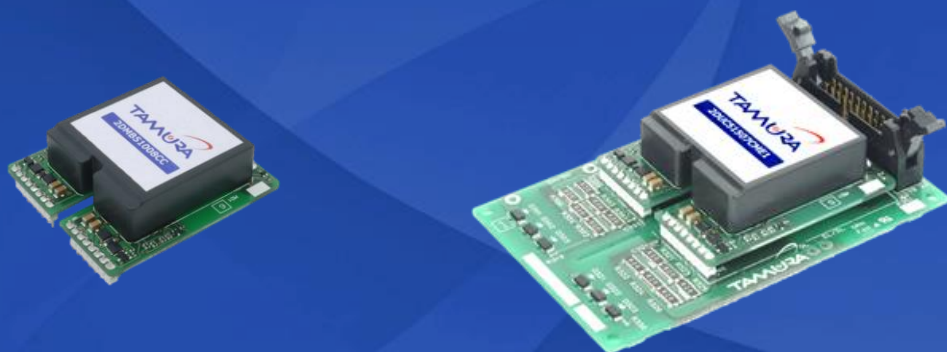


# Gate driver module that brings out the performance of All-SiC power modules



SUSTAINABLE  
DEVELOPMENT  
GOALS

**TAMURA**  
*Your One and Only Company*

## Index

- Tamura Corporation Gate Driver Product Overview
- Functions to bring out the features and performance of All-SiC power modules
- Introducing the line-up of gate drivers for All-SiC power modules

Appendix) Contact person

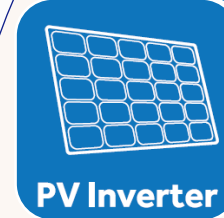
## Role of gate driver

Power Module

SiC MOSFET  
IGBT



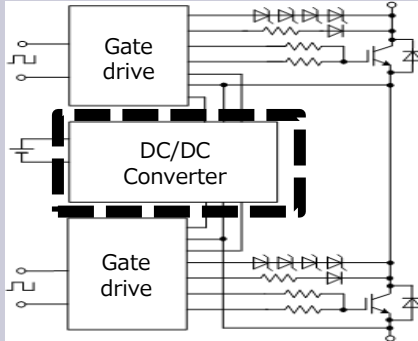

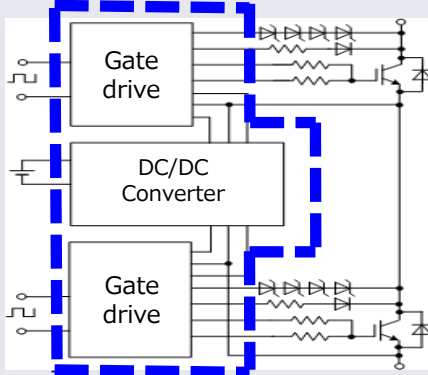

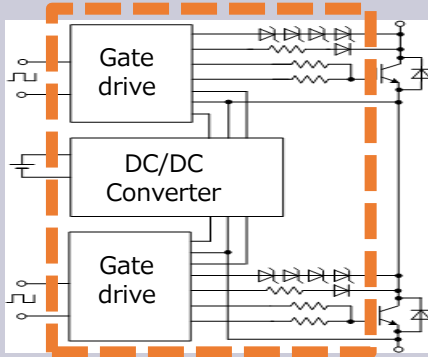

## Applications



### ● What is required of a gate driver ?

1. Bring out the performance of power modules
2. Increase reliability of both power modules and applications.
3. Providing efficient development

# Tamura Corporation Gate Driver Product Overview

Product	Function	Block diagram	Appearance
DC/DC Converter	2 in1 PM designated DC/DC Converter		<b>2DD series</b> 
Gate Driver Module	DC/DC Converter + Gate drive		<b>2CG series</b> 
Gate Driver Unit	Gate Driver Module + Gate resistors Protective function		

