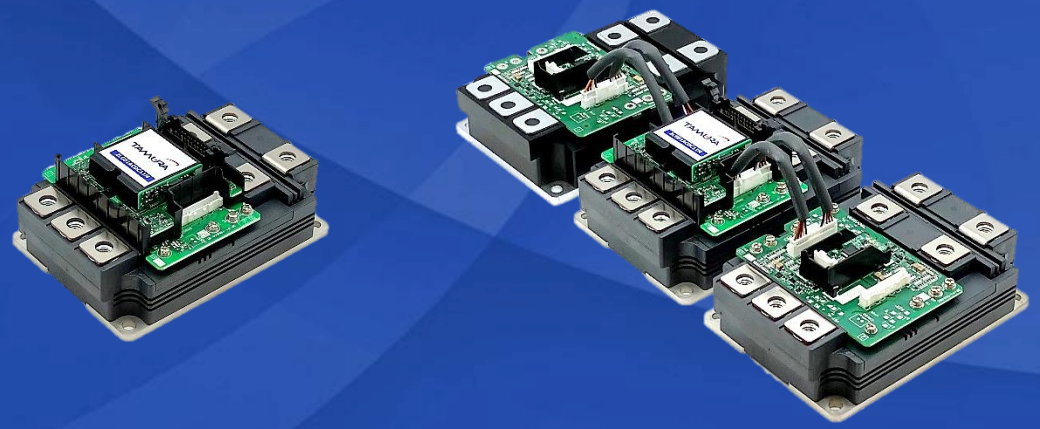
Gate Drivers optimized for FUJI Electric

High-Power Module HPnC X Series



SUSTAINABLE DEVELOPMENT GOALS

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Your One and Only Company

TAM-GDM-00045

Issued on 1st Mar '25 Unit division HQ Japan

Rev G

Index

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

01 Tamura provide of total solution

Gate driver

Provide of main components for various inverter !

