Gate driver module that bring out the performance of Mitsubishi Electric SiC Power Module

SUSTAINABLE DEVELOPMENT GOALS

Rev A

TAM-GDM-00031

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TAMURA
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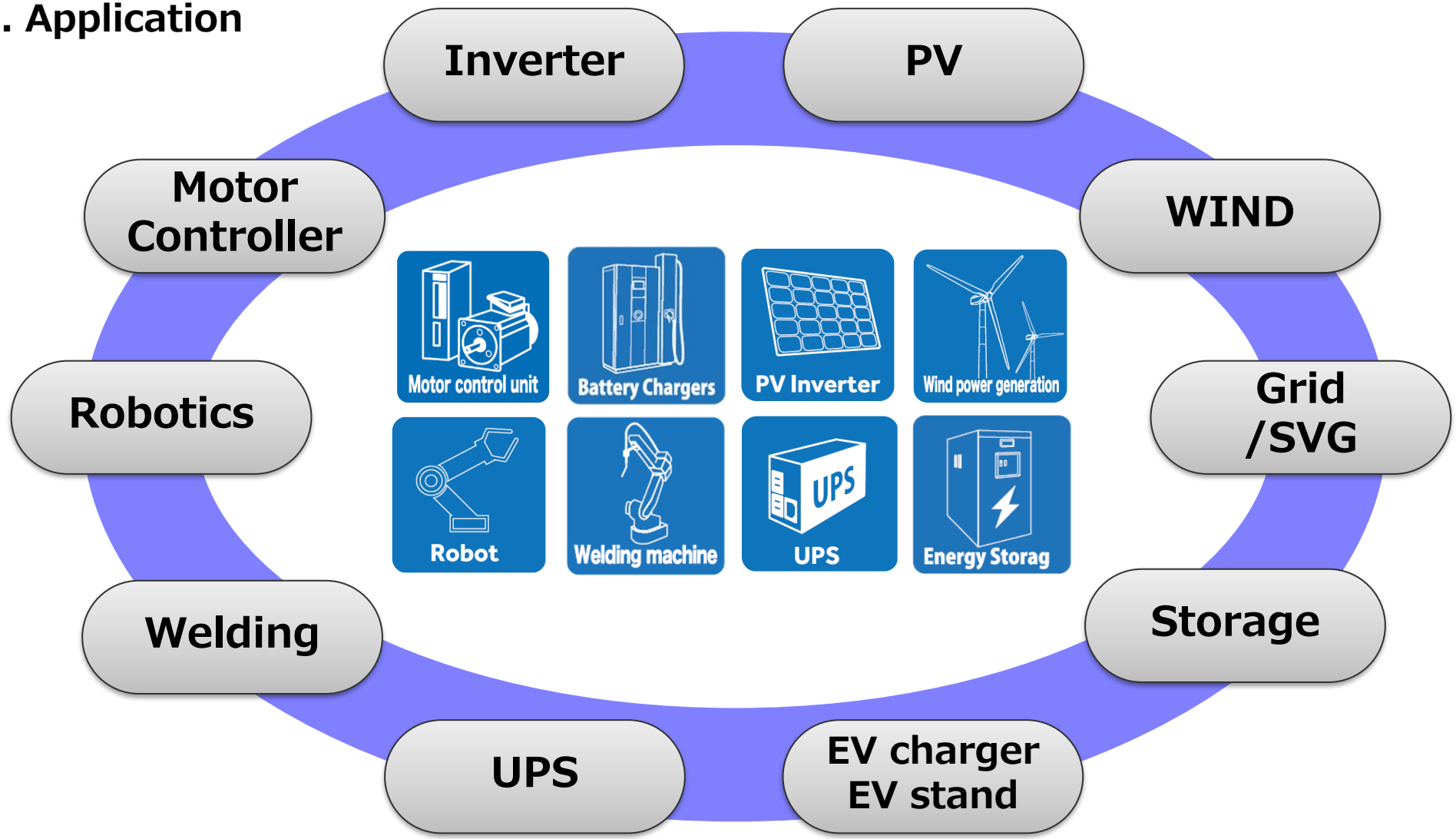
1. Solution Guide for SiC Power Module

1-1. Application



1. Solution Guide for SiC Power Module

1-2. Features of Gate driver module.

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

1. Solution Guide for SiC Power Module

1-2. Features of Gate driver module.