# Tamura Corporation Gate Driver Product Overview

## Outline of specifications

### Gate Driver Module 2CG-B series



### Gate Driver Unit 2EG-B series



		MODEL				
		2CG010BBC11N	2CG010BBC12N	2CG010BBC13N	2CG010BBC14N	2CG010BBC15N *
Output	Output voltage(+)	+15V	+15V	+18V	+18V	+15V
	Output voltage(-)	-10V	-15V	-4V	-2V	-4V
	Output power/1ch	3.8W	3.3W	3.5W	3.2W	3.0W
	Number of output	2				
	Peak output current	±43A				
Input	Input voltage	DC13~28V				
	Logic input voltage	DC3.3~5V				
Insulation	Withstand voltage	Primary to secondary AC5KV / Secondary to secondary AC4KV				
	Partial discharge extinction voltage	1768V peak				
Function	Mode select	Direct mode / Half bridge mode				
	DESAT protection	Yes				
	Soft turn off	Yes				
	Active clamp	No				
	Miller clamp	Yes				

\* Under development

## Features of All-SiC Power Module

Feature① Short circuit tolerance is lower than Si

Feature② Low threshold voltage  $V_{GS(th)}$  (1V~3V)

Feature③  $V_{GS}(+)$  :On resistance does not decrease at 15V  
 $V_{GS}(-)$  :Low tolerance (Less than -5V)

Feature④  $dV/dt$  can be set high

Feature⑤ High frequency operation is possible



# Functions to bring out the features and performance of All-SiC power modules

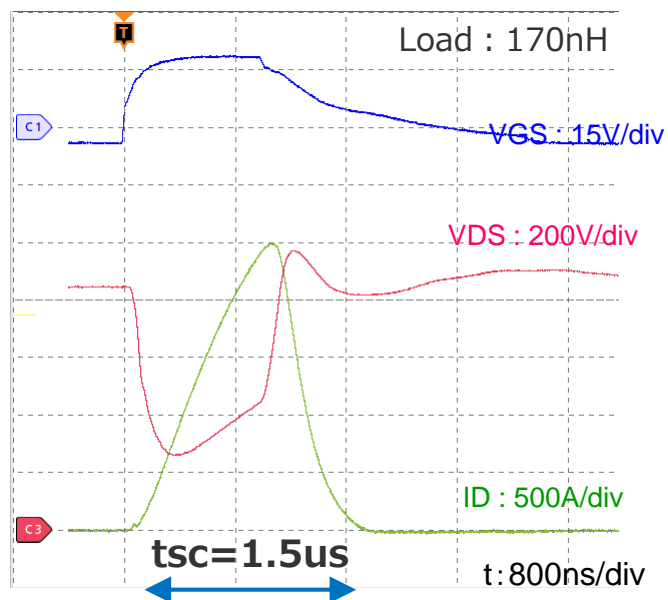
Feature ① Short circuit tolerance is lower than Si

----- Small chip area -----

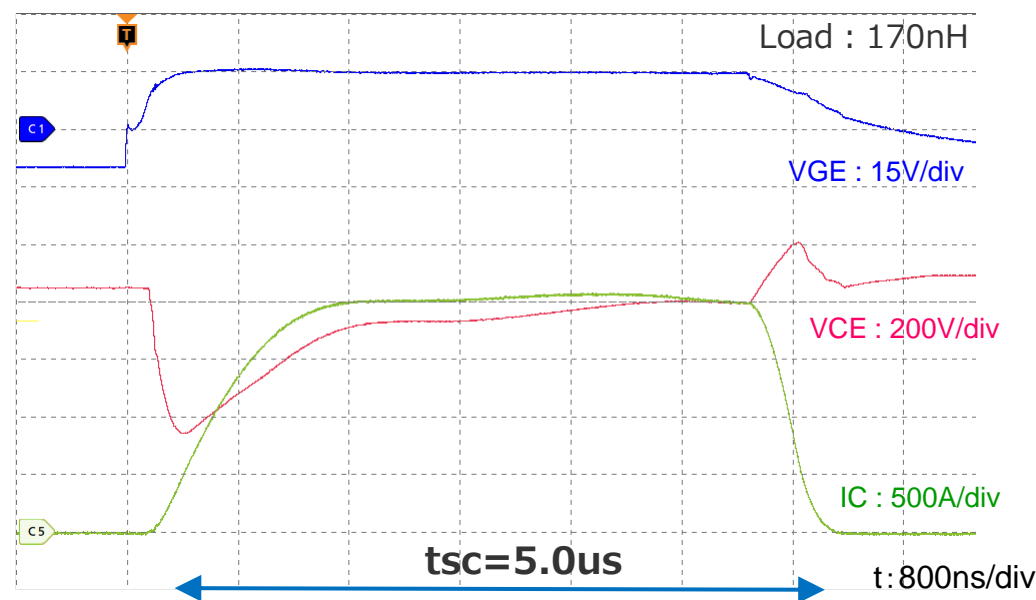
- Wide band gap
- High breakdown voltage
- High temperature operation