Current sensor

Reactor / Trans

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

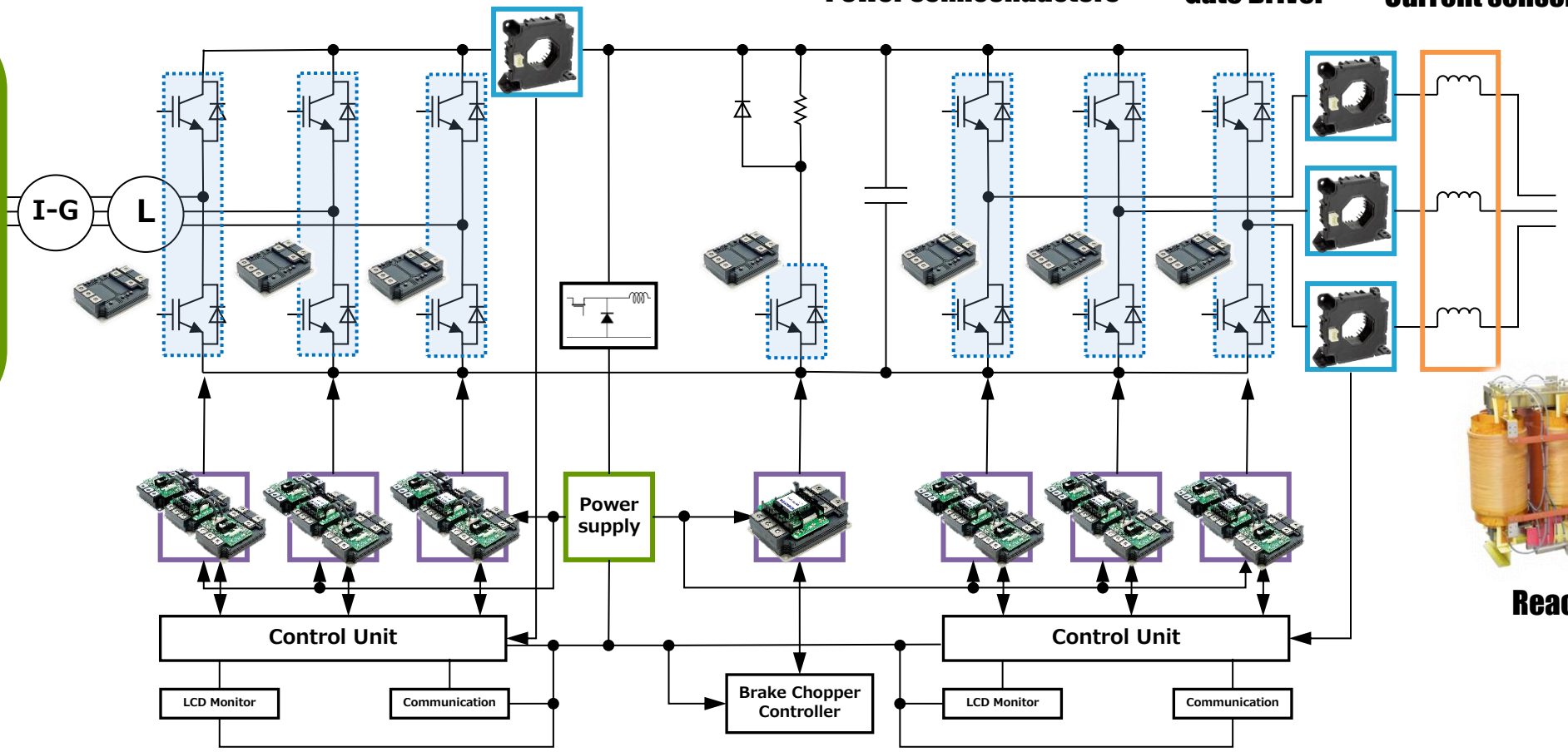
01 Tamura provide of total solution

Wind power converter

Power semiconductors

Gate Driver

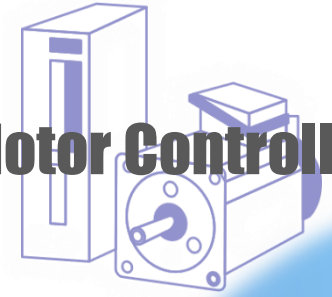
Current sensor



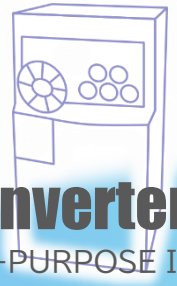
Reactor

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

02 Application



Motor Controller



Inverter

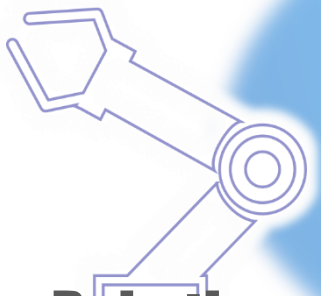
GENERAL-PURPOSE INVERTER

PV

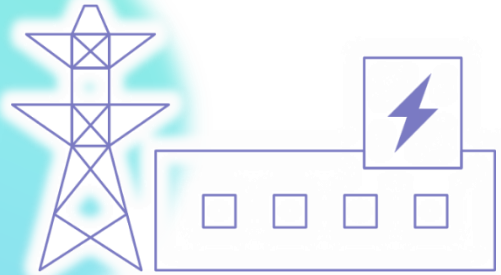
Photovoltaic Power Generation

Wind

Wind Power Generation



Robotics



Grid/SVG

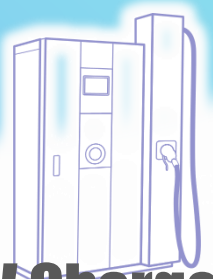
Electric grid

Welding

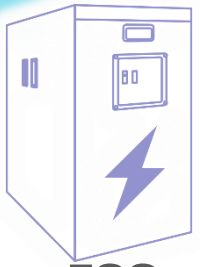
Welding Machine

UPS

Uninterruptible Power Supply



EV Charger
EV Stand

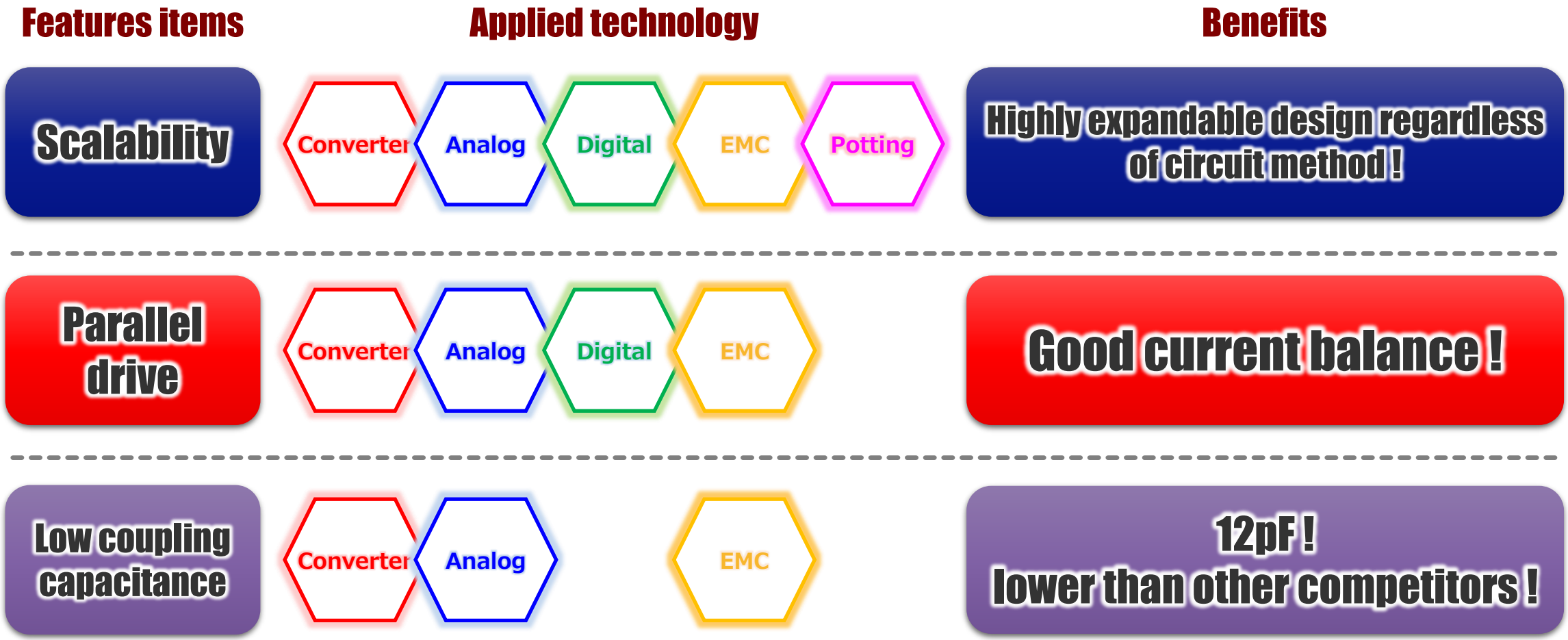


ESS

Energy Storage System

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

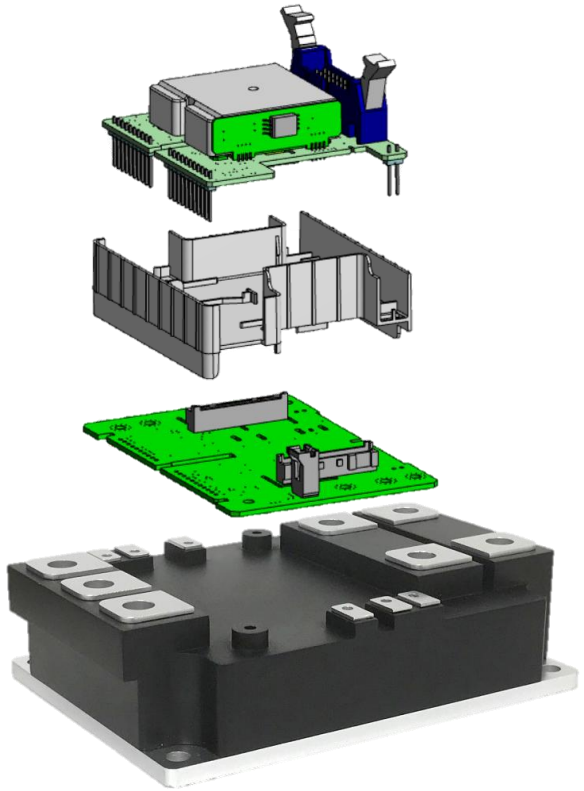
03 Three features obtained by combining HPnC and 2LG series



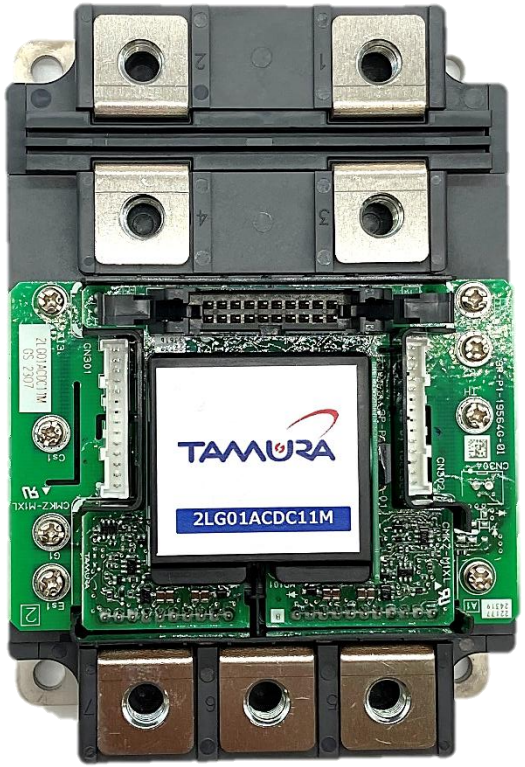
Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

03 Three features obtained by combining HPnC and 2LG series

Scalability



Can be mounted on HPnC !



