

Gate drivers that bring out the performance of ROHM SiC Power Modules



TAM-GDM-00016

Rev C

Supported by ROHM

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- 04 Introduction of Tamura Gate driver
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Gate drivers that bring out the performance of ROHM SiC Power Modules

1. Why, we started development Gate Driver



Transformer Technology



Circuit design Technology



Potting Technology



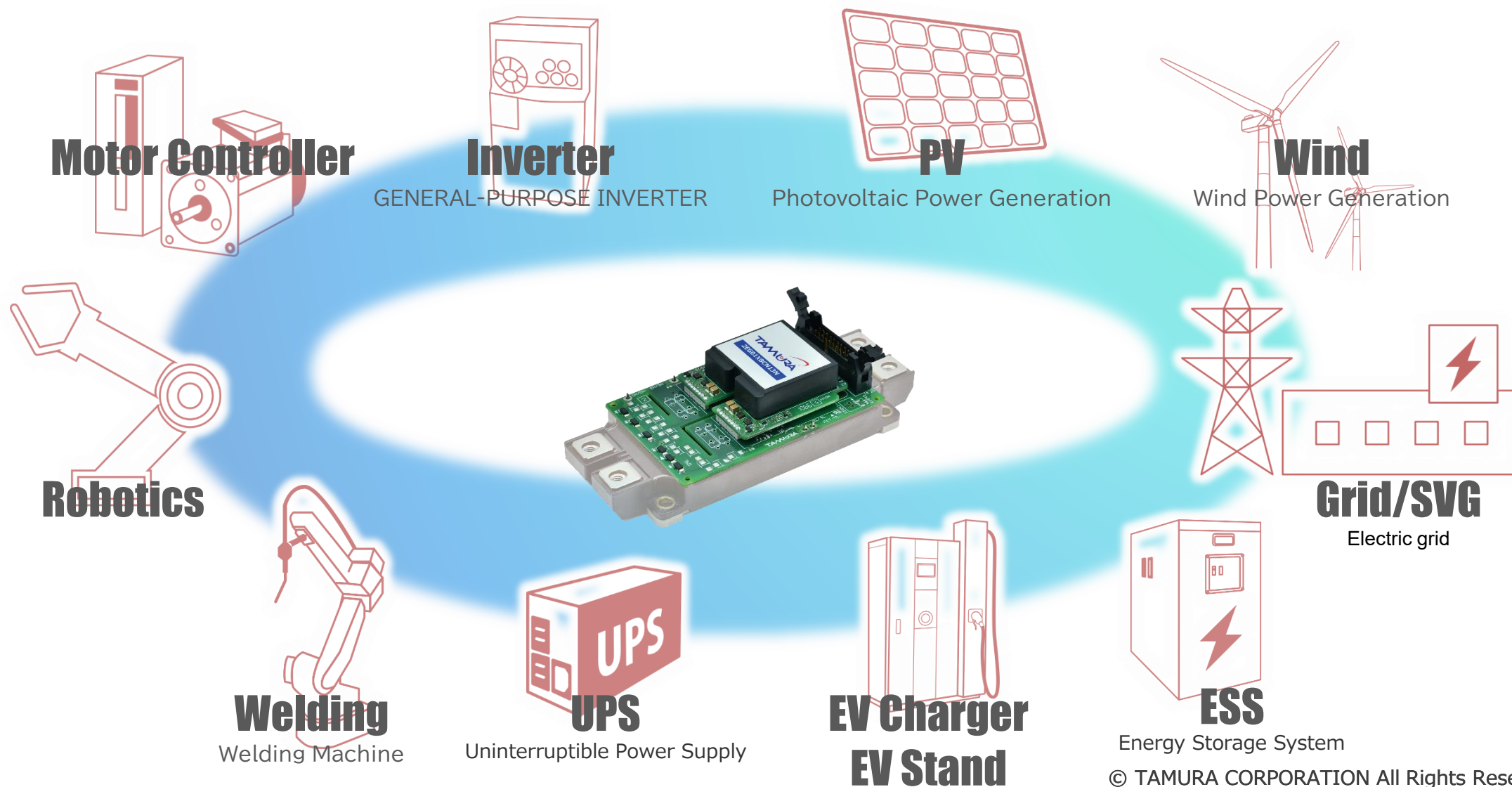
EMI/EMC Solution



Market Awareness

Gate drivers that bring out the performance of ROHM SiC Power Modules

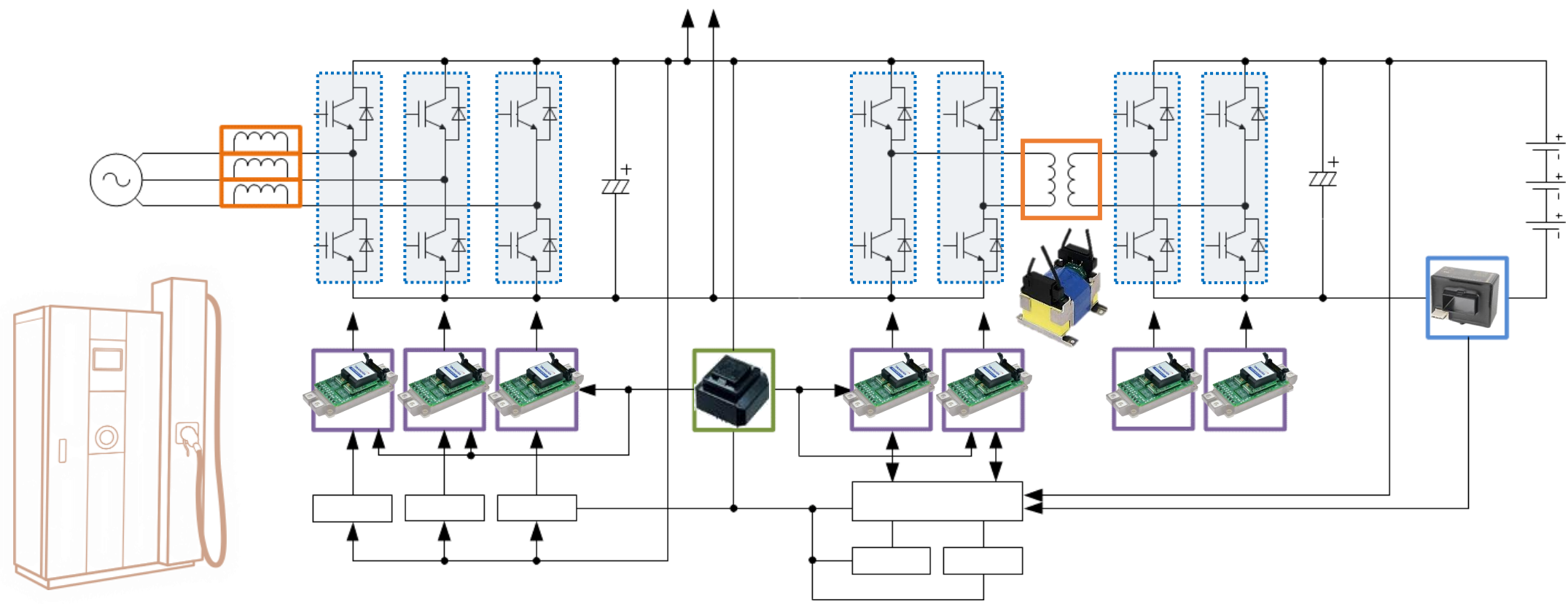
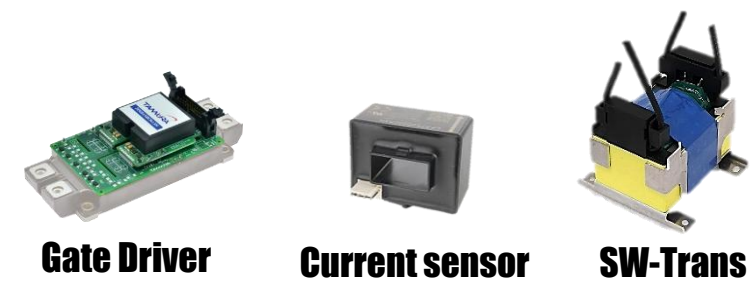
2. Application



Gate drivers that bring out the performance of ROHM SiC Power Modules