**Support with a gate driver** ... Short-circuit mask time (tsc) adjustment function

SiC power module (1200V 300A)  
Waveform with shorted load



IGBT power module (1200V 300A)  
Waveform with shorted load



**Adjustable with external capacitor capacity**

Optimal value of SiC : 1.0~3.0us

Optimal value of IGBT : 3.0~7.0us

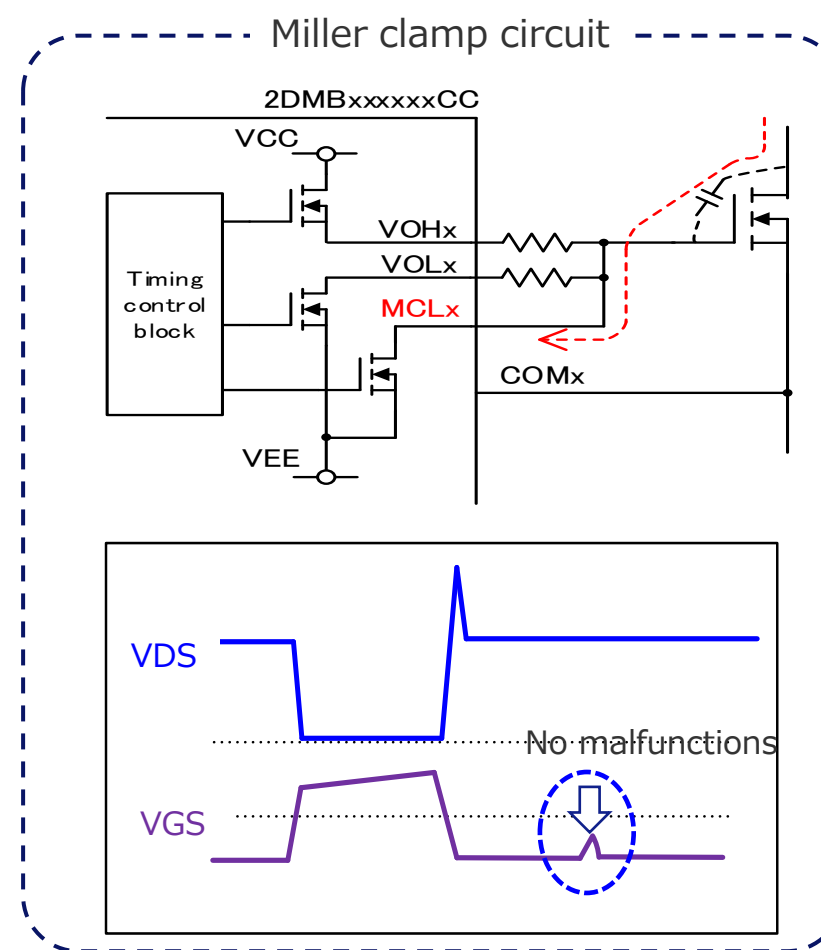
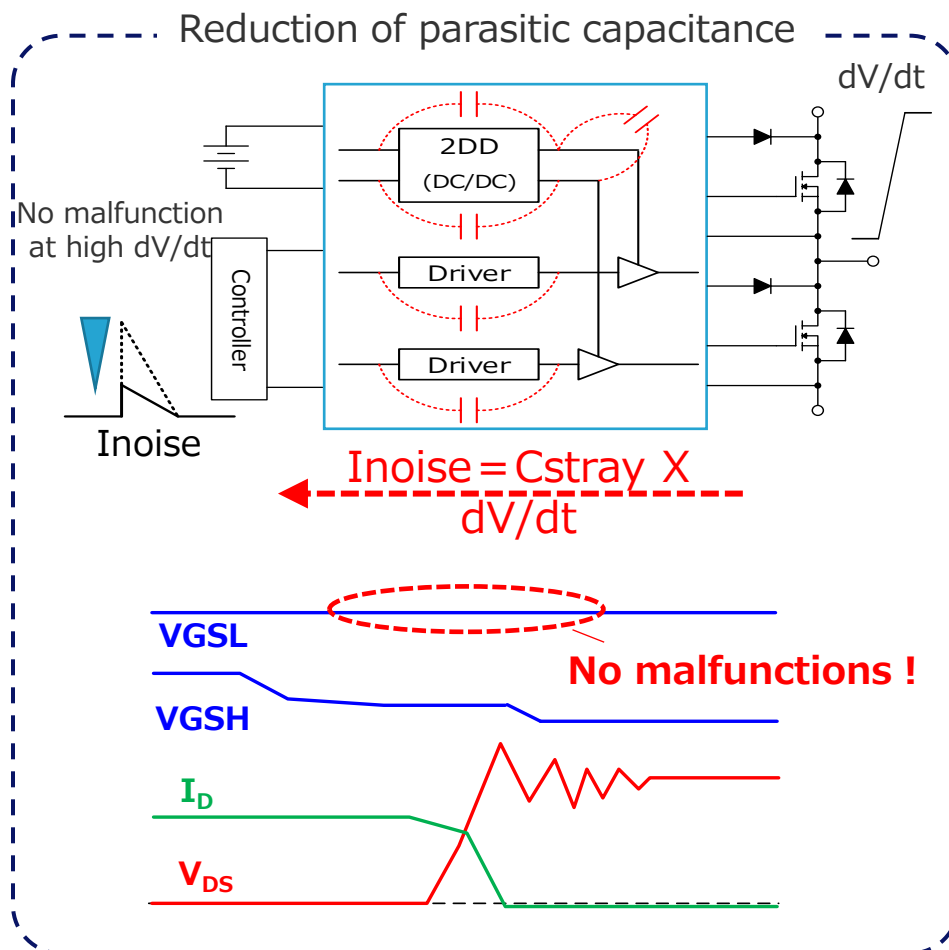
# Functions to bring out the features and performance of All-SiC power modules

