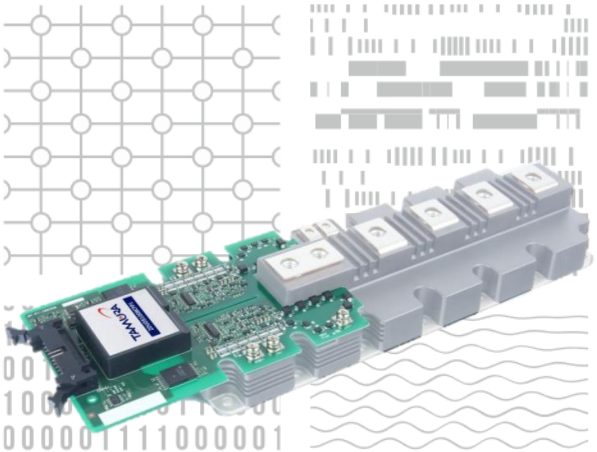
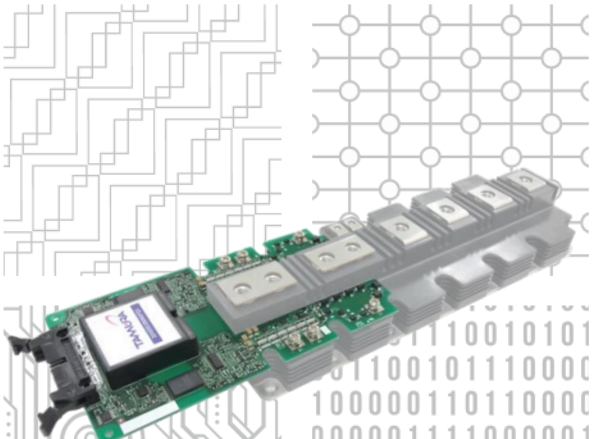
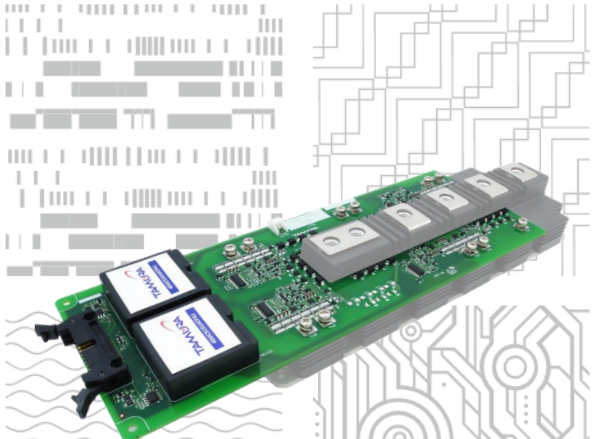
Solution Guide for FUJI Electric PrimePACK™ series.



PrimePACK™ 2in1



PrimePACK™3+



PrimePACK™ 4in1

Supported by FUJI Electric

TAMURA

TAM-GDM-00024

Issued on 1st Apr '21 Unit division HQ Japan

Rev0

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   - 1-2 Tamura Gate Driver 7 key points
   - 1-3 Each protection function to ensure reliability (Low stray capacity / Wider input voltage / Various protection)
   - 1-4 Waveform of Tamura gate driver (2 pulse / Short circuit / Temperature rise)
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1) Solution Guide for FUJI Electric PrimePACK™

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1-2 Tamura Gate Driver 7 key points

1-3 Each protection function to ensure reliability
(Low stray capacity / Wider input voltage / Various protection)

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(2 pulse / Short circuit / Temperature rise)