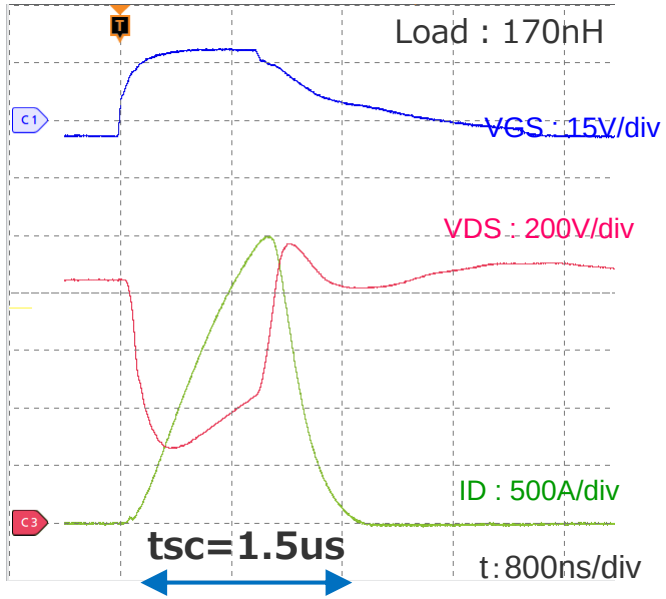
Feature ① Short circuit tolerance is lower than Si

Small chip area

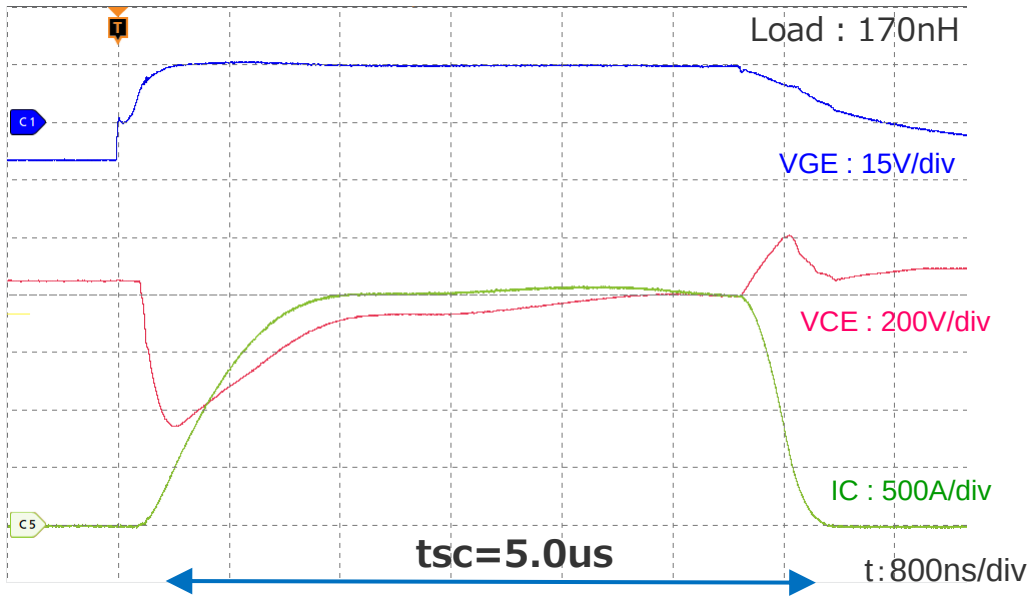
- Wide band gap
- High breakdown voltage
- High temperature operation