Feature② Low threshold voltage VGS (th) (1V~3V)

--- IGBT is 6V~7V

--- Beware of malfunctions from IGBT

**Support with a gate driver** ... Reduction of parasitic capacitance and Miller clamp circuit





# Functions to bring out the features and performance of All-SiC power modules

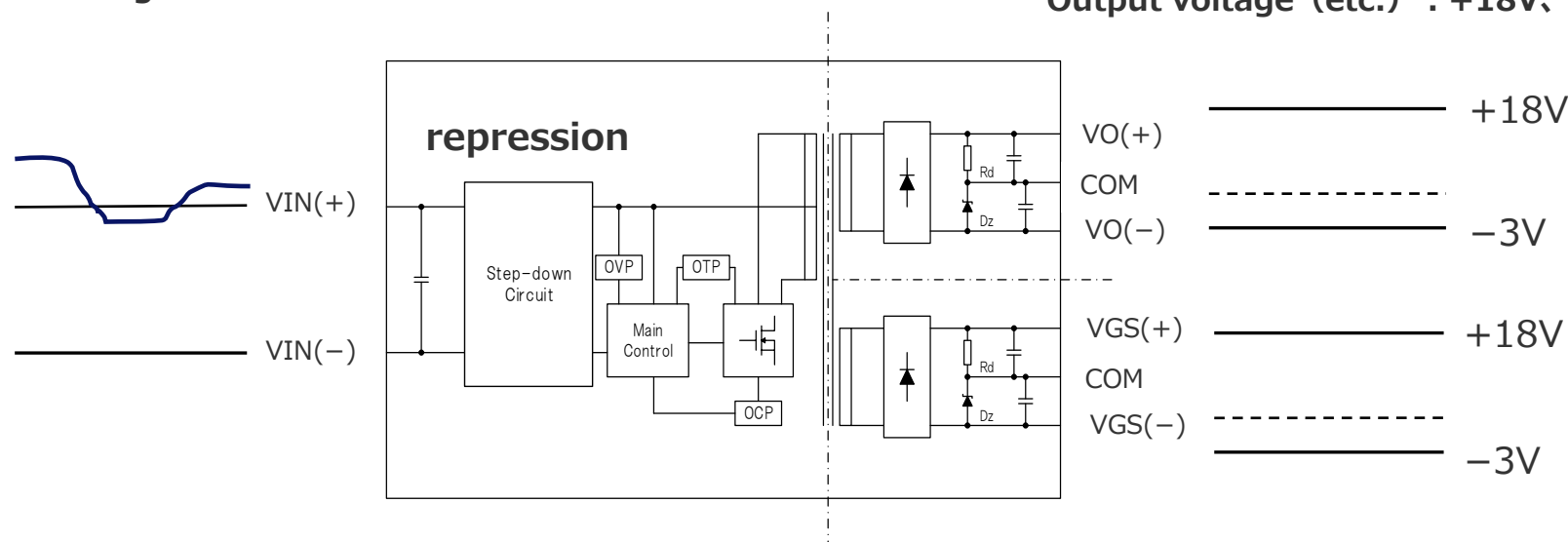
Feature③ VGS(+) : On resistance does not decrease at 15V  
VGS(-) : Low tolerance (Less than -5V)