2. Application

EV fast charger (100kW~)



Gate drivers that bring out the performance of ROHM SiC Power Modules

3. Five features obtained by combining ROHM SiC Power Module and 2EG-B series

Features of SiC Power Modules

Feature① Short circuit tolerance is lower than Si

Feature② Low threshold voltage $V_{GS(th)}$ (2.8V~4.8V)

Feature③ $V_{GS(-)}$:Low tolerance(Less than -4V)

Feature④ dV/dt can be set high

Feature⑤ High frequency operation is possible

Gate
Driver
solves all
problems!

Gate drivers that bring out the performance of ROHM SiC Power Modules

3. Five features obtained by combining ROHM SiC Power Module and 2EG-B series

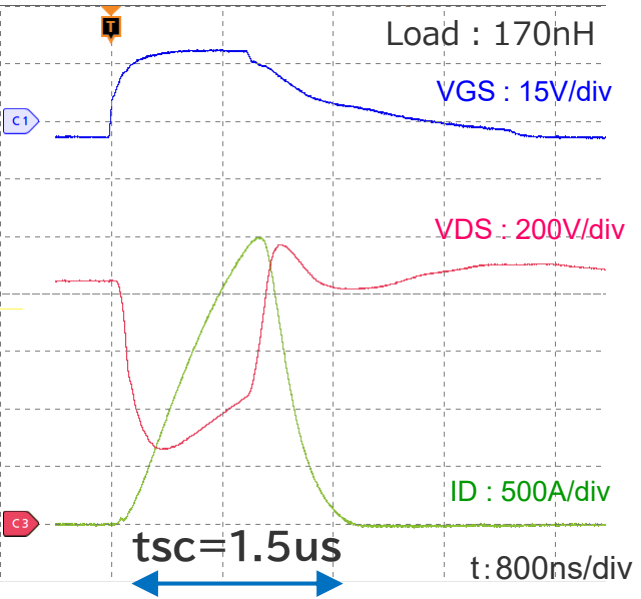
Feature ① Short circuit tolerance is lower than Si

