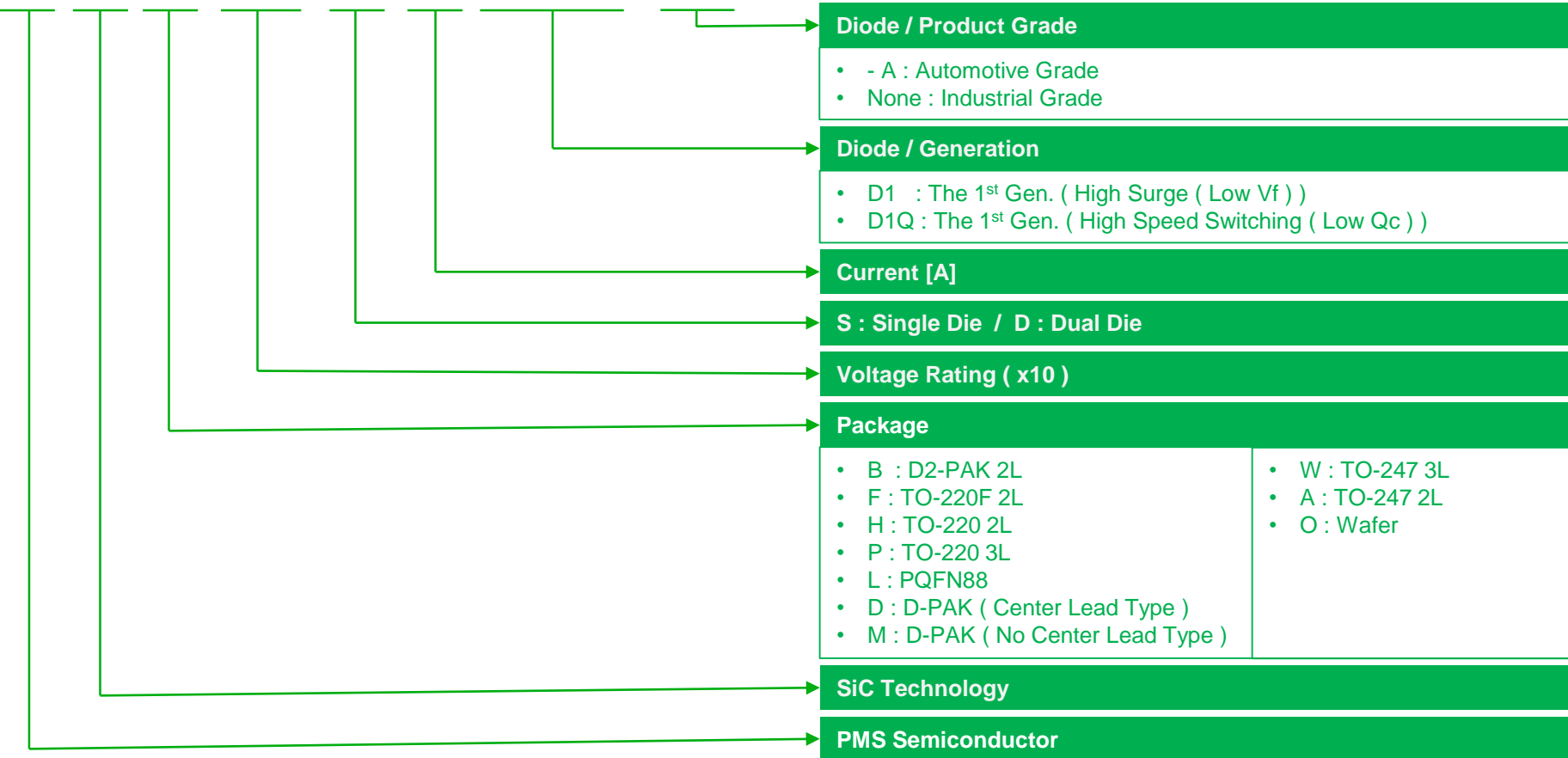
1700V

25A	*PCO170S25D1			*PCA170S25D1	
10A	*PCO170S10D1			*PCA170S10D1	
5A	*PCO170S05D1			*PCA170S05D1	

\* Coming soon

# eSiC Diode - Nomenclature

**P C P 120 S 20 D1(Q) - A**



# Important Notice

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