Same width as power module

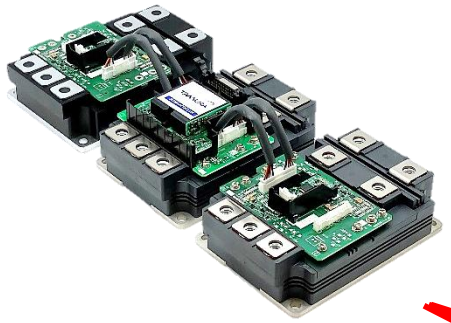
Contribute to compact design of system thanks to “no protrusion”

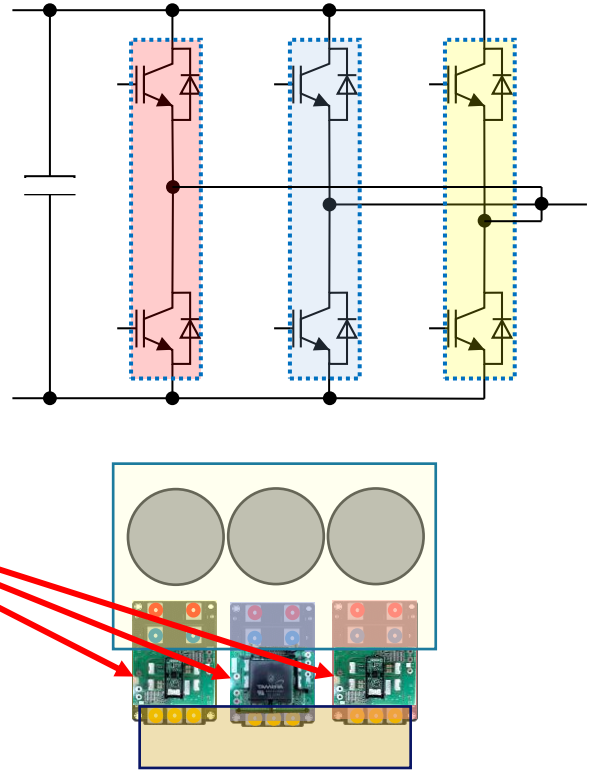
Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

03 Three features obtained by combining HPnC and 2LG series

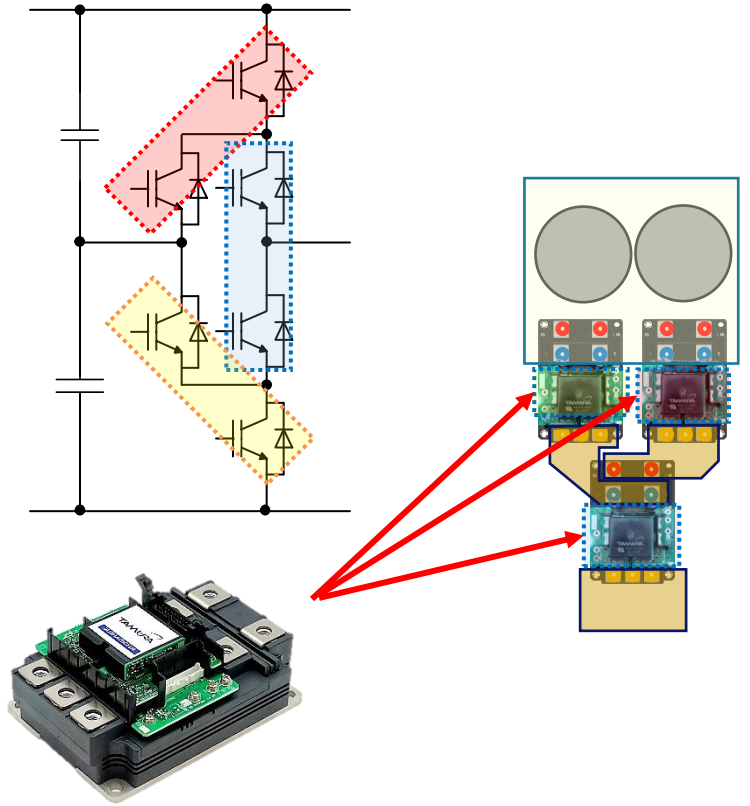
Scalability

HPnC
With 2-level / 3pcs paralleling





HPnC
With 3-level ANPC (I-Type)



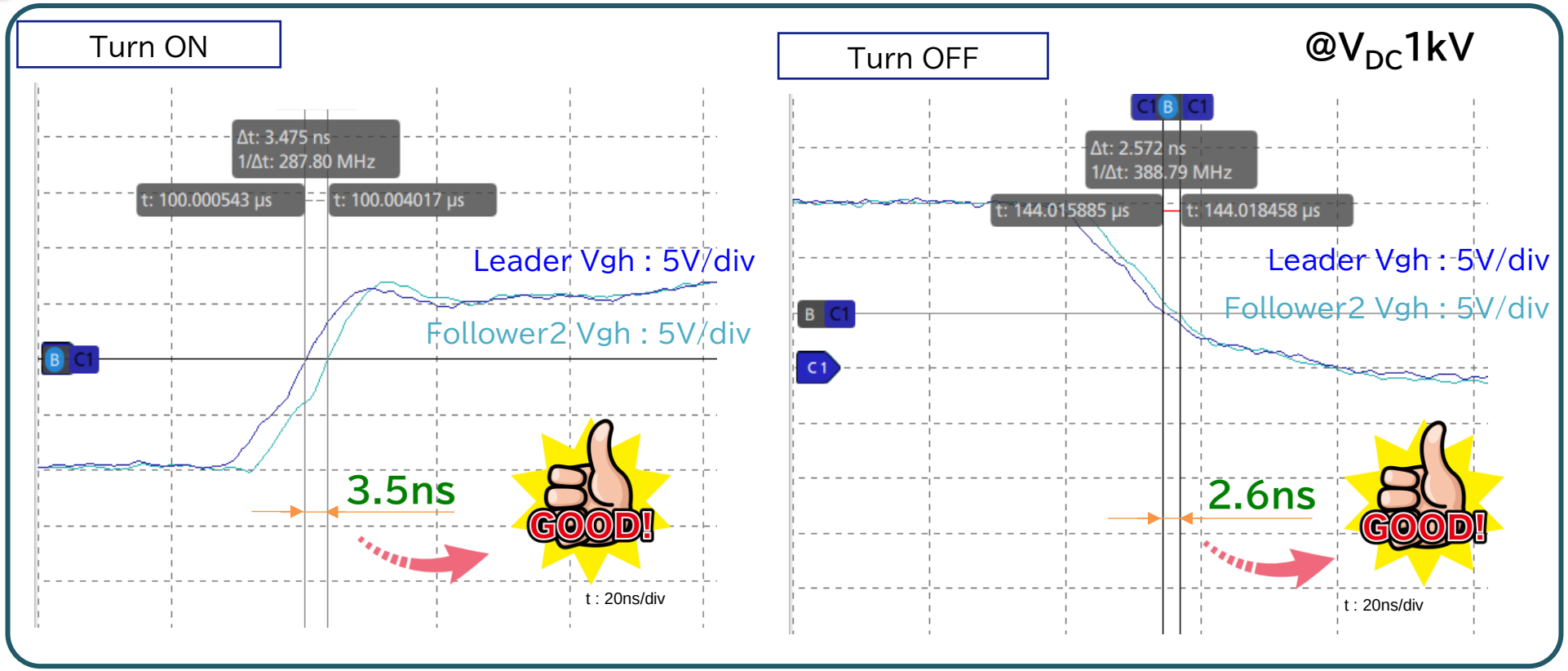
Highly expandable design regardless of circuit method