1-5 Products appearance and line-up

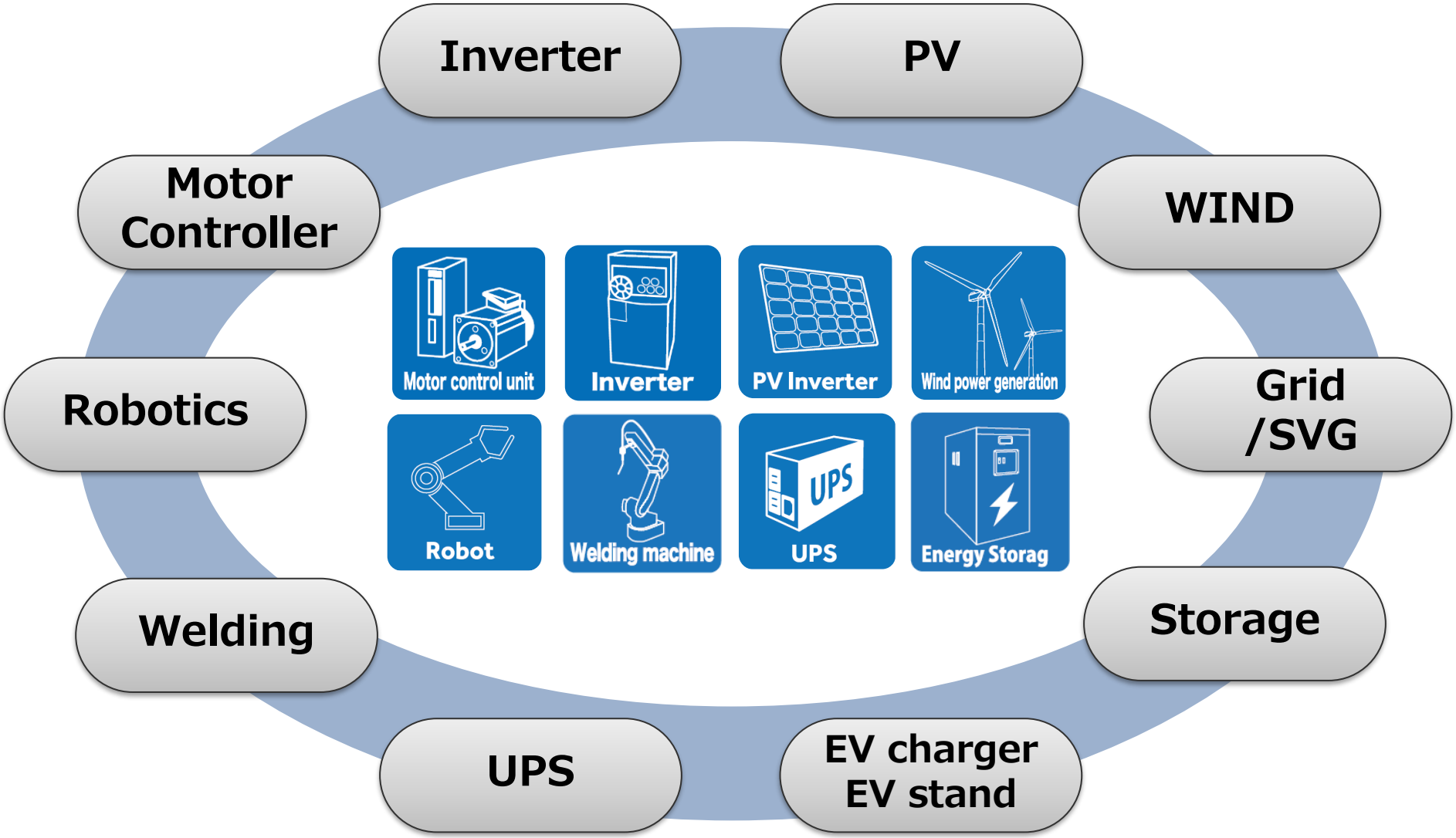
2) Introduction of One Tamura

Appendix) Information & Contact

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1-1. Application

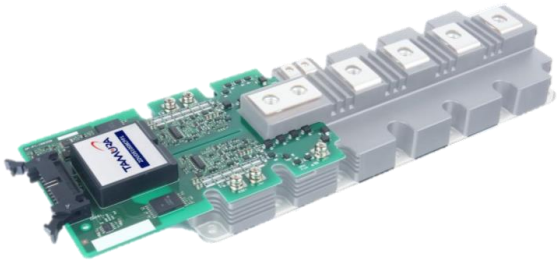


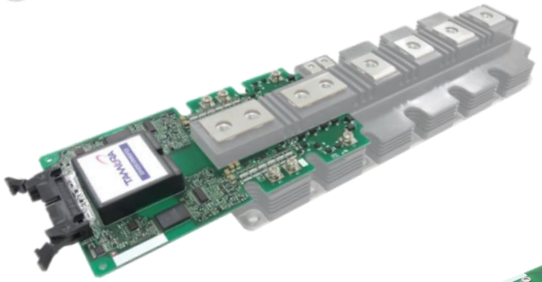
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1-2. Tamura Gate Driver 7 key points