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

1. Solution Guide for SiC Power Module

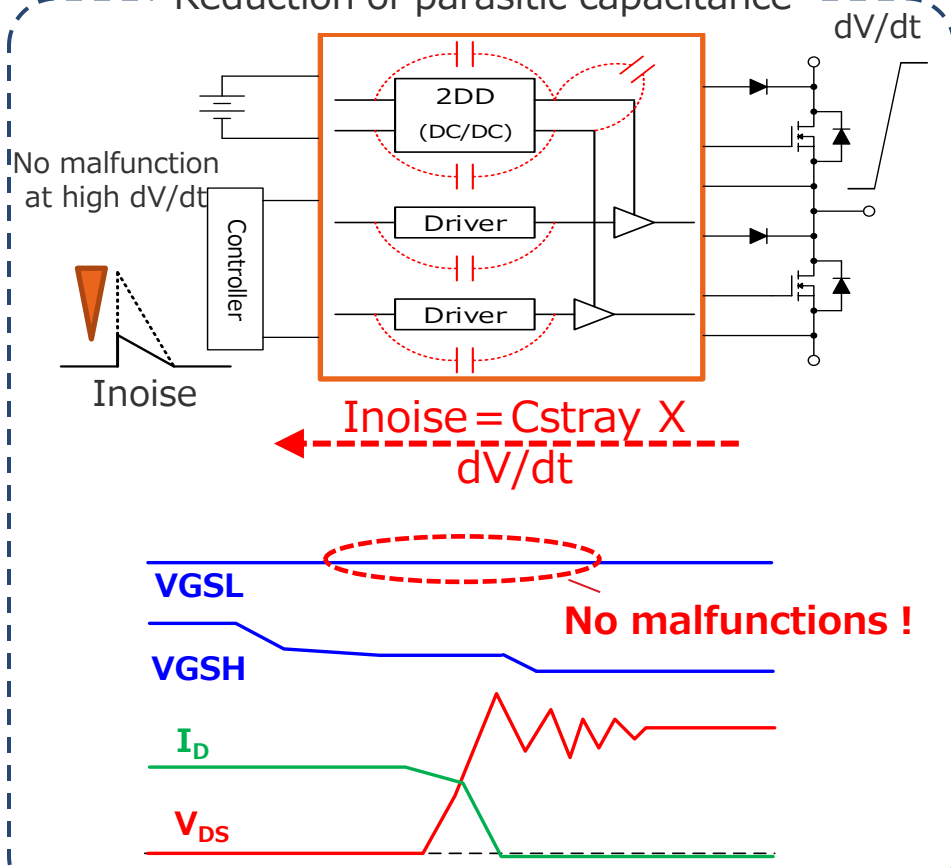
1-2. Features of Gate driver module.

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

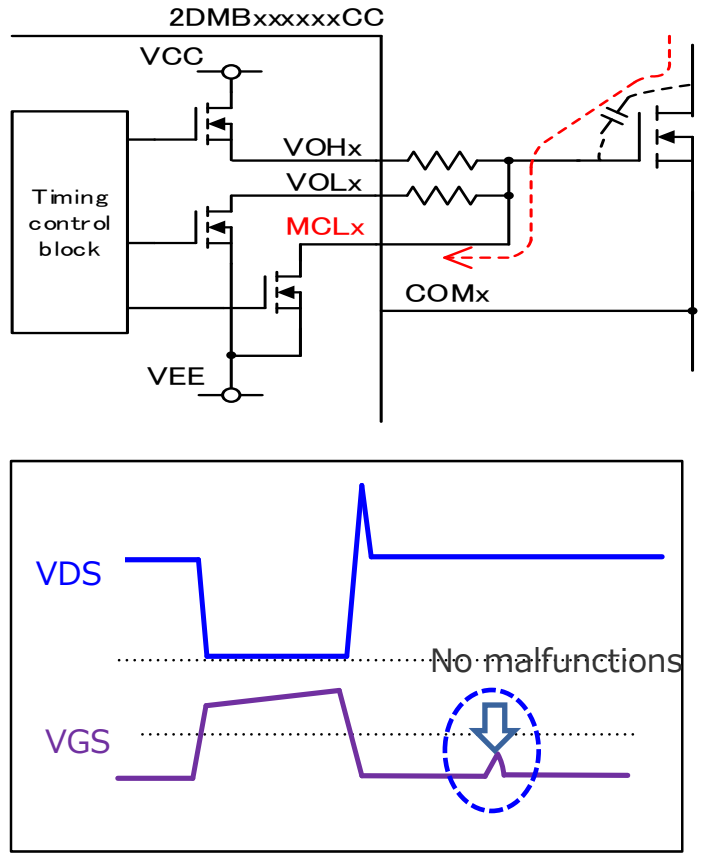
--- IGBT is 6V~7V --- Beware of malfunctions from IGBT

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

Reduction of parasitic capacitance



Miller clamp circuit



1. Solution Guide for SiC Power Module

1-2. Features of Gate driver module.