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

03 Three features obtained by combining HPnC and 2LG series

Parallel drive

Gate signal balance



Follower drive signal delay is very small

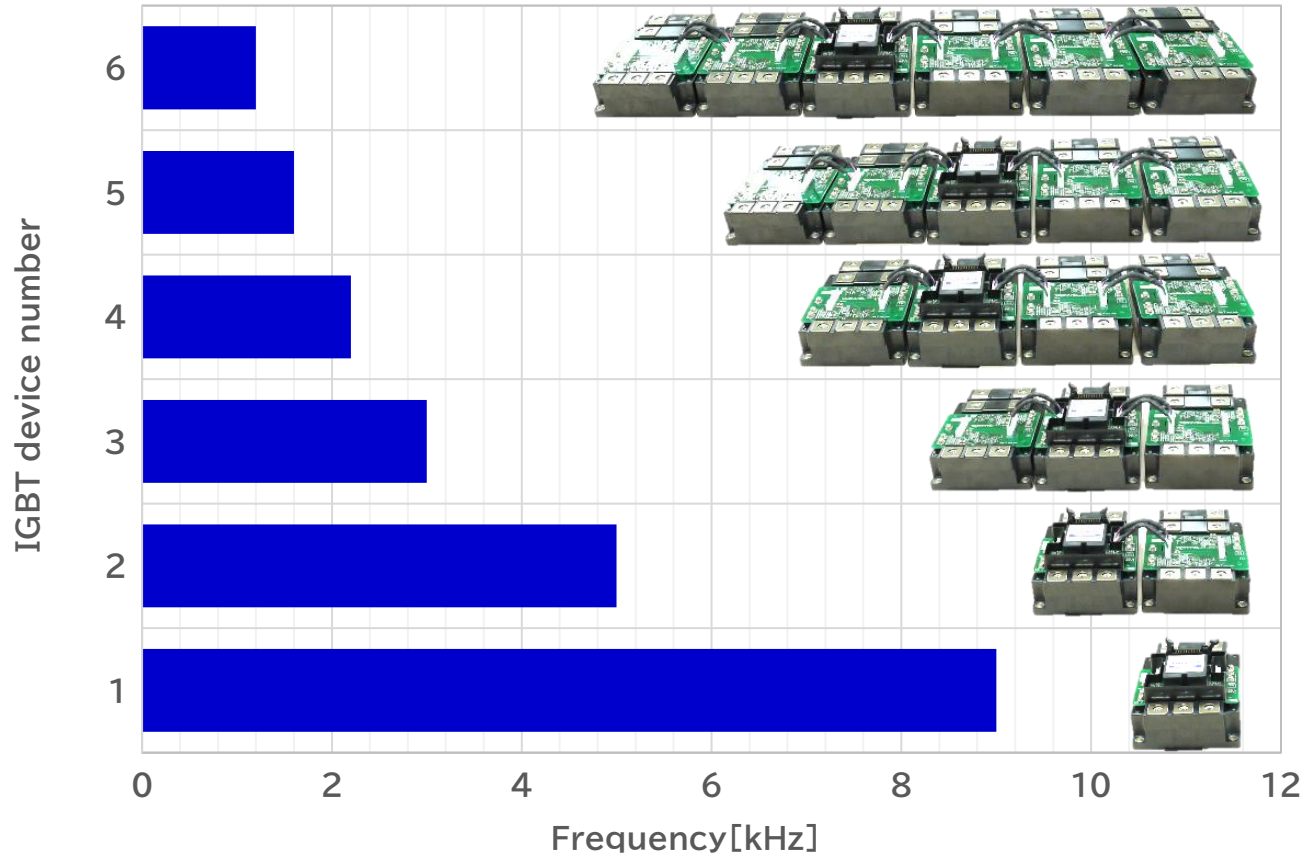
Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

03 Three features obtained by combining HPnC and 2LG series

Parallel drive

For reference 2MBI1200XZF230-50

Frequency vs Gate driver parallel number (+15V / -10V)



* Specifications may be changed.

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

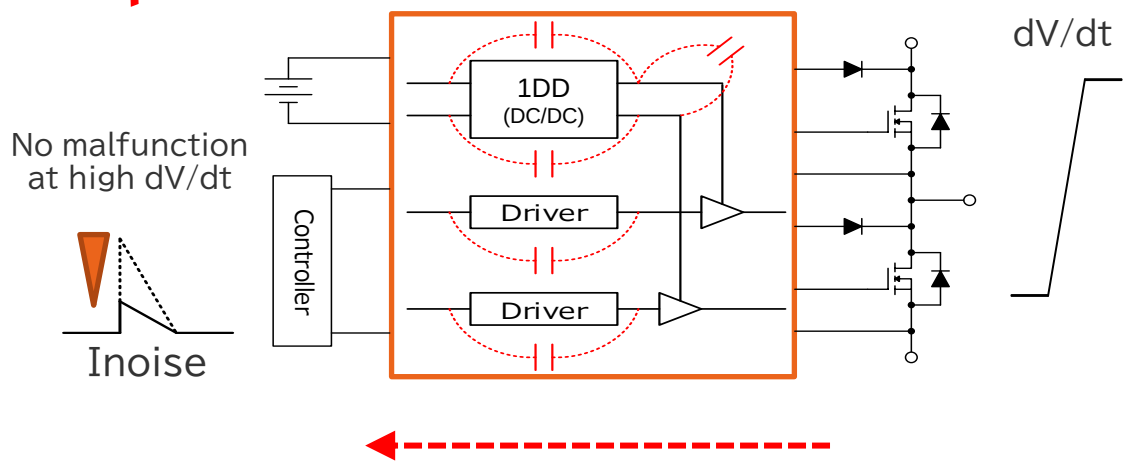
03 Three features obtained by combining HPnC and 2LG series

Low coupling capacitance

No malfunctions during switching of Si or SiC.
⇒ Reduction of parasitic capacitance !

Total=12pF !