--- IGBT's Gate driver cannot be used

## Support with a gate driver ... Constant voltage control of VGS

Input voltage : 13V~28V

Output voltage (etc.) : +18V, -3V



Controls the gate voltage to be constant even for input fluctuations  
The gate voltage is constant even for output fluctuations  
(SW frequency, QG of power module)

**Improved SiC reliability**  
**Low loss operation**

# Functions to bring out the features and performance of All-SiC power modules

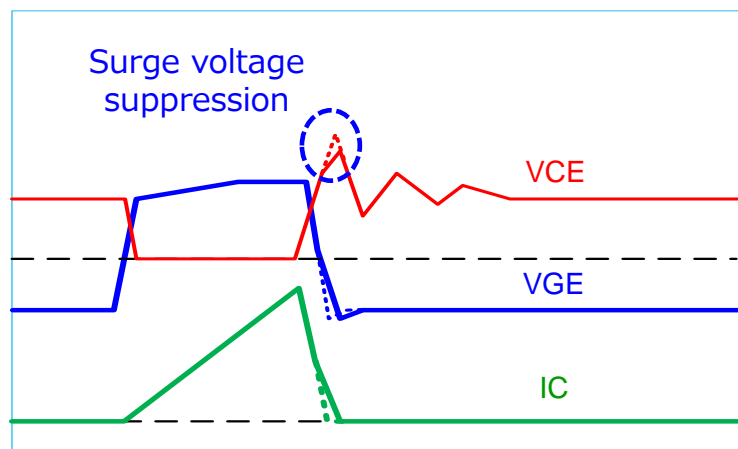
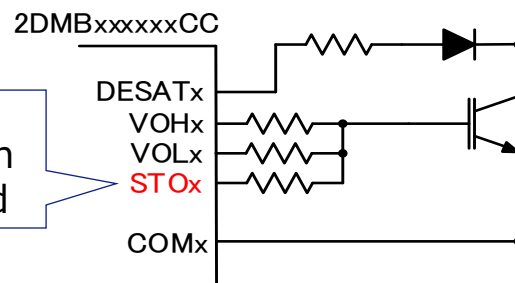
Feature④  $dV/dt$  can be set high