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

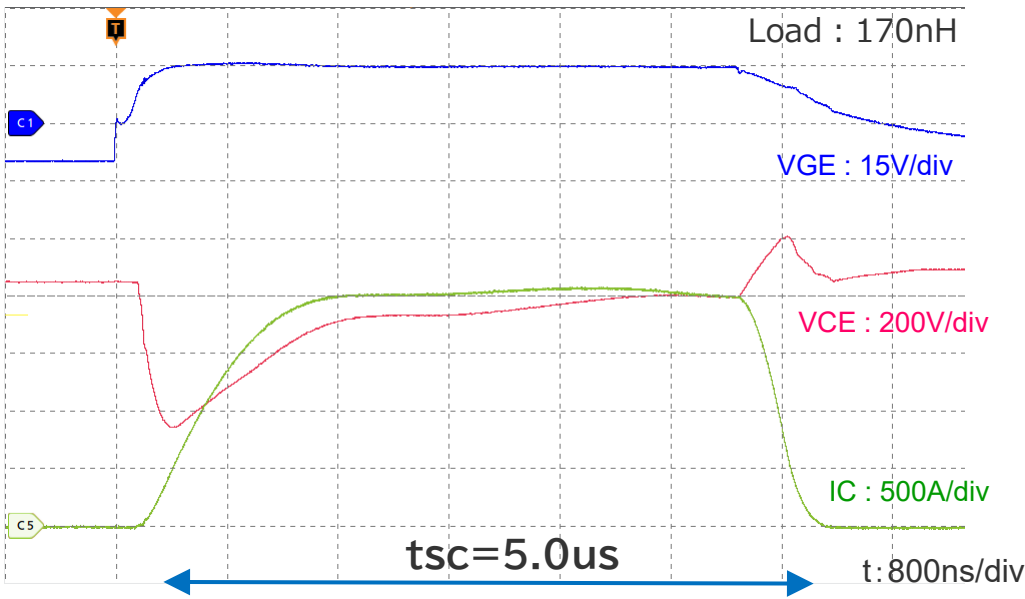
- Wide band gap
- High breakdown voltage
- High temperature operation

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

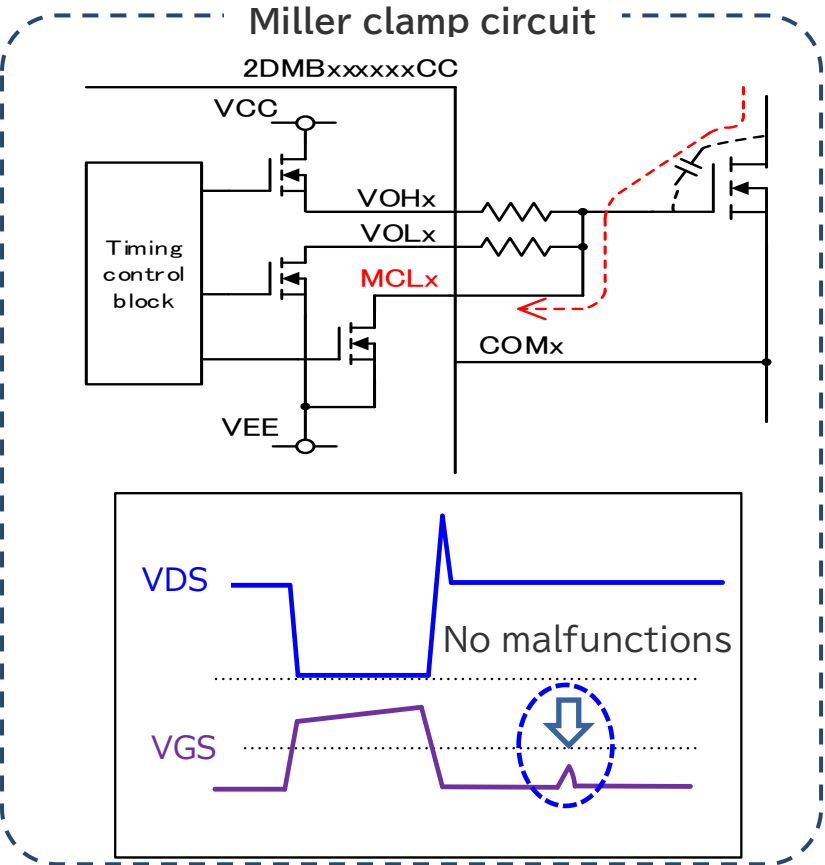
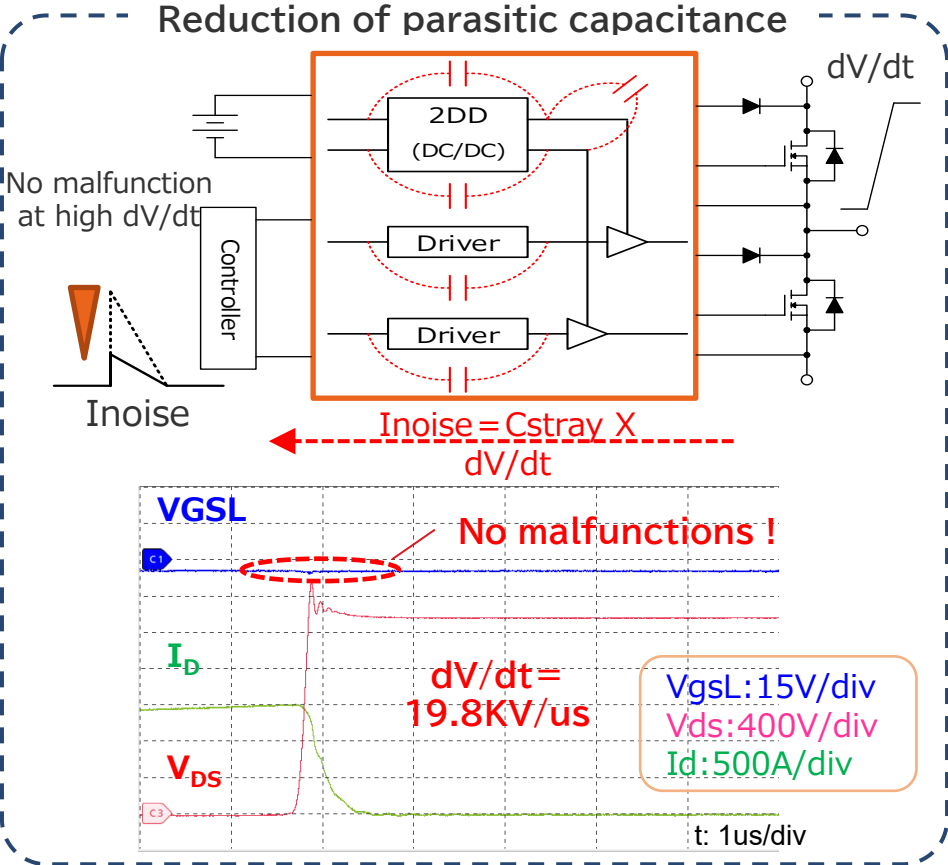
Gate drivers that bring out the performance of ROHM SiC Power Modules