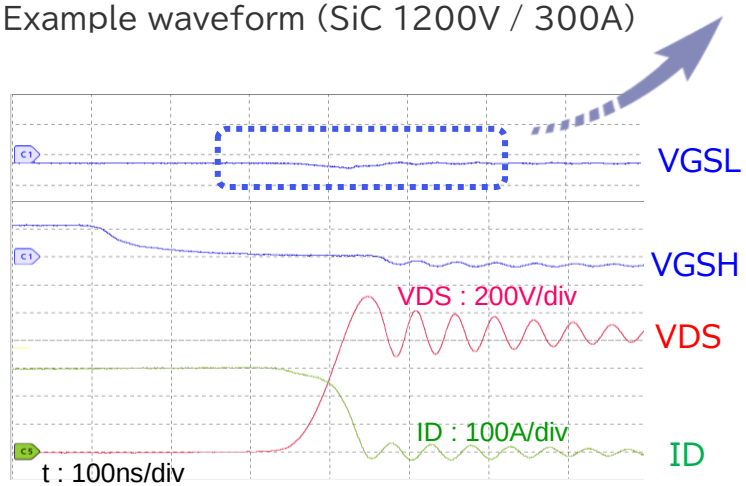
Conceptual diagram



Inoise = Cstray X dV/dt

No malfunctions !

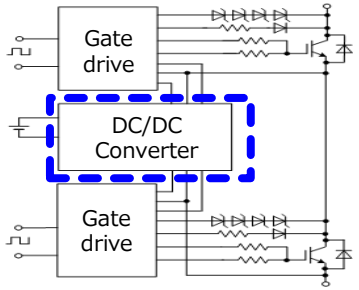
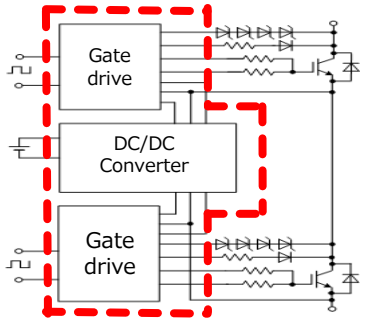
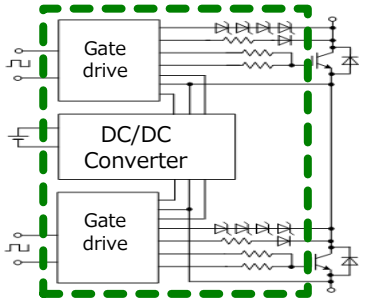
Example waveform (SiC 1200V / 300A)



dV/dt = 15kV/us

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

04 Product tree and line-up

	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	

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

04 Product tree and line-up

GDM Leading sector

DC-DC converter
2DD

Gate driver module
2CG-B / 2CG-D

Gate driver Unit
2LG-C
High-Power Module HPnC X series

Gate driver Unit
2LG-C (Multi-parallel)
High-Power Module HPnC X series

Gate Driver Family Selection Guide

Click here !

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

04 Product tree and line-up

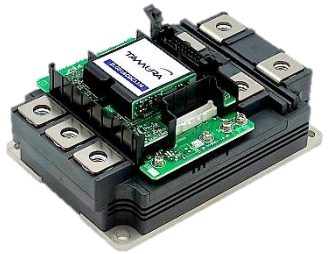
★ Model name for product under development is subject to be changed.

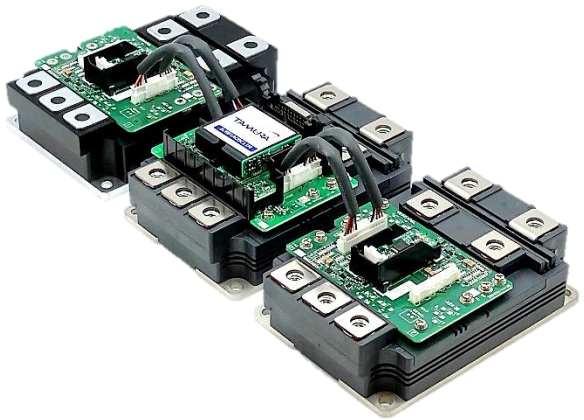
Package	Vce	Ic	Part No	Master /Slave	Model	Frequency (kHz) Single
	1700	1200	2MBI1200XZF170-50	Leader 	T.B.D(contact us)	T.B.D
				 Follower	T.B.D(contact us)	
		1500	2MBI1500XZF170-50	Leader 	T.B.D(contact us)	T.B.D
				 Follower	T.B.D(contact us)	
		1800	2MBI1800XZF170-50	Leader 	T.B.D(contact us)	T.B.D
				 Follower	T.B.D(contact us)	
	2300	1200	2MBI1200XZF230-50	Leader 	**2LG08AFDC11M**	9kHz
				 Follower	**2LG08AGZC11S**	

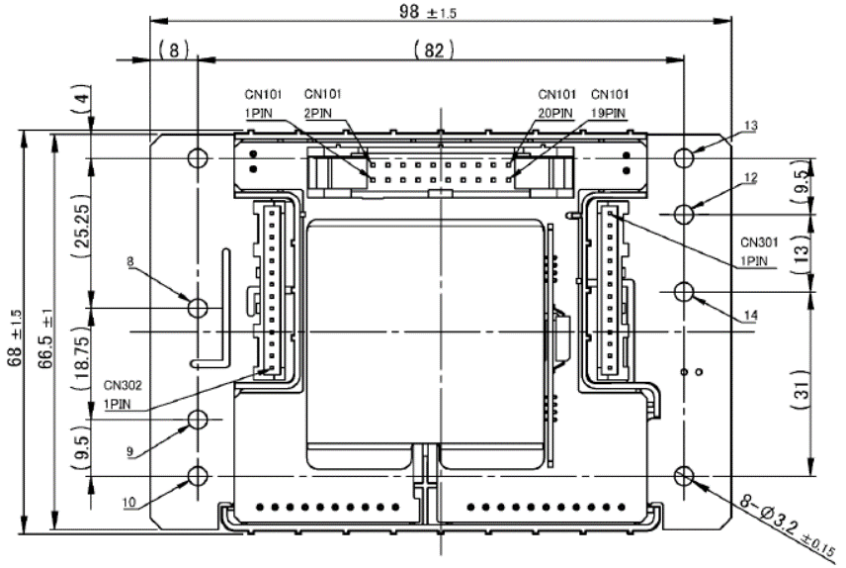
Active clamp function is optional. Please contact us.

