



We are the link  
between the real and  
the digital world.

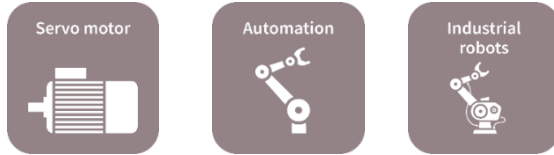
# Smart motor demo

## Integrated servo motor drive

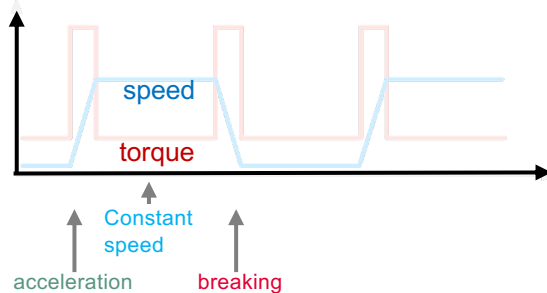
Infineon's virtual show 2020



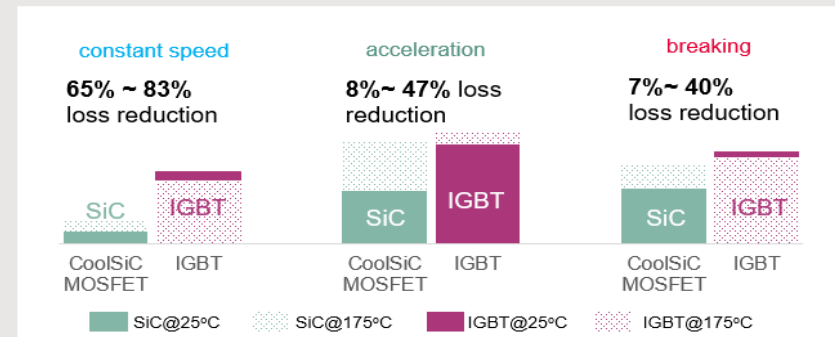
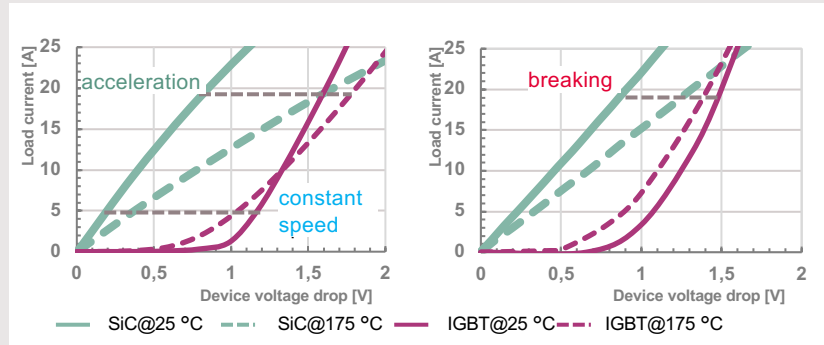
# 1200 V SiC MOSFET in servo drives: Conduction loss reduction in all operation modes



- > High torque (current) in acceleration and braking period
- > Low torque (current) in constant speed period
- > Typically 90% of the time spent in low torque operation