3. Five features obtained by combining ROHM SiC Power Module and 2EG-B series

Feature② Low threshold voltage V_{GS} (th)
(2.8V~4.8V)

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

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



Gate drivers that bring out the performance of ROHM SiC Power Modules

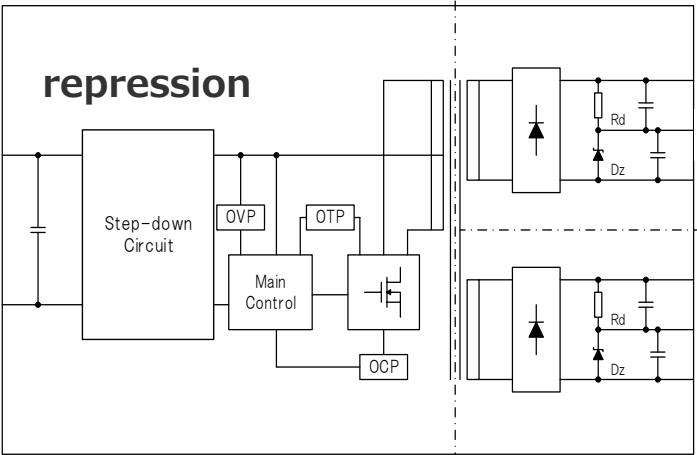
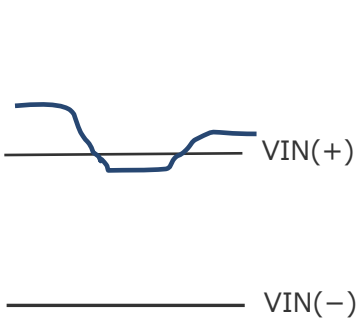
3. Five features obtained by combining ROHM SiC Power Module and 2EG-B series

Feature③ $V_{GS}(-)$:Low tolerance(Less than $-4V$)

