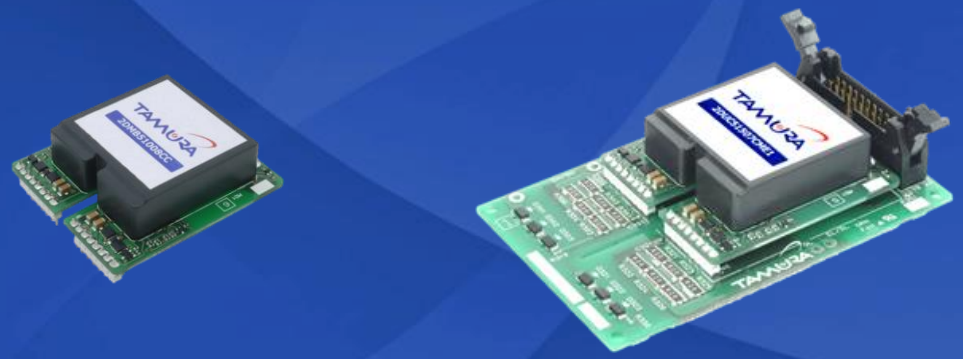
Gate driver module that brings out the performance of All-SiC power modules



SUSTAINABLE DEVELOPMENT GOALS

TAMURA
Your One and Only Company

TAM-GDM-00016

Issued on 1st Feb '23 Unit division HQ Japan

Rev B

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Tamura Corporation Gate Driver Product Overview

Rev B

Role of gate driver

Power Module

SiC MOSFET
IGBT

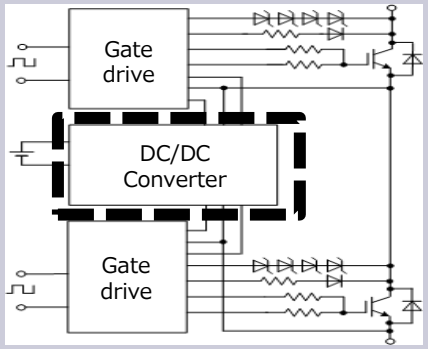
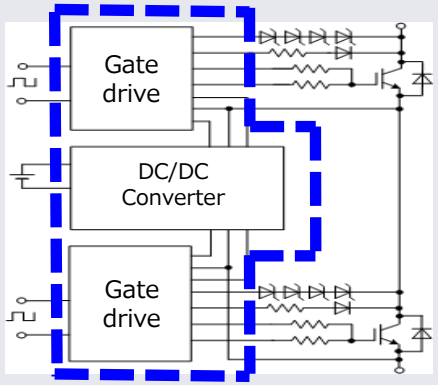
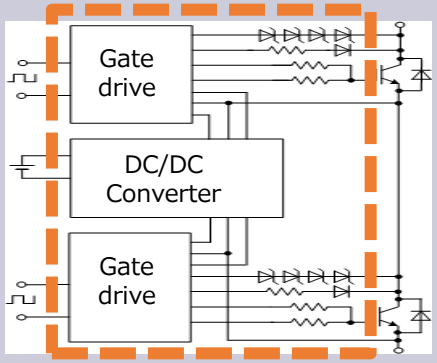
Applications

● 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

Rev B

Product	Function	Block diagram	Appearance
DC/DC Converter	2 in 1 PM designated DC/DC Converter		2DD series 
Gate Driver Module	DC/DC Converter + Gate drive		2CG series 
Gate Driver Unit	Gate Driver Module + Gate resistors Protective function		

Tamura Corporation Gate Driver Product Overview

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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	T.B.D
	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				

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

Rev B

Features of All-SiC Power Module

Feature① Short circuit tolerance is lower than Si

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

Feature③ VGS(+) :On resistance does not decrease at 15V
VGS(−) :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

Rev B

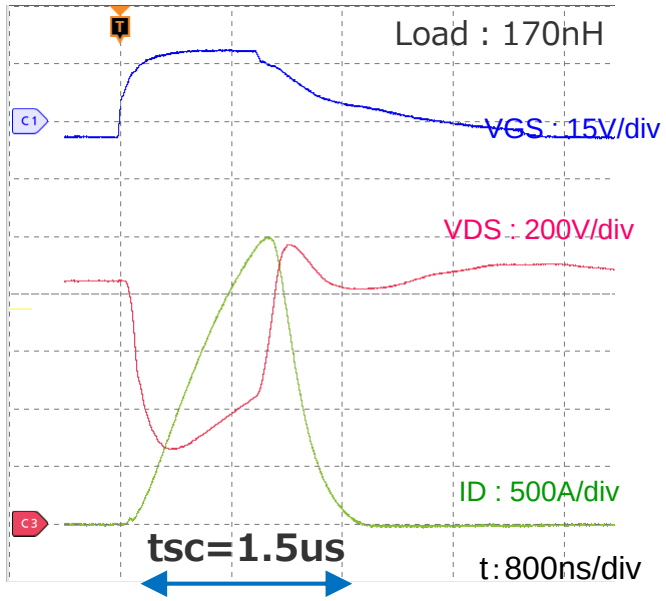
Feature ① Short circuit tolerance is lower than Si