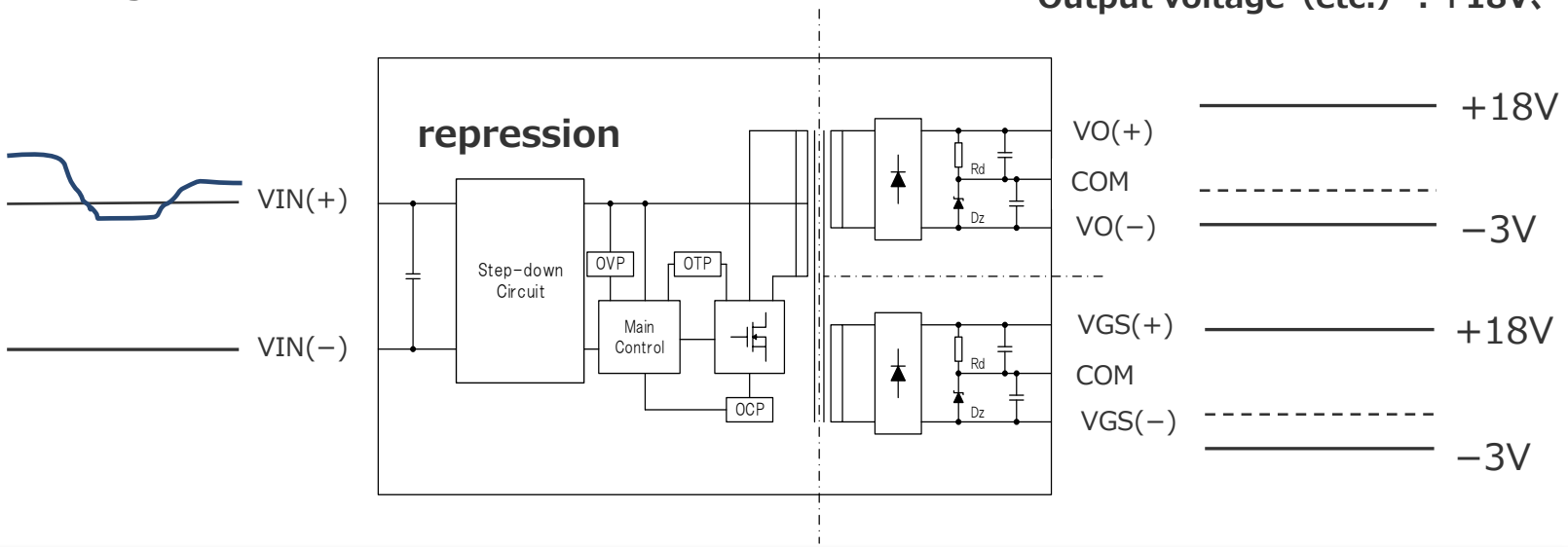
Feature③ VGS(+) :On resistance does not decrease at 15V
VGS(−) :Low tolerance（Less than −5V）

--- 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

1. Solution Guide for SiC Power Module

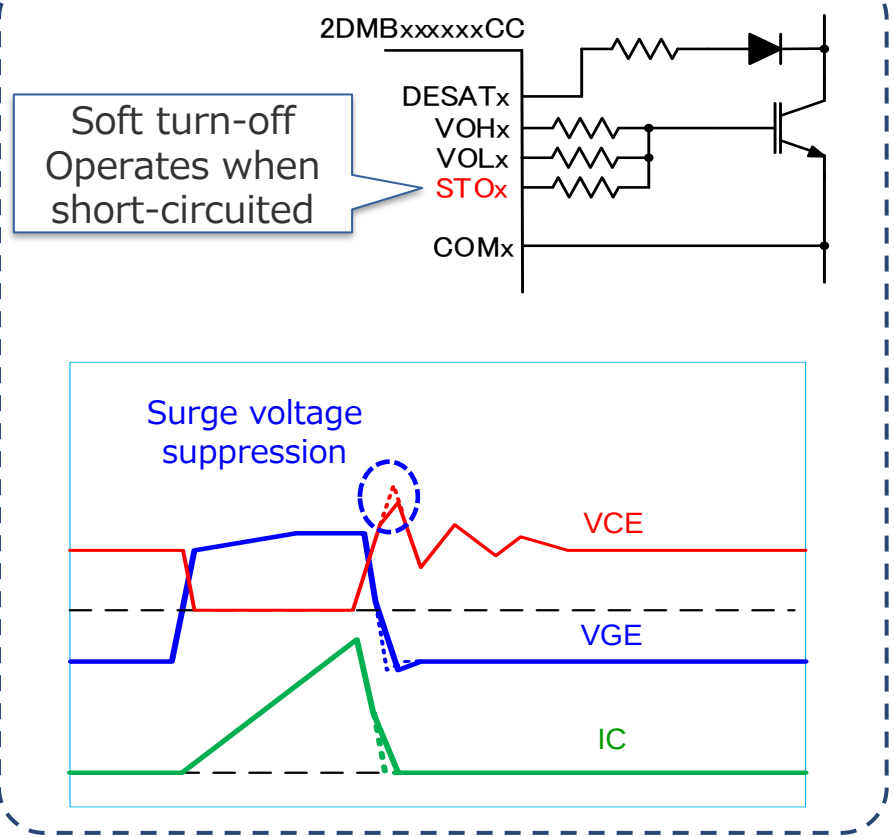
1-2. Features of Gate driver module.