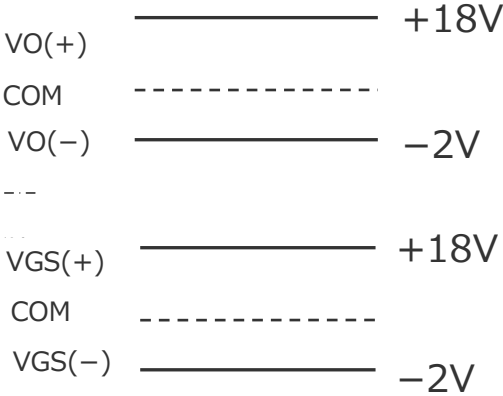
--- IGBT's Gate driver cannot be used

Support with a gate driver ...Constant voltage control of V_{GS}

Input voltage:13V~28V



Output voltage(etc.):+18V、-2V



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

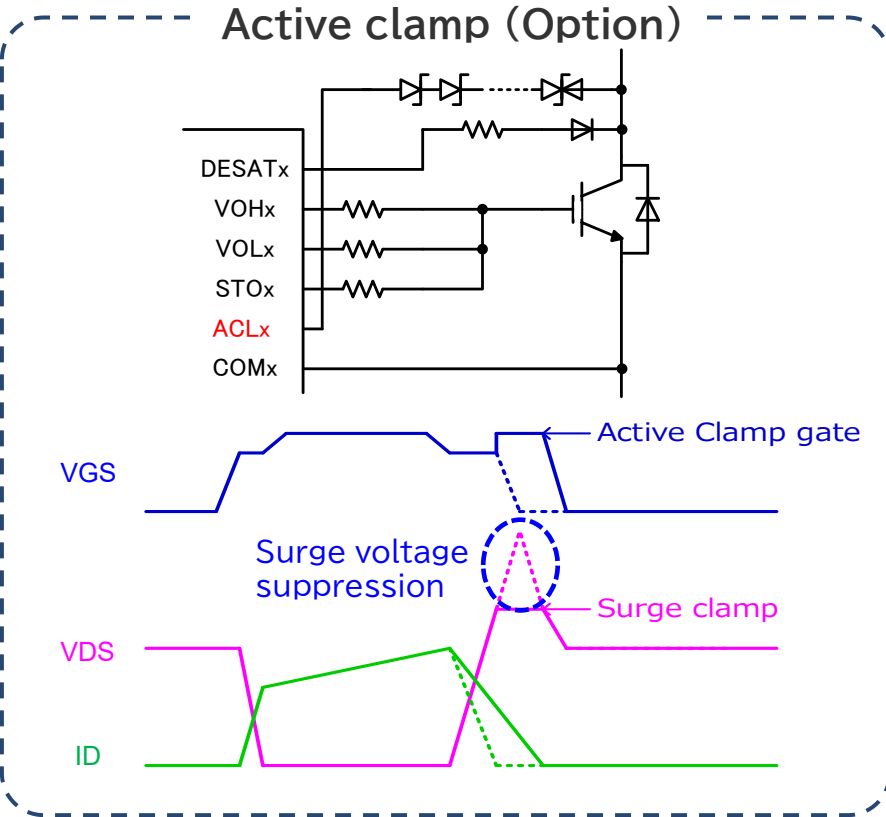
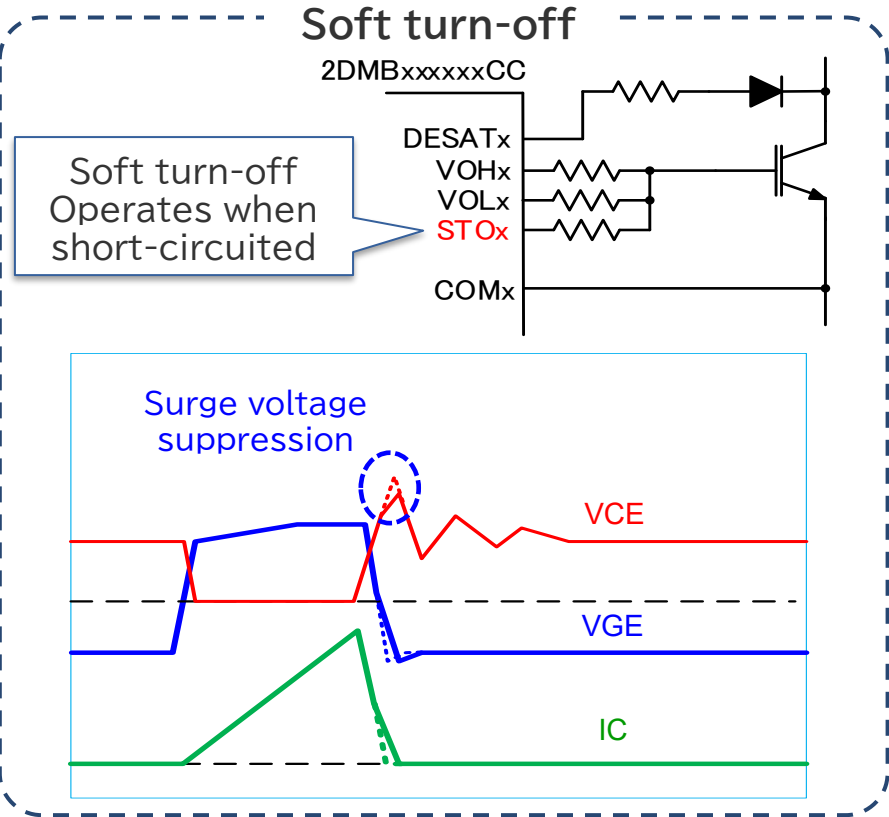
Gate drivers that bring out the performance of ROHM SiC Power Modules

3. Five features obtained by combining ROHM SiC Power Module and 2EG-B series

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)



Gate drivers that bring out the performance of ROHM SiC Power Modules

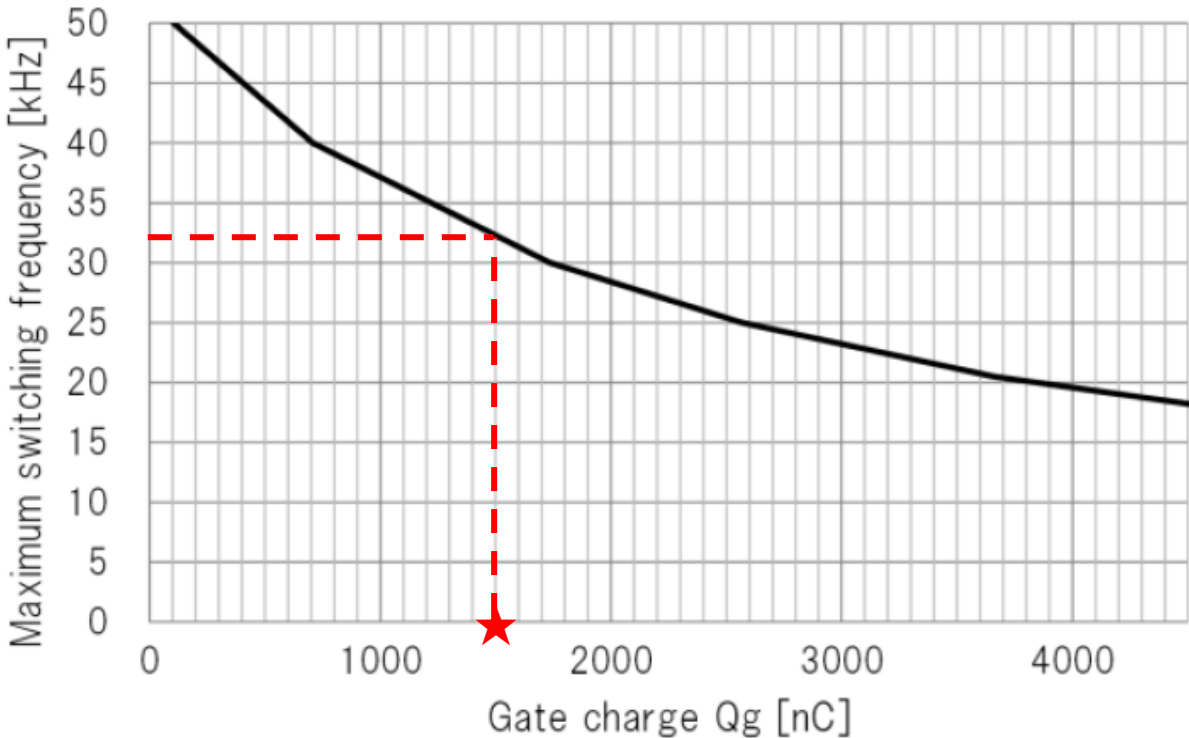
3. Five features obtained by combining ROHM SiC Power Module and 2EG-B series