Small chip area

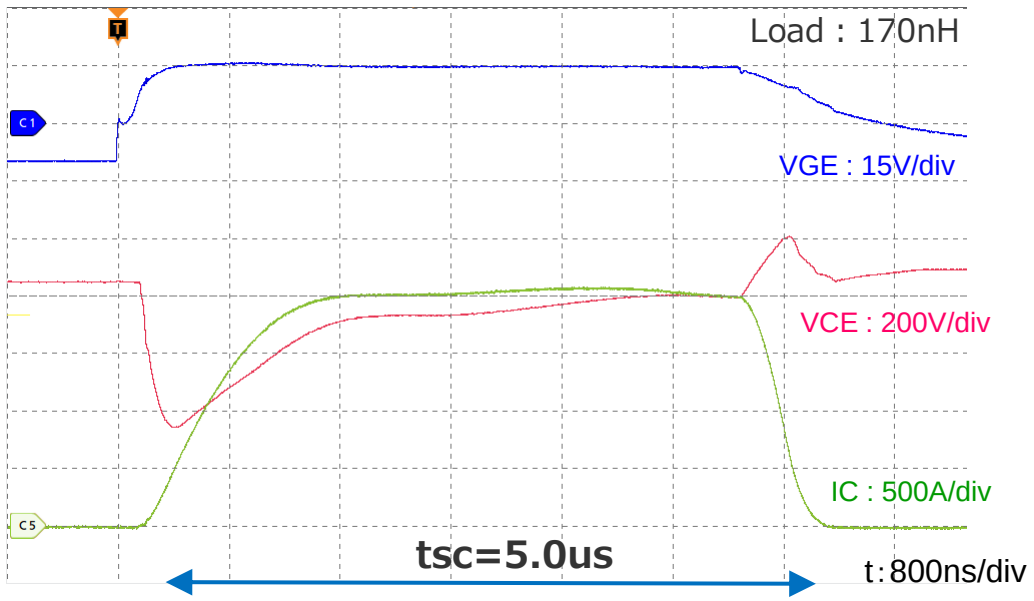
- Wide band gap
- High breakdown voltage
- High temperature operation

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

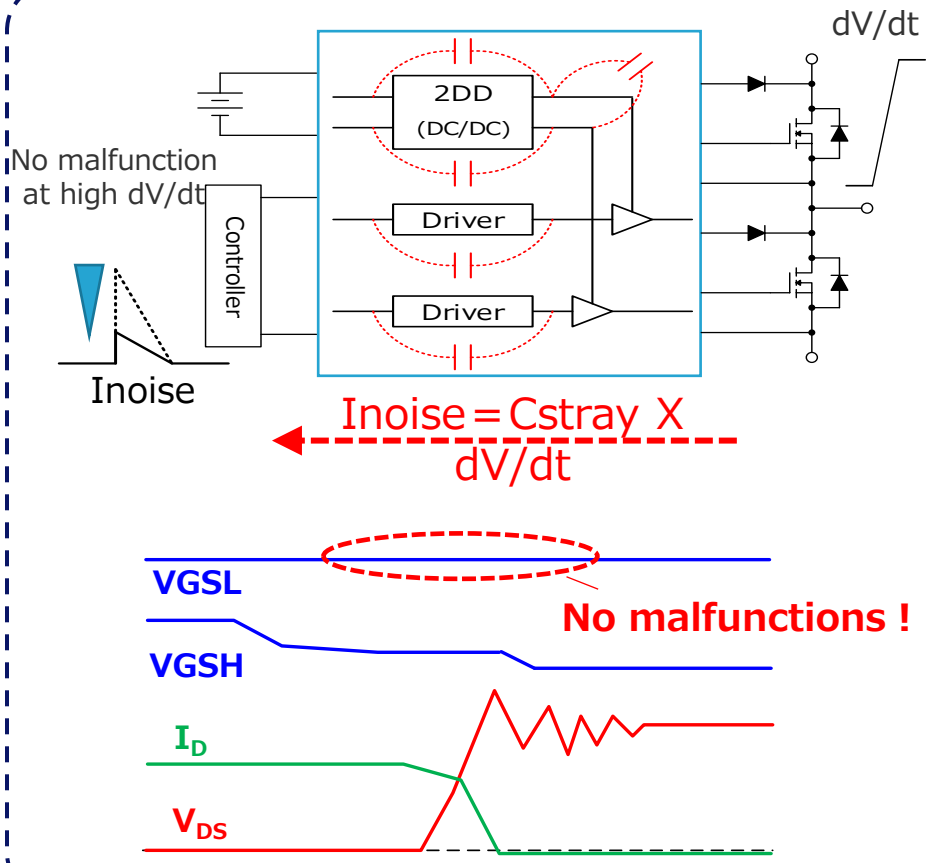
Functions to bring out the features and performance of All-SiC power modules