Feature④ dV/dt can be set high

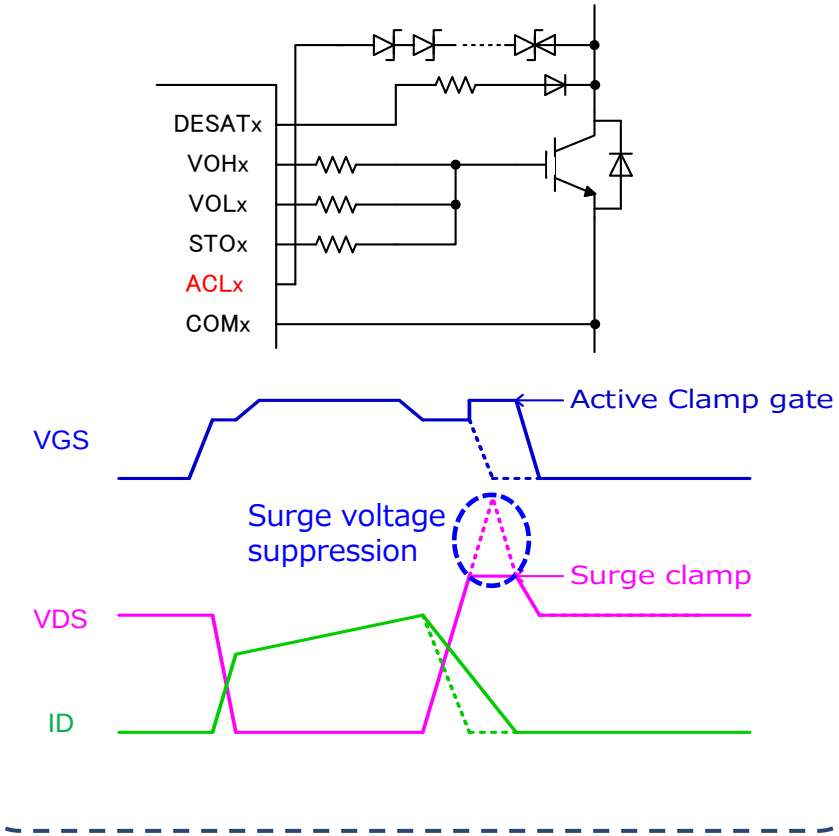
Turn-on: Recovery current is small
Turn-off: No tail current

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)