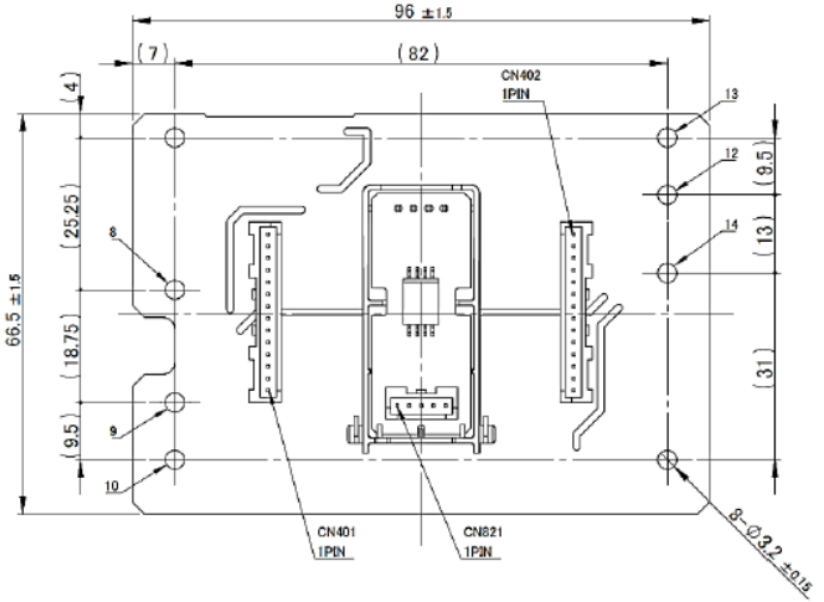
Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

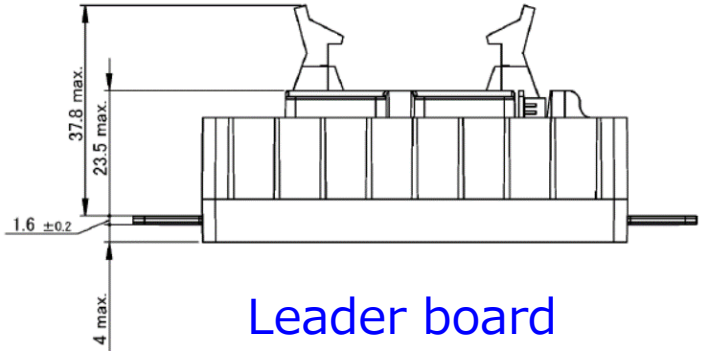
04 Product tree and line-up



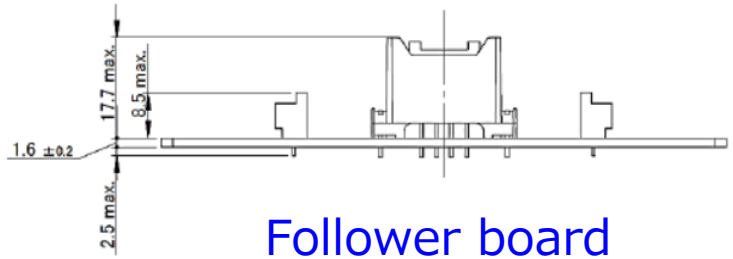








Leader board



Follower board

Unit : mm

Note :1.The dimensional tolerance without directions is ± 0.5mm.

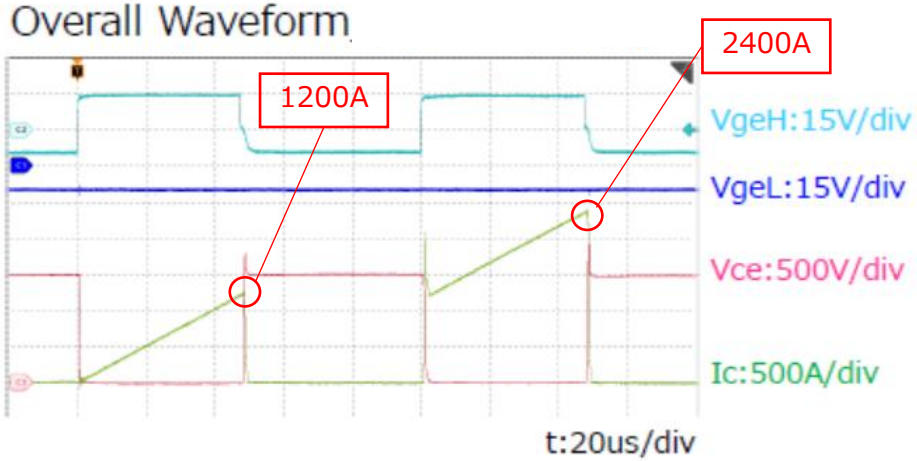
* Specifications may be changed.

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

05 Matching data (2-pulse / 2MBI1200XZF230-50 / Single)

Waveform example（Vcc=1500V Tj=150℃） Upper arm

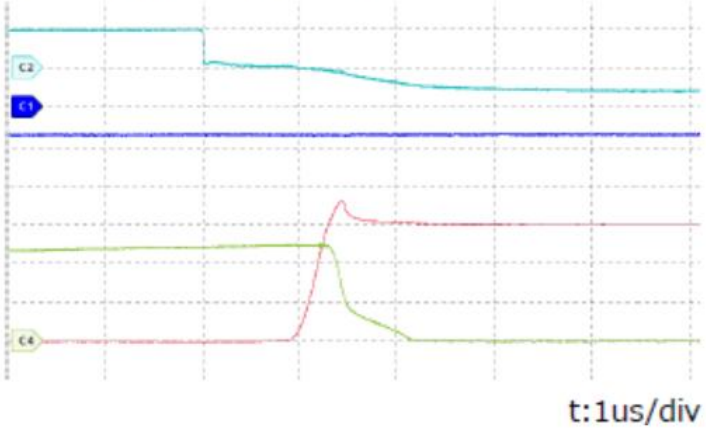
Overall Waveform



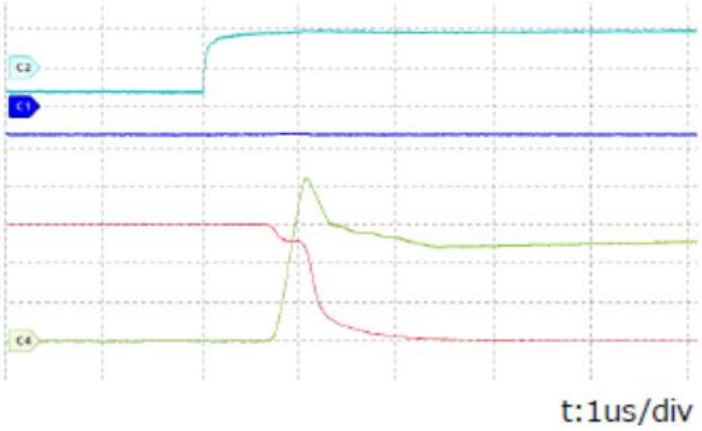
Measurement Value

Item	Turn on [1200A]	Turn off [1200A]	Turn off [2400A]	unit
Vcepk	–	1806	1939	V
dV/dt	3.7	5.0	4.6	kV/us
dI/dt	6.9	2.0	10.2	kA/us
Eon	898	–	–	mJ
Eoff	–	833	1685	mJ