CoolSiC™ MOSFET 1200 V 30 mΩ vs. IGBT HS3 1200 V 40 A @ 25 °C & 175 °C



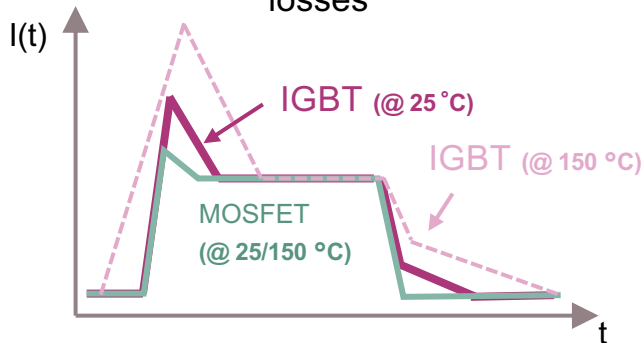
# 1200 V SiC MOSFET in servo drives

## Switching loss reduction in all operation modes

Low  $Q_{rr}$  and no tail current

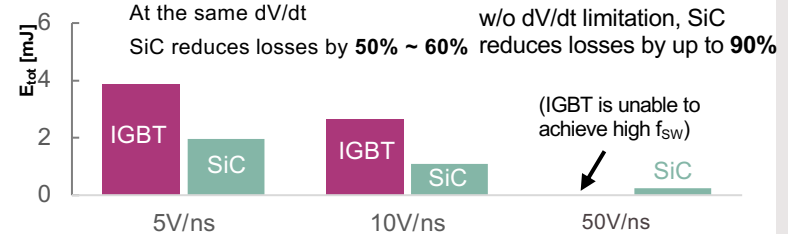


Temperature-independent switching losses

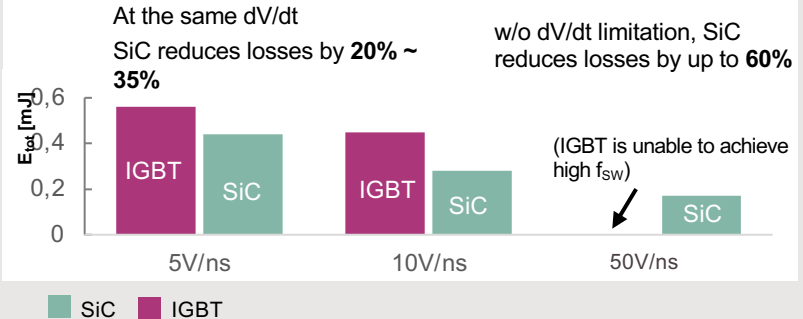


CoolSiC™ MOSFET 1200 V 30 mΩ vs. IGBT HS3 1200 V 40 A @ 25 °C & 175 °C

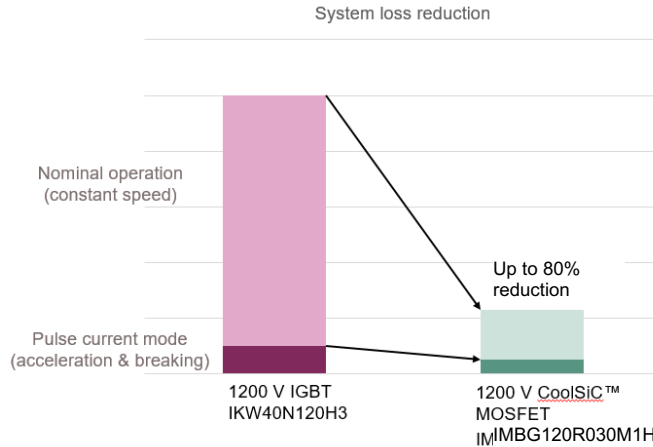
**Total switching loss at 150 °C, acceleration and breaking [20 A]**



**Total switching loss at 25 °C, constant speed operation (5 A)**



# CoolSiC™ MOSFET enables the next generation of servo drives by reducing losses by up to 80%



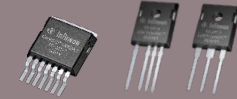
## Key SiC MOSFET requirements in B6 topology in servo drives

Robust and low  $Q_{rr}$  body diode

Immunity against parasitic turn-on

Short-circuit capability of 3  $\mu$ s

## CoolSiC™



## Passive cooling



No cooling fan

## Inverter motor integration



## Enhanced pulse current capability

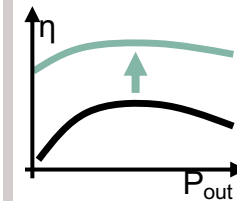


## Current rating jump



Increased current for a given package

## Improved efficiency



and more...