Turn-on: Recovery current is small  
Turn-off: No tail current

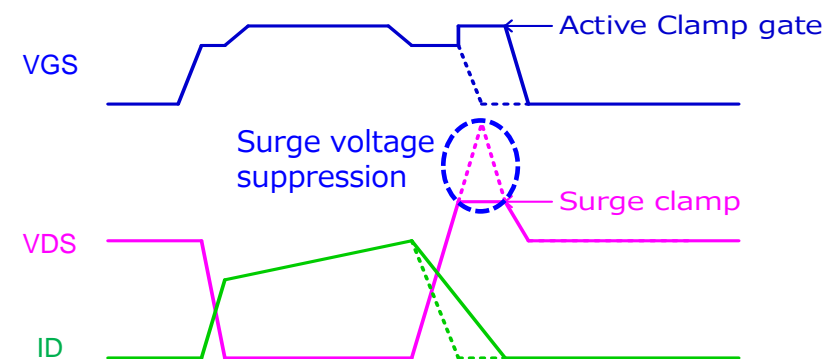
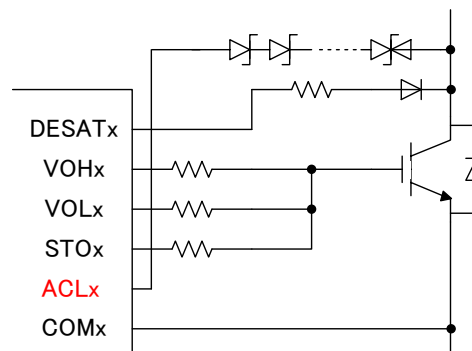
**Support with a gate driver** ··· Ability to suppress surge voltage with high  $dV/dt$   
(Soft turn-off, Active clamp)

Soft turn-off

Soft turn-off  
Operates when  
short-circuited



Active clamp (Option)