Rev B

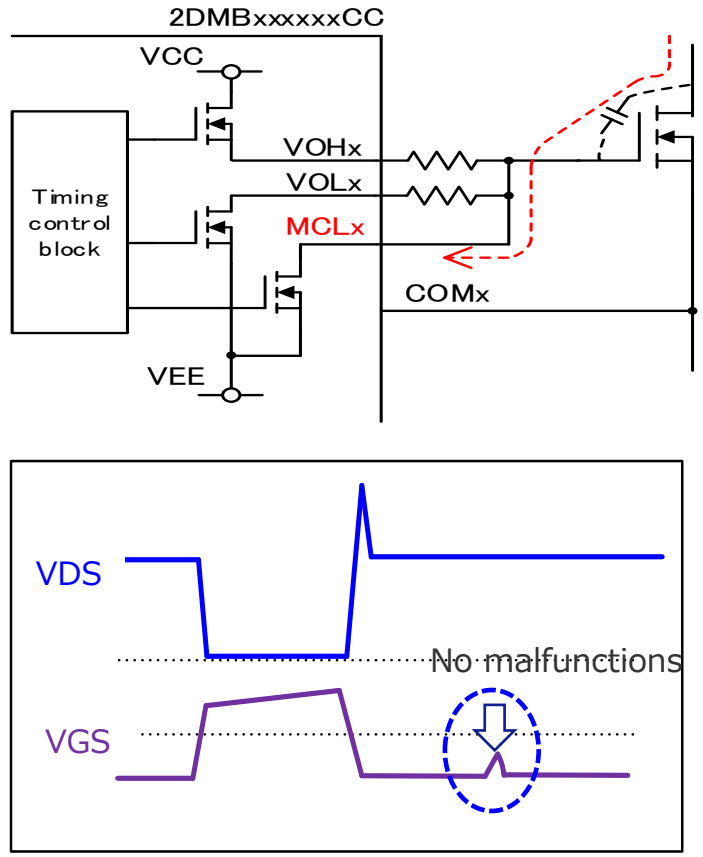
Feature② Low threshold voltage VGS (th) (1V~3V) --- IGBT is 6V~7V --- Beware of malfunctions from IGBT