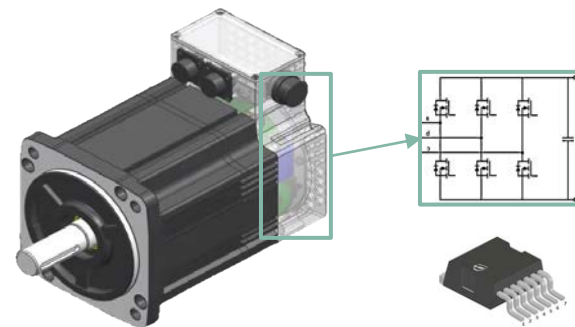
# Concept of integrated servo motor



servo

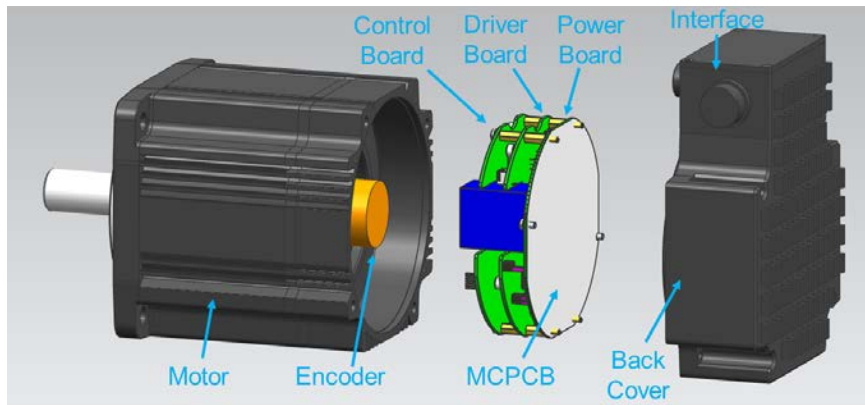


motor

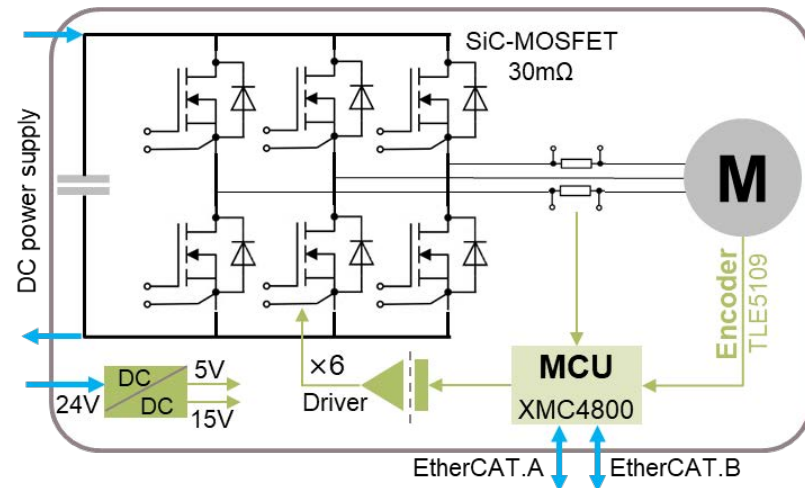


integrated servo motor drive

# Design approach: SMD on IMS with passive cooling



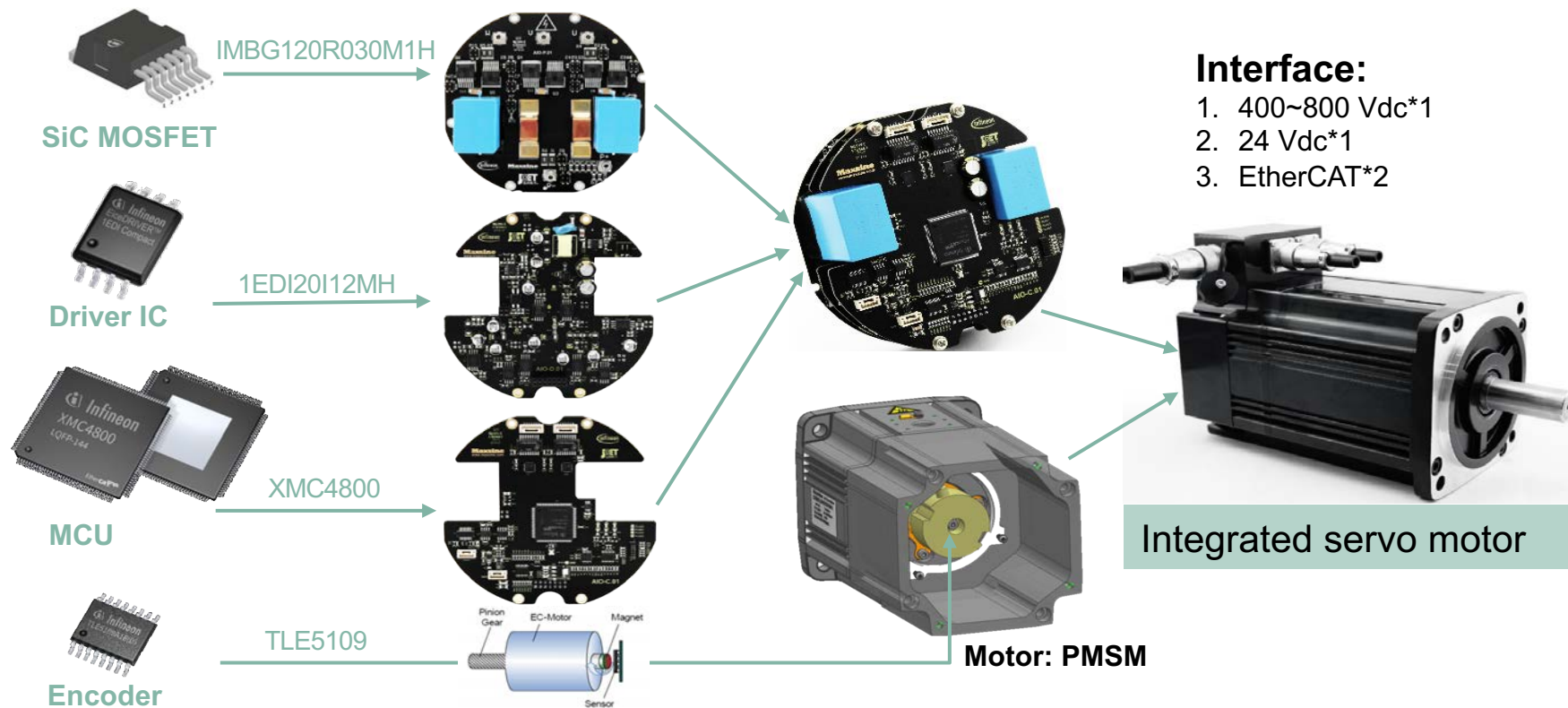
- 1) Motor: PMSM, 130mm\*130 mm
- 2) Encoder: magnetic coding
- 3) Control board: motor control and communication
- 4) Driver board: driver circuit and power supply
- 5) Power board: SiC MOSFET for inverter
- 6) MCPCB: aluminum base, copper clad laminate
- 7) Back cover: incl. dissipation fins



## Interface:





- 1) DC power supply: 400~800 V
- 2) DC power supply: 24 V
- 3) Communication: EtherCAT \* 2

# Smart motor powered by Infineon products



# New 1200 V CoolSiC™ MOSFET portfolio for compact inverter motor integration



	$R_{DS(on)}$ [mΩ]	TO-247 3 	TO-247 4 	D <sup>2</sup> PAK-7L  <b>New</b>	D <sup>2</sup> PAK-7L extended creepage  <b>New</b>
1200 V	30	IMW120R030M1H	IMZ120R030M1H	IMBG120R030M1H	
	45	IMW120R045M1	IMZ120R045M1	IMBG120R045M1H	
	60	IMW120R060M1H	IMZ120R060M1H	IMBG120R060M1H	
	90	IMW120R90M1H	IMZ120R090M1H	IMBG120R090M1H	
	140	IMW120R140M1H	IMZ120R140M1H	IMBG120R140M1H	
	220	IMW120R220M1H	IMZ120R220M1H	IMBG120R220M1H	
	350	IMW120R350M1H	IMZ120R350M1H	IMBG120R350M1H	
1700 V	450				IMBF170R450M1
	650				IMBF170R650M1
	1000				IMBF170R1K0M1



# Summary



CoolSiC™ solutions

As reliable as Si power transistors from Infineon

Outstanding performance and best ease of use

Comprehensive portfolio – all in mass production

This is the revolution you can rely on!

For more product information, please visit

**Webpage:** [www.infineon.com/coolsic-mosfet](http://www.infineon.com/coolsic-mosfet)

**Forum:** [www.infineonforums.com/forums/34-Silicon-Carbide-\(SiC\)-Forum](http://www.infineonforums.com/forums/34-Silicon-Carbide-(SiC)-Forum)

## Acknowledgement

**Thanks for the great support from JingChuan and Maxsine**



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