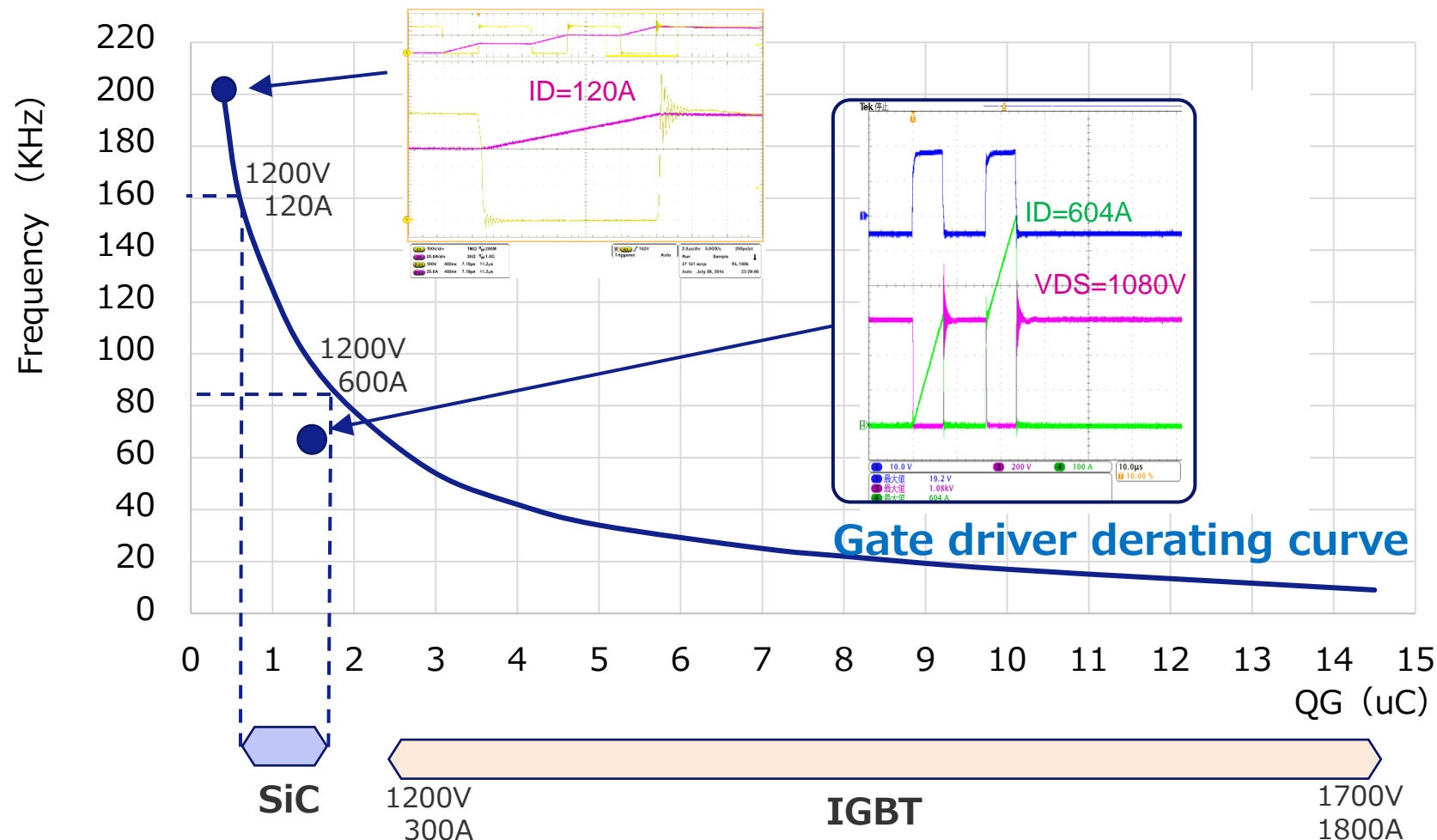


# Functions to bring out the features and performance of All-SiC power modules








Feature⑤ High frequency operation is possible

----- Drive power needs to be increased

**Support with a gate driver** ... Output capacity considering SiC power module



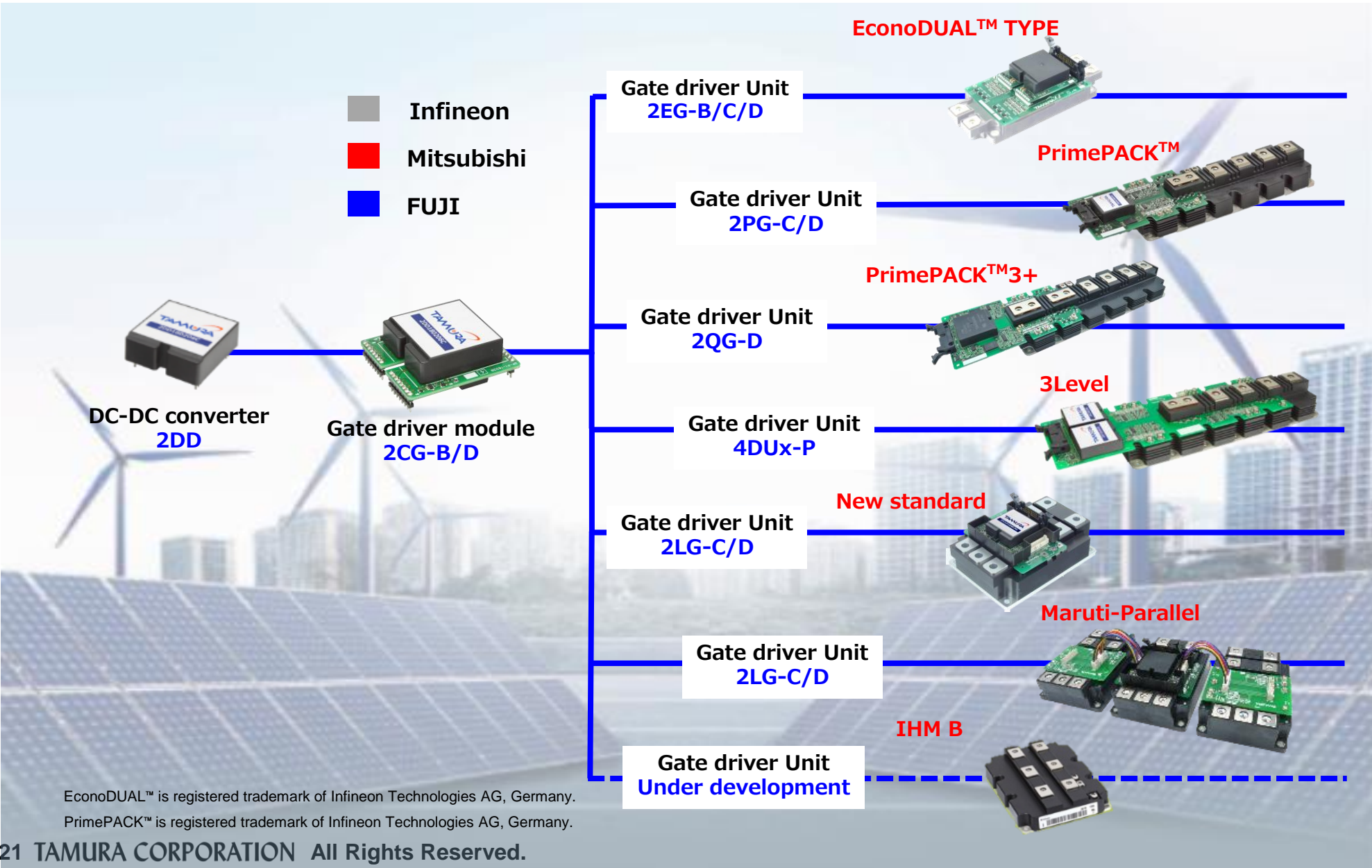
# Gate Driver Line-up for SiC power module