Feature⑤ High frequency operation is possible

----- Drive power needs to be increased

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

Total gate charge (Qg) vs permissible frequency curve



— Ta: -40~+85°C / $V_{IN} = 13.5 \sim 18V$
 Ta: -40~+75°C / $V_{IN} = 18 \sim 26.4V$

★ BSM600D12P3G001 : 1500nC

About 32kHz Max

Gate drivers that bring out the performance of ROHM SiC Power Modules

4. Introduction of Tamura Gate driver 2EG-B series

Product

DC/DC Converter

Gate Driver Module

Gate Driver Unit

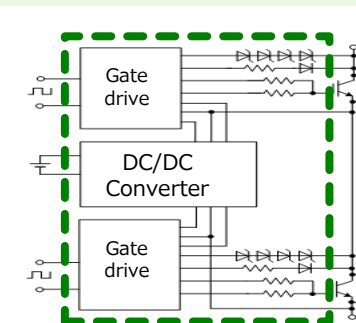
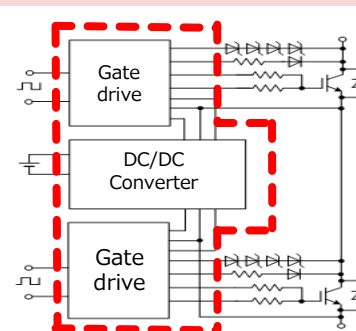
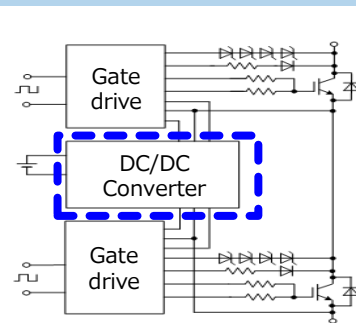
Function

**2in1 PM designated
DC/DC Converter**

**DC/DC Converter
+ Gate drive**

**Gate Driver Module
+ Gate resistors
Protective function**

Block diagram



Appearance



2DD series



2CG-B/D series



2EG-B series

Gate drivers that bring out the performance of ROHM SiC Power Modules

4. Introduction of Tamura Gate driver 2EG-B series

GDM Leading sector For ROHM SiC Power Module



DC-DC converter
2DD180407C (for 2nd Gen)
2DD180206C (for 3rd Gen)



Gate driver module
2CG010BBC13N (for 2nd Gen)
2CG010BBC14N (for 3rd Gen)

Gate driver Unit *
2EG01XBCN13N (for 2nd Gen)
2EG01XBCN14N (for 3rd Gen)



Signal input voltage (3.3~15V)

Gate driver Unit *
2EG01XBDN13N (for 2nd Gen)
2EG01XBDN14N (for 3rd Gen)



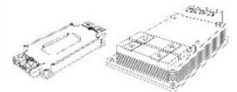
Signal input voltage (15V)

Gate Driver Family Selection Guide

 Products Selection Guide

Click here to search applicable power modules!

[Go to selection guide !](#)



▶ Click here !

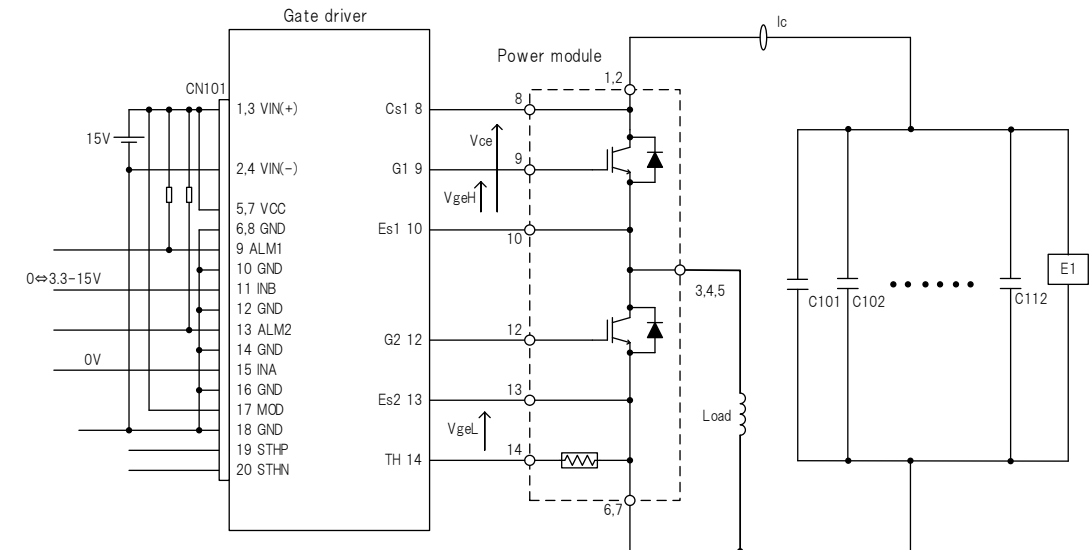


* Gate resistance is not assembled. They must be assembled by the user before operation.