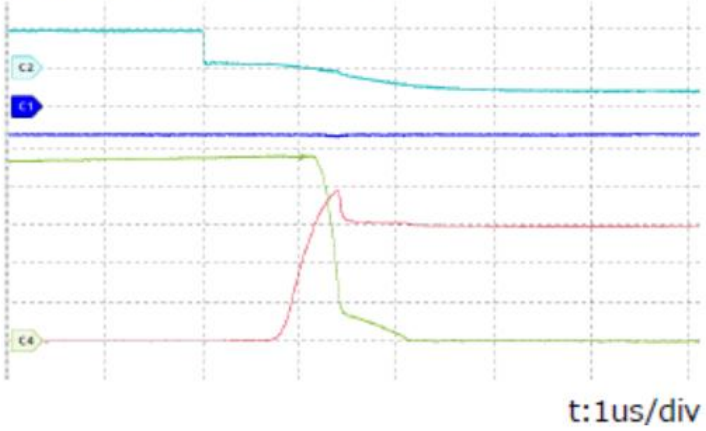
Turn off/Ic=1200A



Turn on/Ic=1200A



Turn off/Ic=2400A

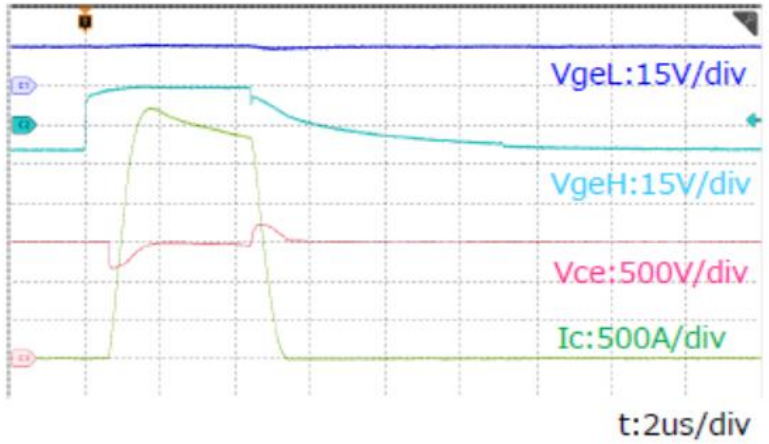


Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

05 Matching data (Short circuit / 2MBI1200XZF230-50 / Single)

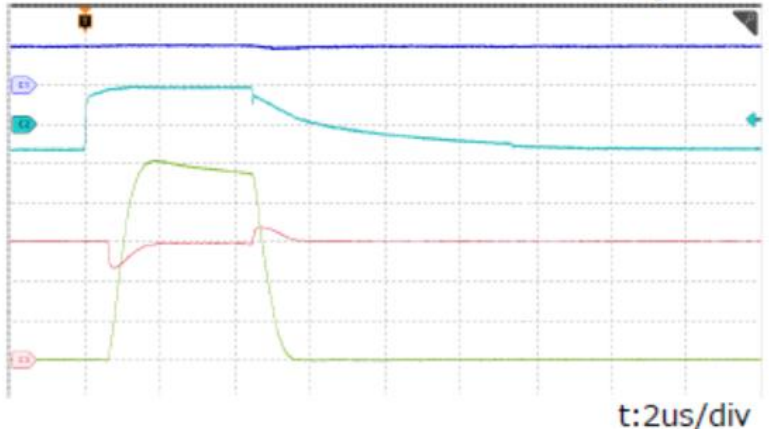
Waveform example (Vcc=1500V Tj=25 / 150℃) Upper arm

Overall Waveform_VCC=1500V,Tj=25℃

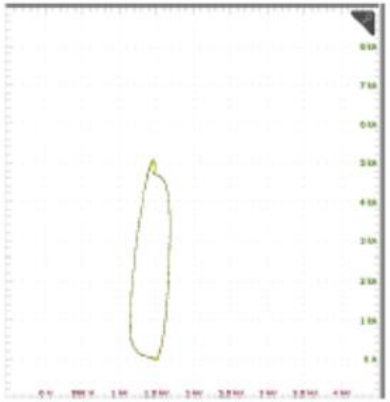


SOA

Overall Waveform_VCC=1500V,Tj=150℃



SOA



Measurement Value

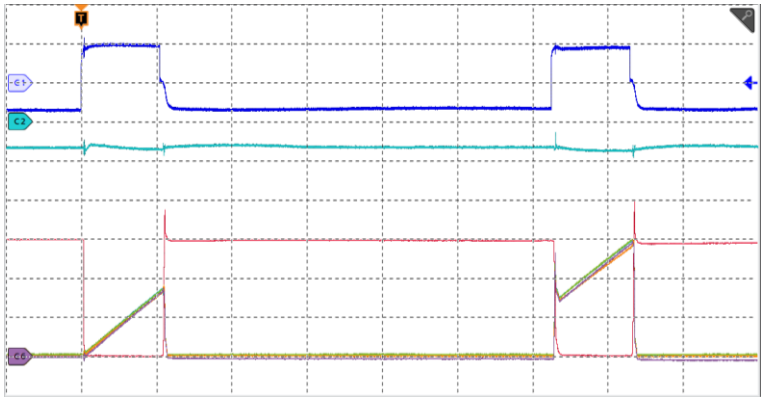
Item	Tj=25℃	Tj=150℃	Unit
Vcepk	1727	1685	V
Icpk	6439	5077	A
tsc	4.8	5.0	us
Esc	33.6	27.6	J

Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

05 Matching data (2-pulse / 2MBI1200XZF230-50 / 4-Parallel)

Waveform example (Vcc=1500V Tj=150℃)

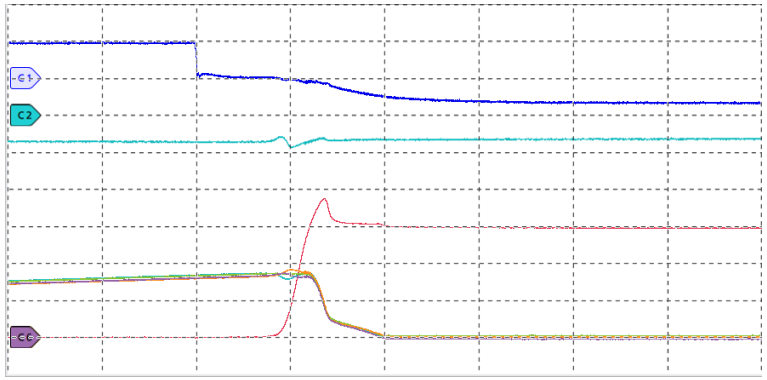
Overall Waveform_VCC=1500V,Tj=150℃



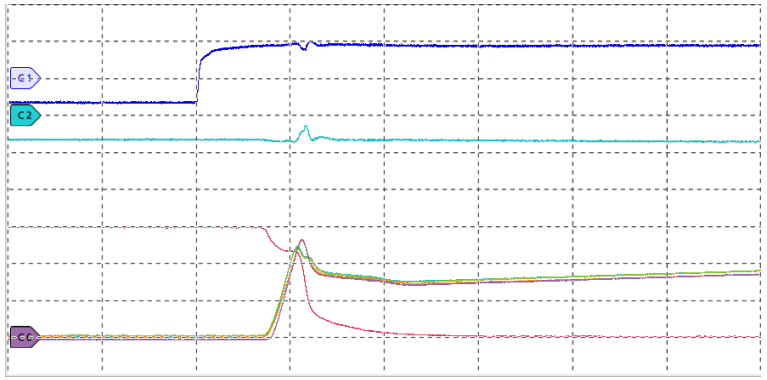
Measurement Value

Item	Turn on 【1200A】				Turn off 【1200A】				Turn off 【2400A】				unit
	IGBT 1	IGBT 2	IGBT 3	IGBT 4	IGBT 1	IGBT 2	IGBT 3	IGBT 4	IGBT 1	IGBT 2	IGBT 3	IGBT 4	
Vcepk	–	–	–	–	1874	–	–	–	1989	–	–	–	V
dV/dt	7.8	7.8	7.8	7.8	6.3	6.3	6.3	6.3	5.9	5.9	5.9	5.9	kV/us
dI/dt	7.3	6.8	7.6	7.7	7.0	7.8	7.3	7.7	11.2	11.7	11.3	11.5	kA/us
Eon	743	731	713	750	–	–	–	–	–	–	–	–	mJ
Eoff	–	–	–	–	793	840	833	805	1520	1571	1599	1513	mJ