Package	Ic	Part No	TAMURA Driver		
			2EG-B 	2CG-B 	2DD 
Vce = 1200V					
 C type	80	BSM080D12P2C008	-	2CG010BBC13N	2DD180407C
	120	BSM120D12P2C005	-		
	180	BSM180D12P3C007	-	2CG010BBC14N	2DD180206C
 E type	180	BSM180D12P2E002	2EG01XBxN13N *1	2CG010BBC13N	2DD180407C
	300	BSM300D12P2E001	2EG01XBxN13N *1		
	300	BSM300D12P3E005	2EG01XBxN14N *1	2CG010BBC14N	2DD180206C
 G type	400	BSM400D12P2G003	2EG01XBxN13N *1	2CG010BBC13N	2DD180407C
	400	BSM400D12P3G002	2EG01XBxN14N *1	2CG010BBC14N	2DD180206C
	600	BSM600D12P3G001	2EG01XBxN14N *1		
Vce = 1700V					
 E type	250	BSM250D17P2E004	2EG01XBxN13N *1	2CG010BBC13N	2DD180407C

\*1 Not in stock due to optimization required. Please contact us.

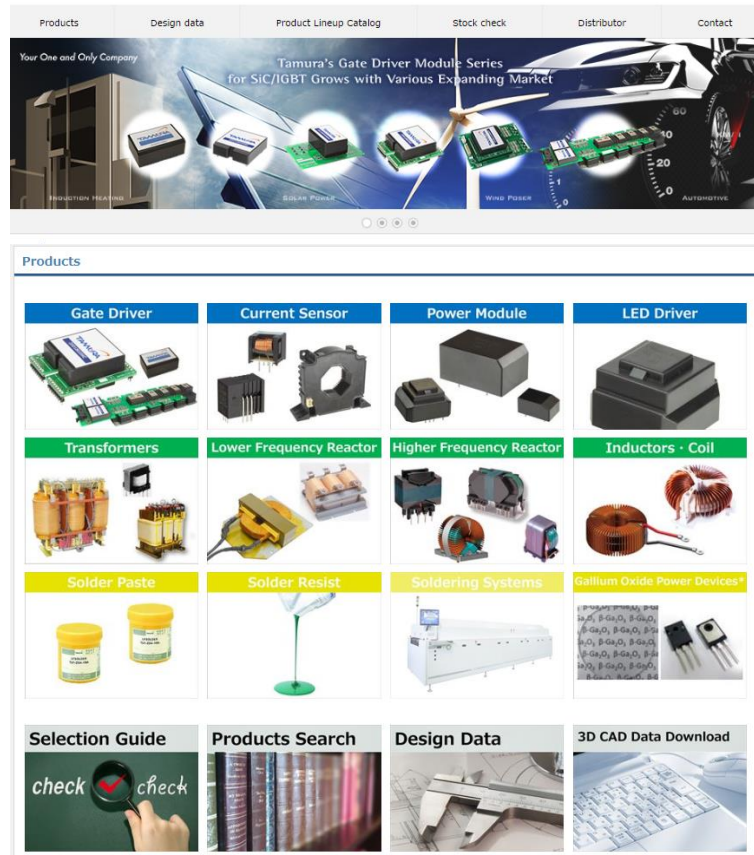
x: Signal input voltage selectable " C " => 3.3~15V " D " => 15V

# Extensive line-up of SiC and IGBT gate drivers



## Appendix) Information & Contact

Please visit our website!



- Let's know more TAMURA products  
Special movie  
Presentation of conference
- Easy Get the essential  
Matching data with power module  
3D data to design!
- One-click to purchase  
from the check stock!

Feel free to inquire! ↓

<https://www.tamuracorp.com/electronics/en/contact/>