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

Reduction of parasitic capacitance



Miller clamp circuit



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

Rev B

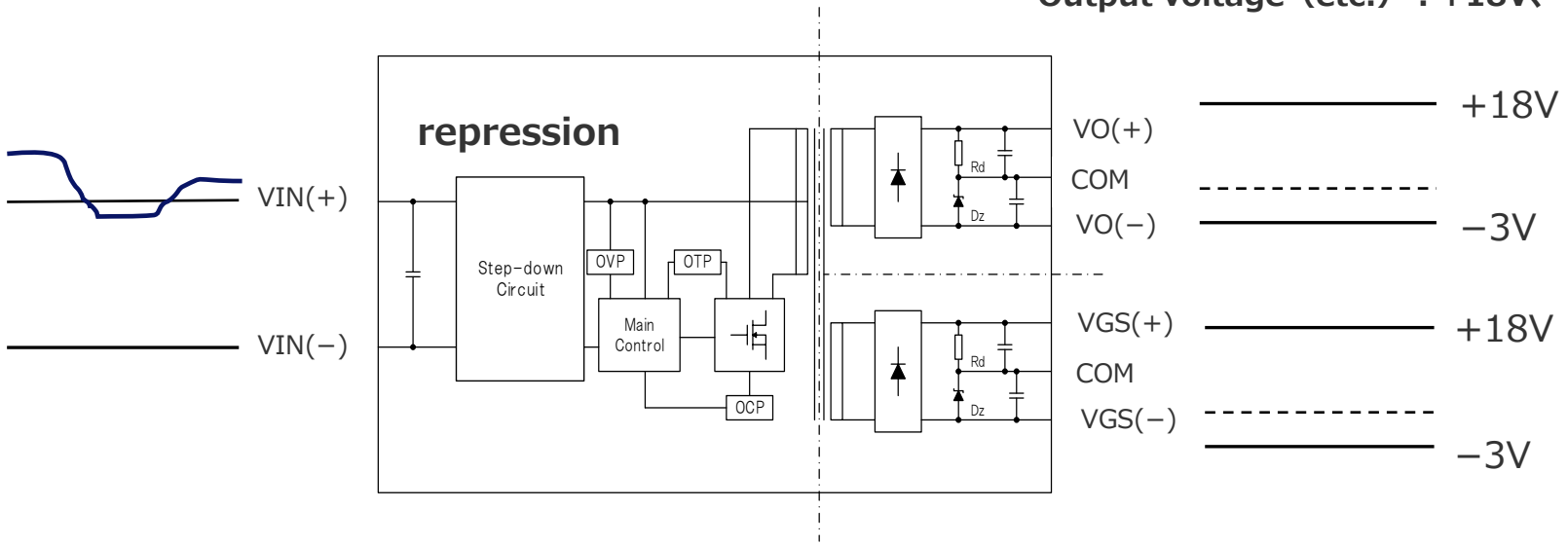
Feature③ VGS(+) :On resistance does not decrease at 15V
VGS(−) :Low tolerance（Less than −5V）

--- 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

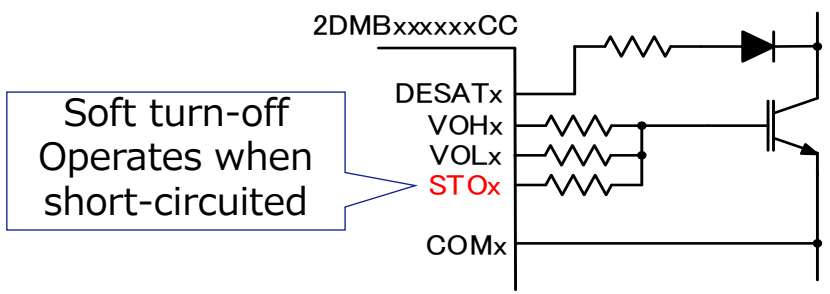
Rev B

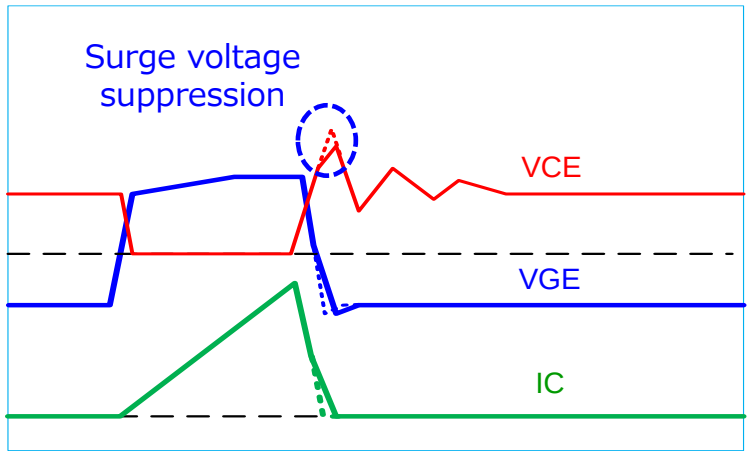
Feature④　dV/dt can be set high

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

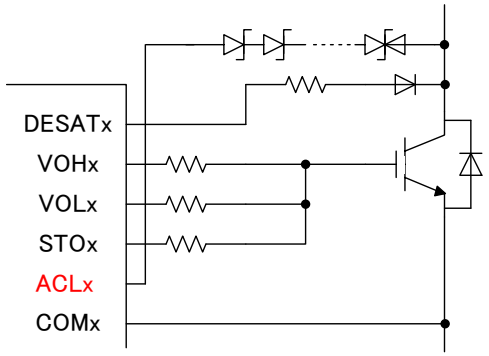
Support with a gate driver ・・・Ability to suppress surge voltage with high dV/dt (Soft turn-off, Active clamp)