- Low stray capacity
- Soft turn off + Active Clamp
- Wider input voltage
- High-speed response
- High-accuracy
- High Power DC-DC converter
- Multi parallel solution







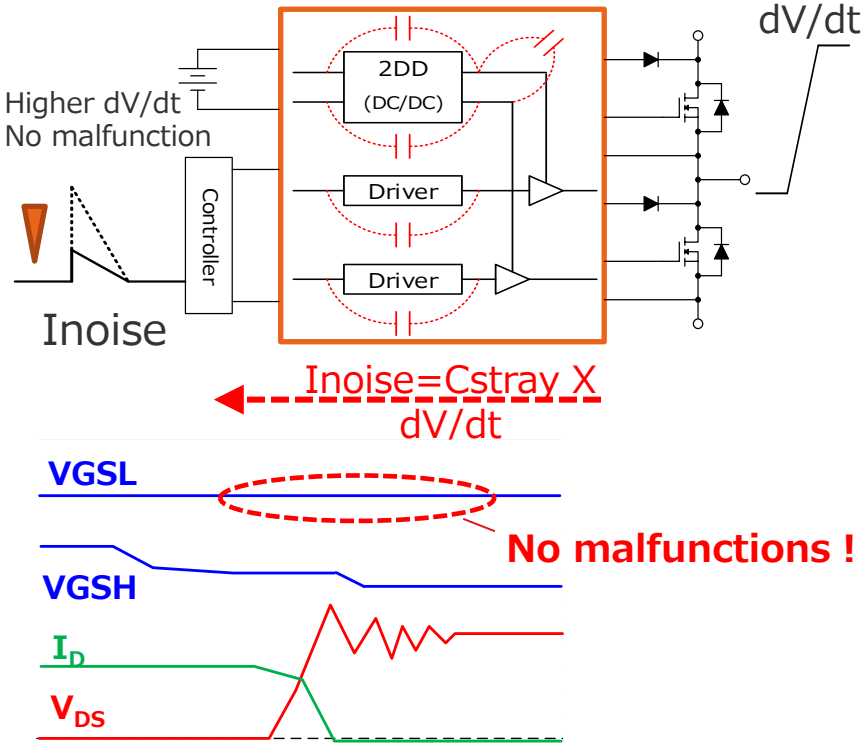
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1-3. Each protection function to ensure reliability