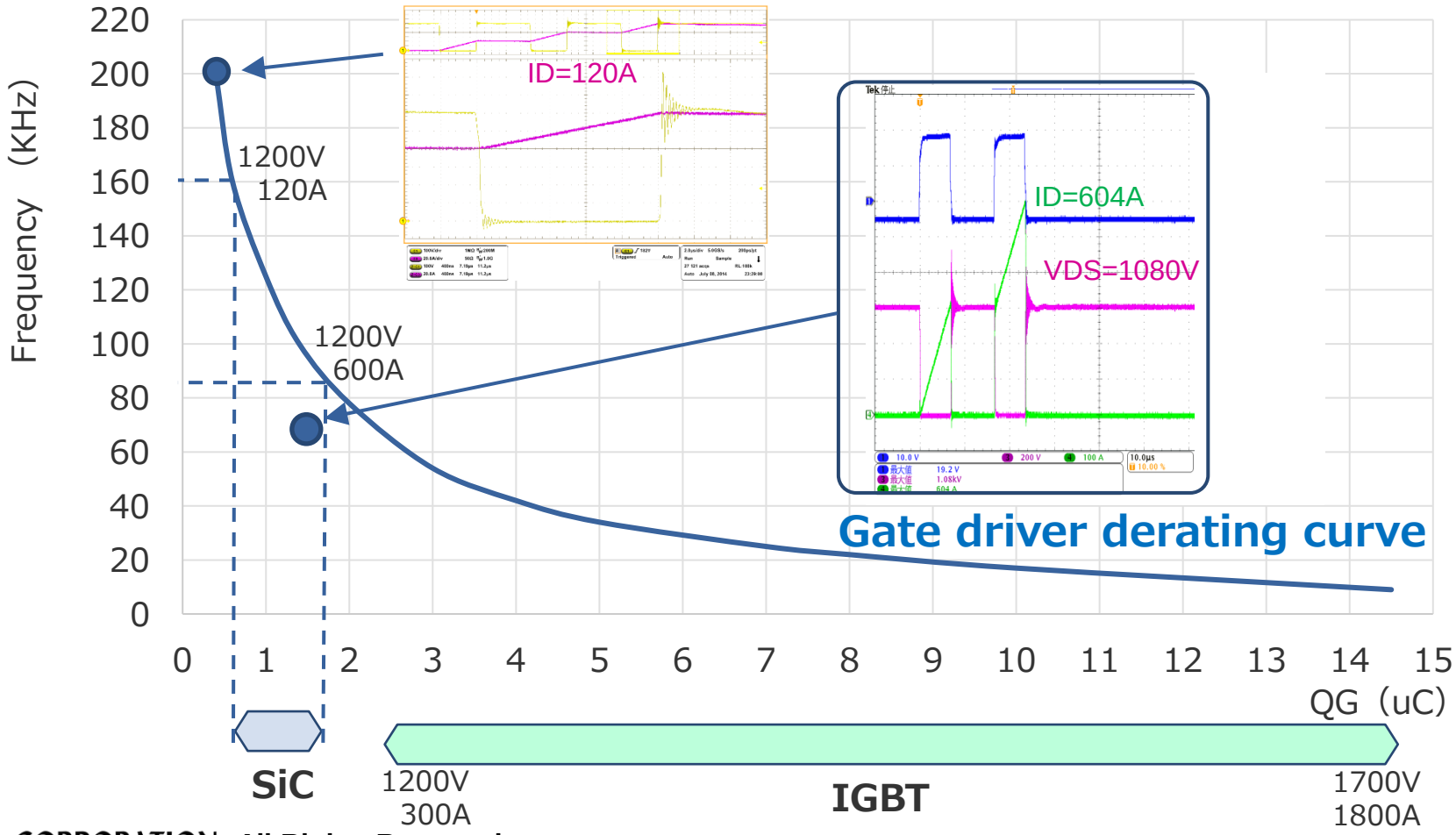
1. Solution Guide for SiC Power Module

1-2. Features of Gate driver module.

Feature⑤ High frequency operation is possible

Drive power needs to be increased

Support with a gate driver ・・・Output capacity considering SiC power module



1. Solution Guide for SiC Power Module

1-3. Product Line-up

Gate Driver Module 2CG-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				

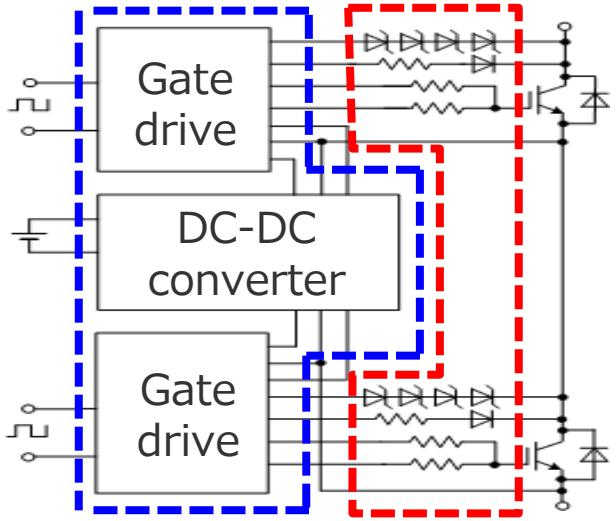
* Under development

1. Solution Guide for SiC Power Module

1-4. Evaluation board

Help your evaluation !