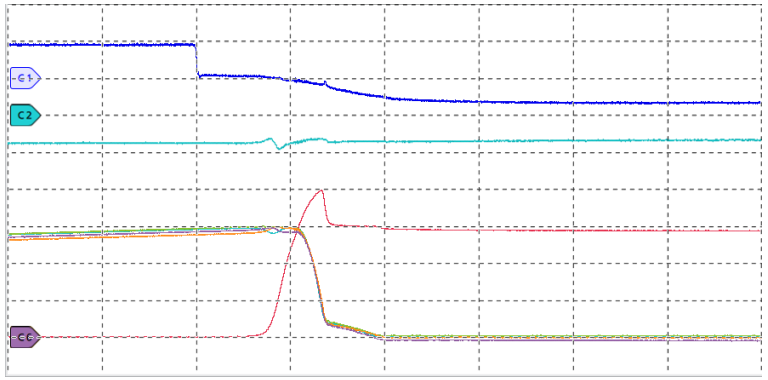
Turn off/Ic=1200A



Turn on/Ic=1200A



Turn off/Ic=2400A

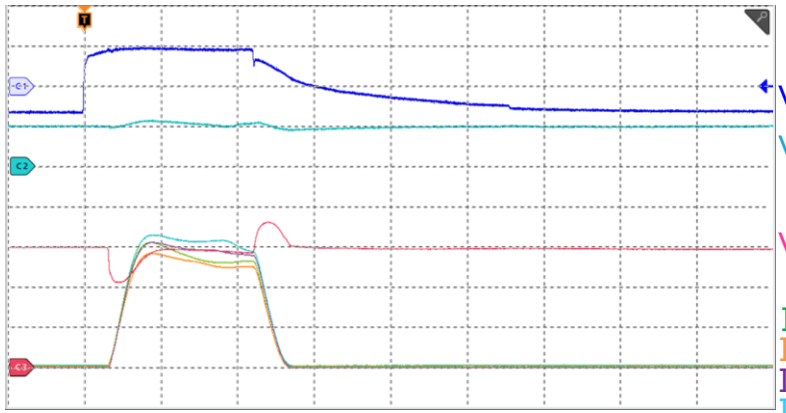


Gate Drivers optimized for FUJI Electric High-Power Module HPnC X Series

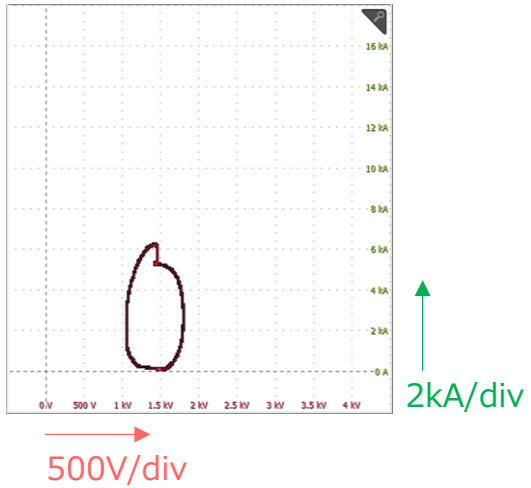
05 Matching data (Short circuit / 2MBI1200XZF230-50 / 4-Parallel)

Waveform example (Vcc=1500V Tj=25 / 150℃) Upper arm

Overall Waveform_VCC=1500V,Tj=25℃



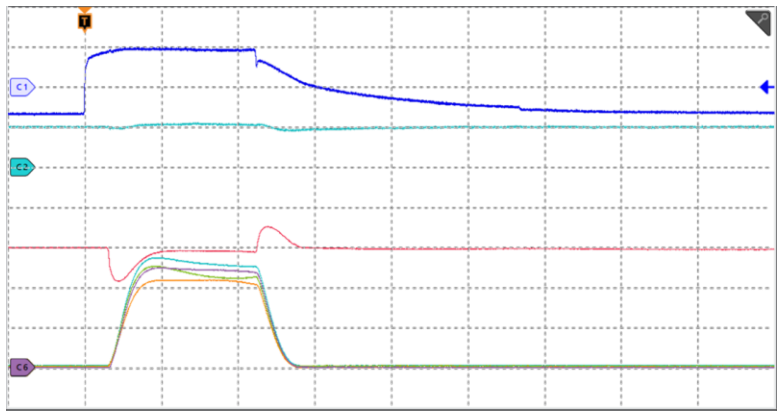
V-I Locus (IGBT1)



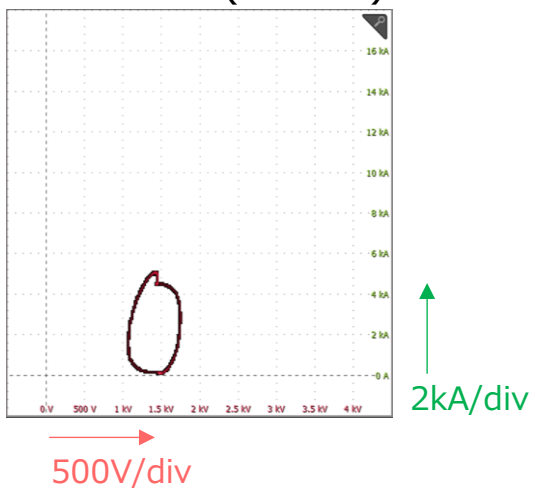
Measurement Value

Item	Tj=25℃				Tj=150℃				Unit
	IGBT1	IGBT2	IGBT3	IGBT4	IGBT1	IGBT2	IGBT3	IGBT4	
Vcepk	1811	–	–	–	1758	–	–	–	V
Icpk	6230	5686	6231	6603	5067	4372	4984	5483	A
tsc	4.7	4.6	4.7	4.7	4.8	4.7	4.8	4.8	us
Esc	30.6	28.6	31.9	34.4	26	23.7	26.8	29.1	J

Overall Waveform_VCC=1500V,Tj=150℃



V-I Locus (IGBT1)



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CORPORATE GOVERNANCE REPORT

Tamura's mascot "Quenu"


TAMURA