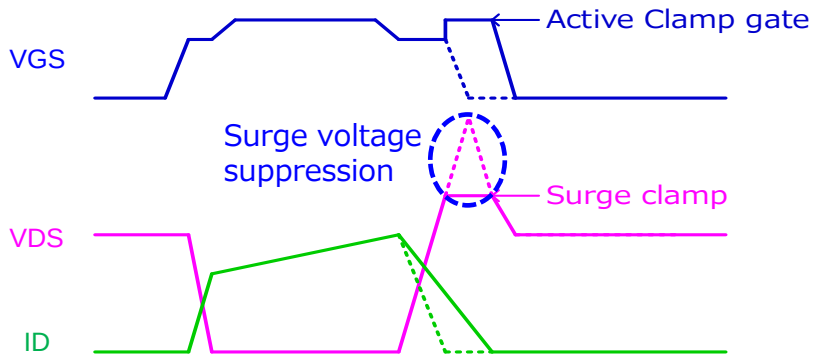
Soft turn-off





Active clamp (Option)





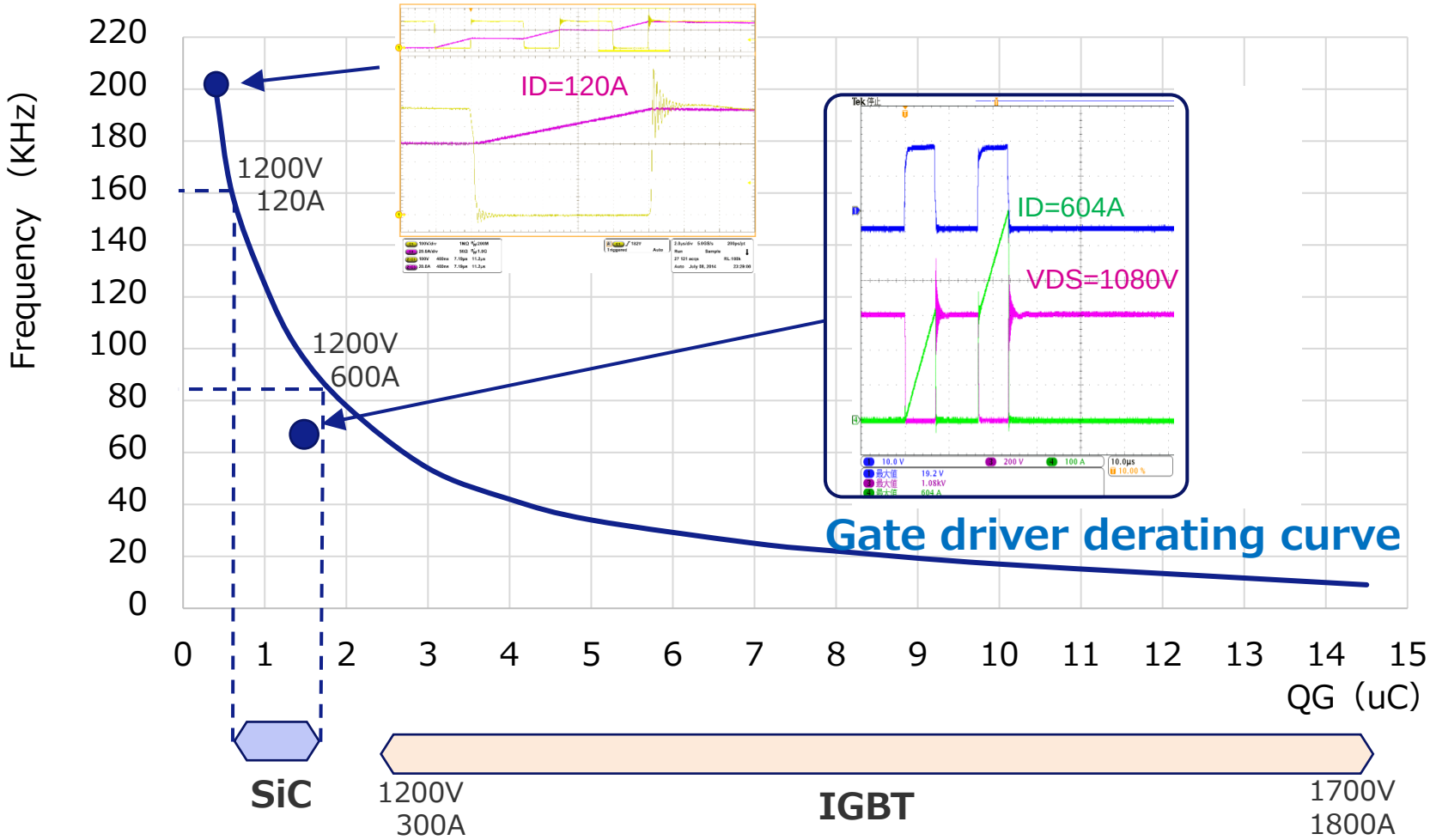
Functions to bring out the features and performance of All-SiC power modules