* For 4th Gen, please contact us.

2 pulse test of upper arm

Item	Description
Device	BSM600D12P3G001 (Rohm)
Gate driver	2EG01XBDN14N
Gate voltage	+18V/-2V
Gate resistor	Rg: +2.2Ω/-5.6Ω
DC-link voltage (VCC)	800V
Main circuit current	550A, 1100A
Switching condition	Period:100us on duty:30~50%
Load inductance(Switching test)	45uH
Junction temperature	25℃



C107-112 : OPEN

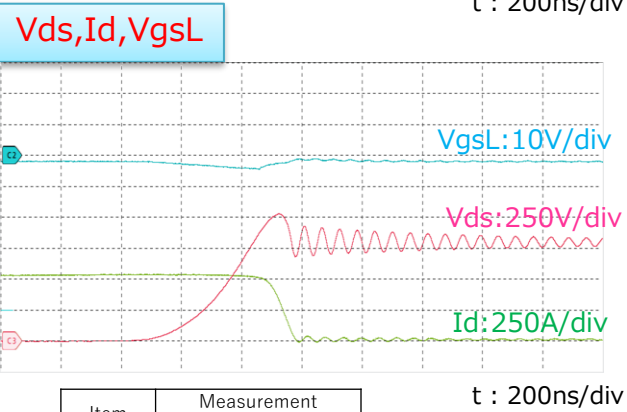
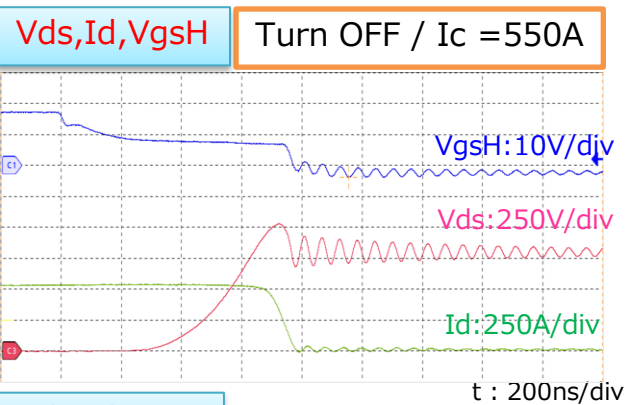
Circuit inductance : about 27nH

Gate drivers that bring out the performance of ROHM SiC Power Modules

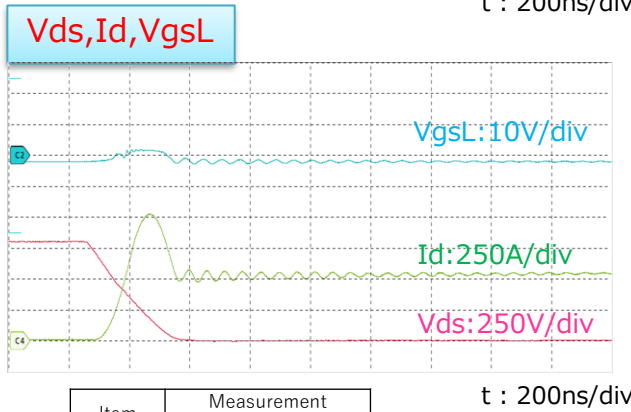
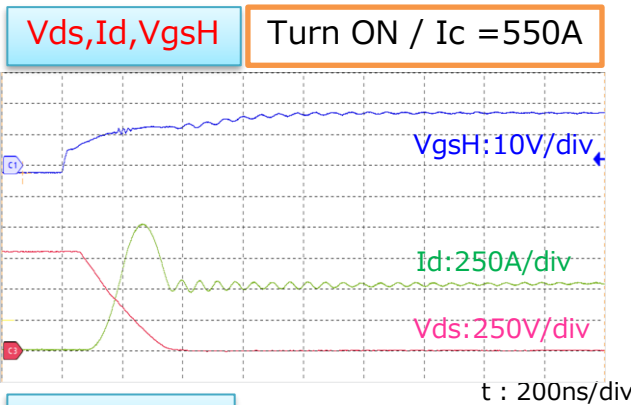
5. Matching data (2-pulse / Short circuit)

2 pulse test of upper arm

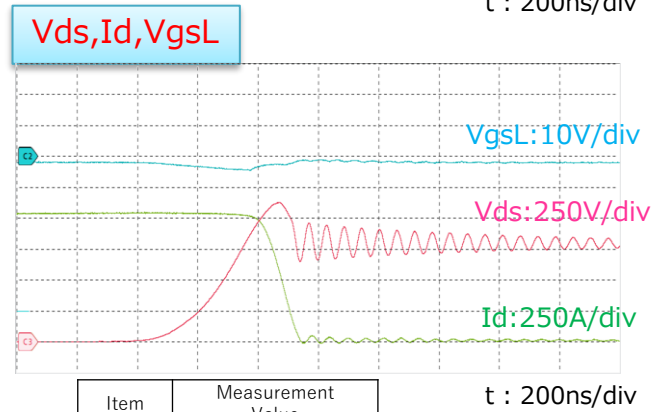
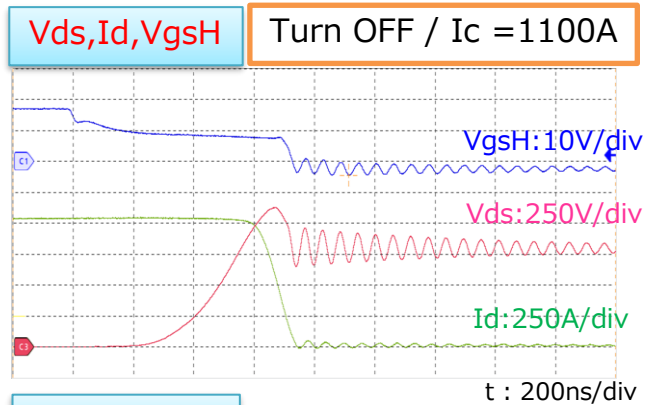
Test Result