Gate Driver Module
2CG-B series



Evaluation board
for 2CG-B series

*2

I_D	Part No	2CG-B series	Evaluation board
	V_{DS}=1200V	2CG010BBC11N 2CG010BBC12N 2CG010BBC13N 2CG010BBC14N 2CG010BBC15N	
300	FMF300BXZ-24B		*1
400	FMF400BX-24B		*2
	FMF400BXZ-24B		*1
600	FMF600DXZ-24B		*3
800	FMF800DX-24B		*2
	FMF800DXZ-24B		
1200	FMF1200DXZ-24B		*3
	V_{DS}=1700V		
300	FMF300DXZ-34B		

*1: It is necessary to branch the lead wire of the gate signal from the evaluation board.

*2: A connection board with the SiC power module is required.

*3: A lead wire with a connector is required.

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2. Introduction of One Tamura (General application)

Rev A

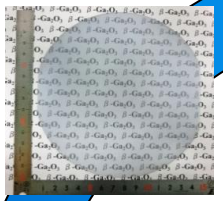
Power electronics technology and main products

Gate driver
Circuit technology

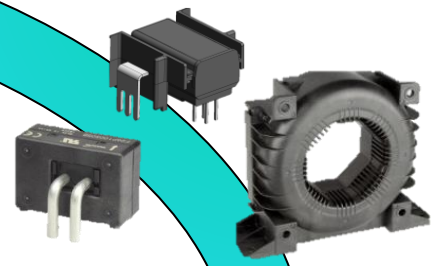
Gate Driver Unit

Device technology
Novel Crystal Technology, Inc.

Ga_2O_3

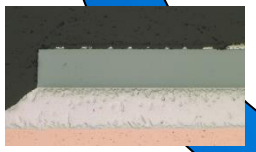


Module technology
Current sensor



Power electronics technology and main products

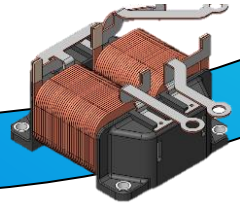
Soldering technology



Electric Chemicals
Soldering material
Die attach material
TIM material

Reflow soldering system

Automotive reactor



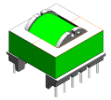
Reactor for PF
(2 in 1)

Passive components

Reactor
Trans
Coil

Large reactor/ transformer

Toroidal coil

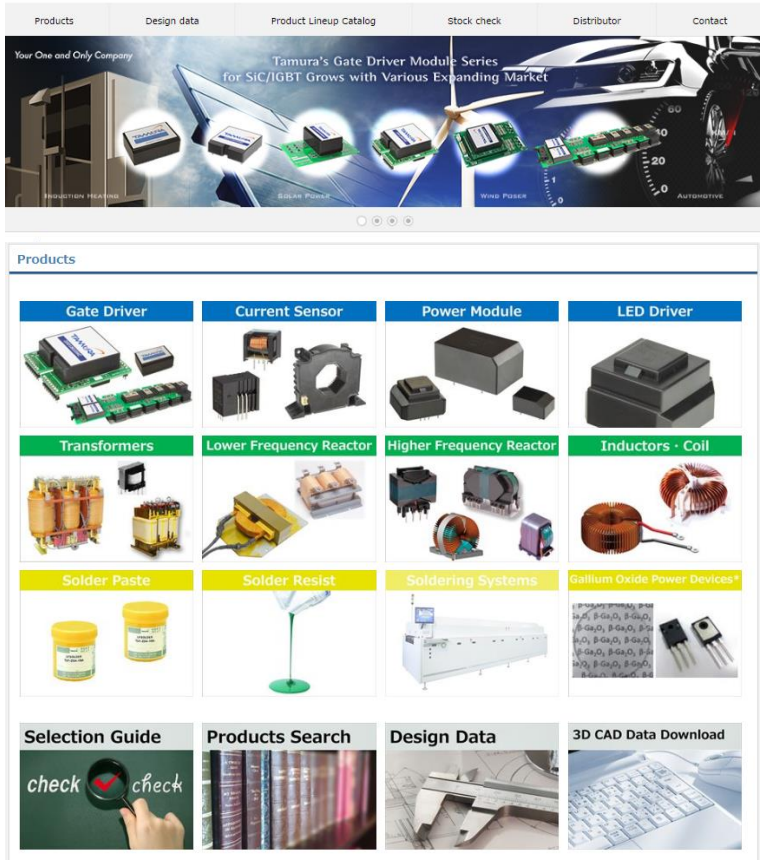


SW-Trans

Appendix) Information & Contact

Rev A

Please visit our website!



WEB

Tamura Gate Driver

- 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/