Rev B

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

Rev B

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	2CG010BBC13N	2DD180407C
	300	BSM300D12P2E001	2EG01XBxN13N		
	300	BSM300D12P3E005	2EG01XBxN14N	2CG010BBC14N	2DD180206C
 G type	400	BSM400D12P2G003	2EG01XBxN13N	2CG010BBC13N	2DD180407C
	400	BSM400D12P3G002	2EG01XBxN14N	2CG010BBC14N	2DD180206C
	600	BSM600D12P3G001	2EG01XBxN14N		
			Vce = 1700V		
 E type	250	BSM250D17P2E004	2EG01XBxN13N	2CG010BBC13N	2DD180407C

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

Extensive line-up of SiC and IGBT gate drivers

Rev B

Infineon
Mitsubishi
FUJI

DC-DC converter
2DD

Gate driver module
2CG-B/D

Gate driver Unit
2EG-B/C/D

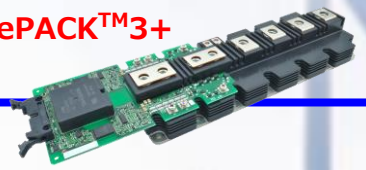
EconoDUAL™ TYPE

Gate driver Unit
2PG-C/D

PrimePACK™

Gate driver Unit
2QG-D

PrimePACK™3+

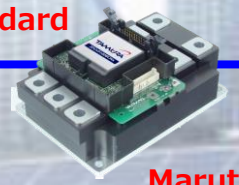


Gate driver Unit
4DUx-P

3Level

Gate driver Unit
2LG-C/D

New standard



Gate driver Unit
2LG-C/D

Maruti-Parallel

Gate driver Unit
Under development

IHM B

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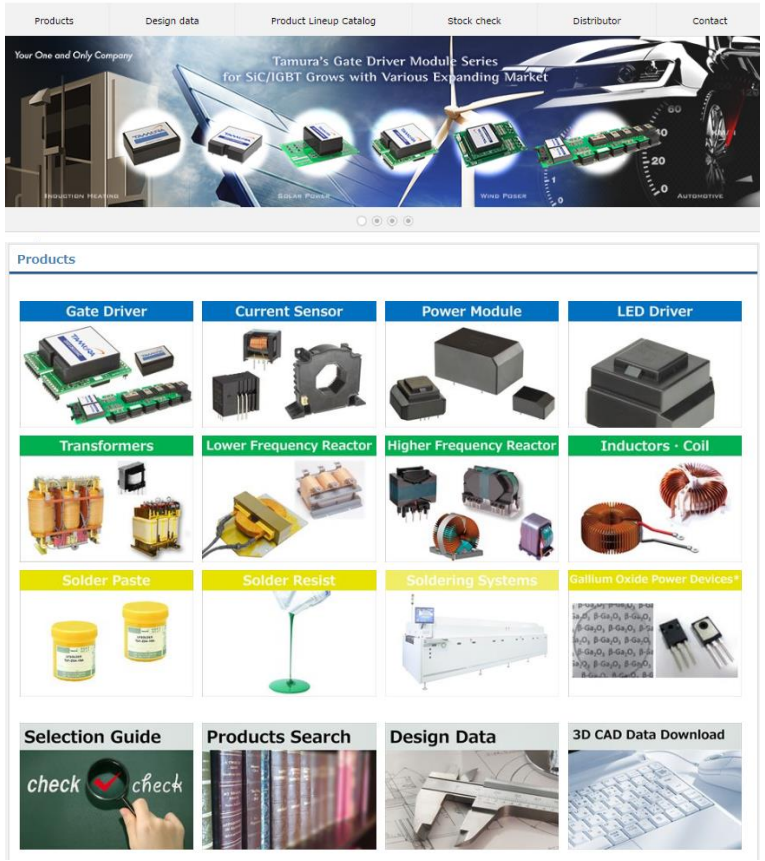
Appendix) Information & Contact

Rev B

Please visit our website!



WEB

Tamura Gate Driver

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