Item	Measurement Value	
Vcep	1026	V
dV/dt	2.8	kV/us
dI/dt	5.7	kA/us
tf	0.1	us
Eoff	97	mJ



Item	Measurement Value	
dV/dt	2.8	kV/us
dI/dt	6.7	kA/us
tr	0.2	us
Eon	33	mJ



Item	Measurement Value	
Vcep	1125	V
dV/dt	3.0	kV/us
dI/dt	8.5	kA/us
tf	0.1	us
Eoff	214	mJ

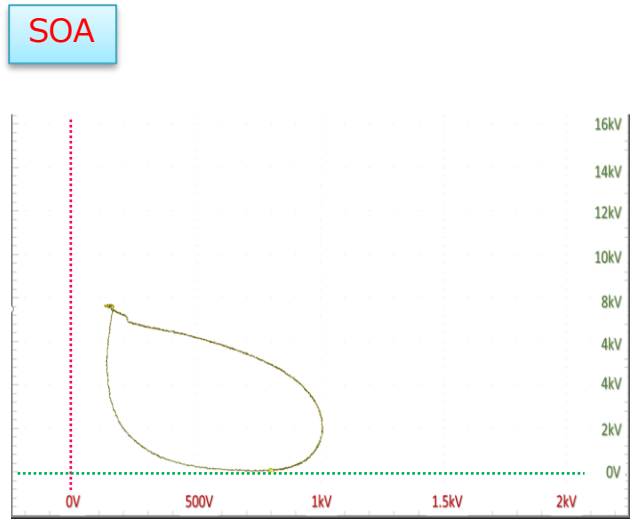
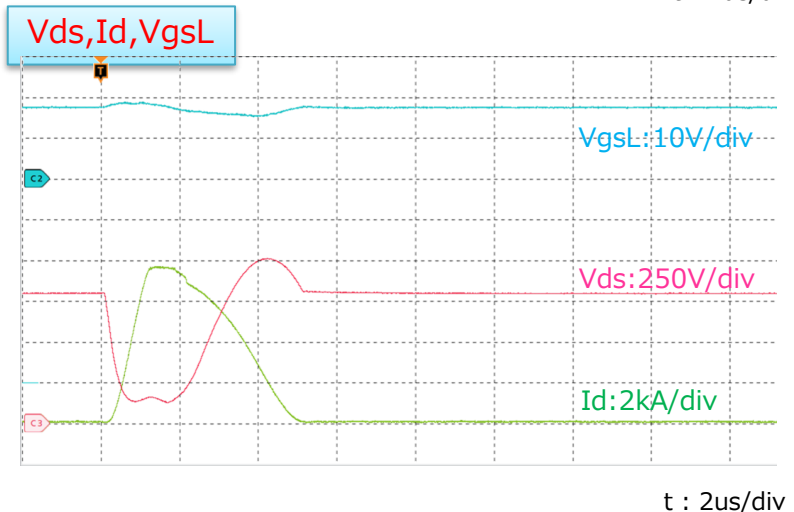
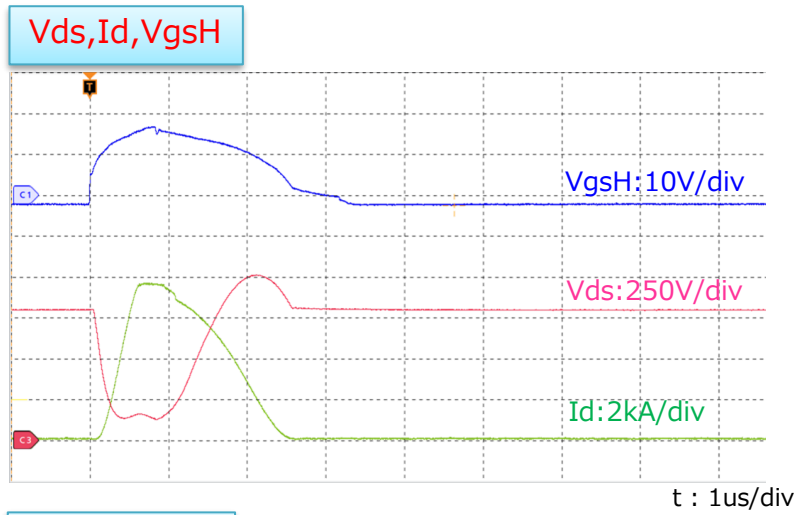
Gate drivers that bring out the performance of ROHM SiC Power Modules

5. Matching data (2-pulse / Short circuit)

Short circuit test of upper arm

Arm short (Load inductance : open)

Test Result



Item	Measurement Value	
Vcep	1011	V
Icp	7688	A
tw	2.4	us

*This document does not guarantee the rating of the device.

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