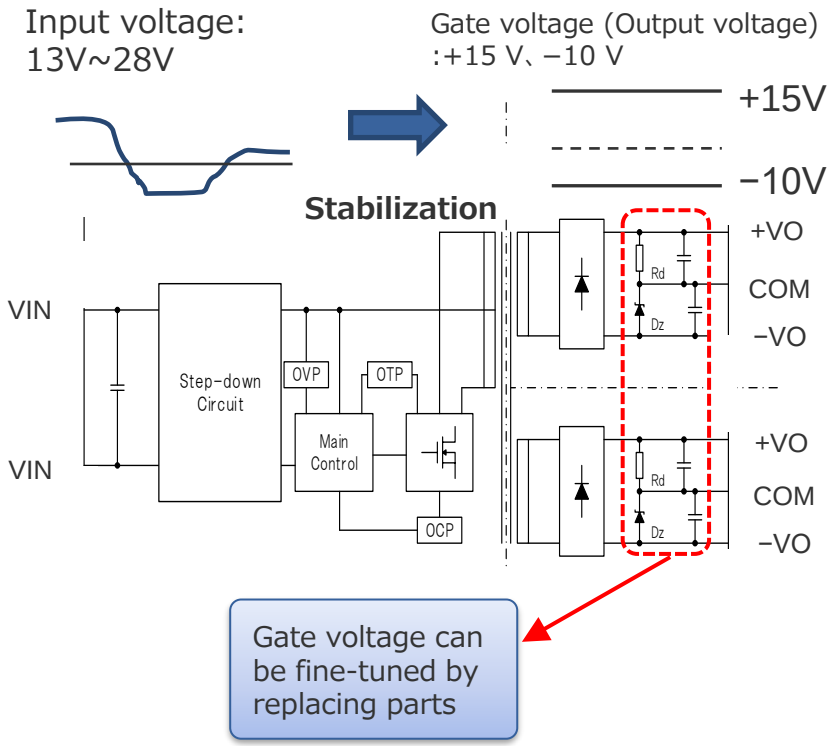
Low stray capacity

Reduction of stray capacitance



Wider input voltage

Gate voltage stabilization



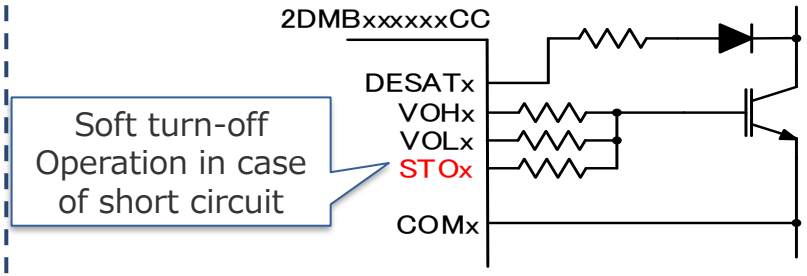
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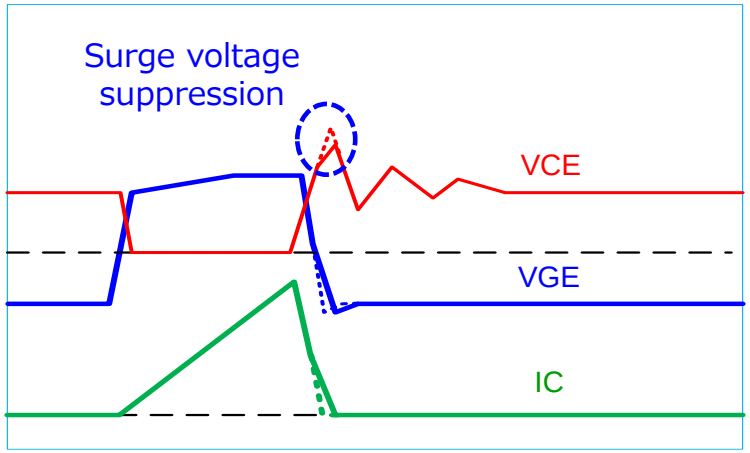
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1-3. Each protection function to ensure reliability

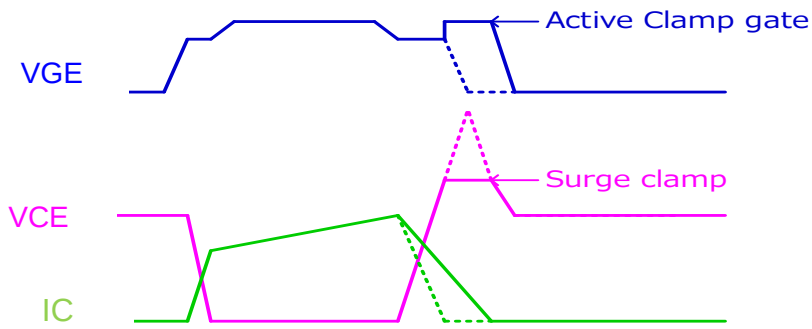
Soft turn off + Active Clamp

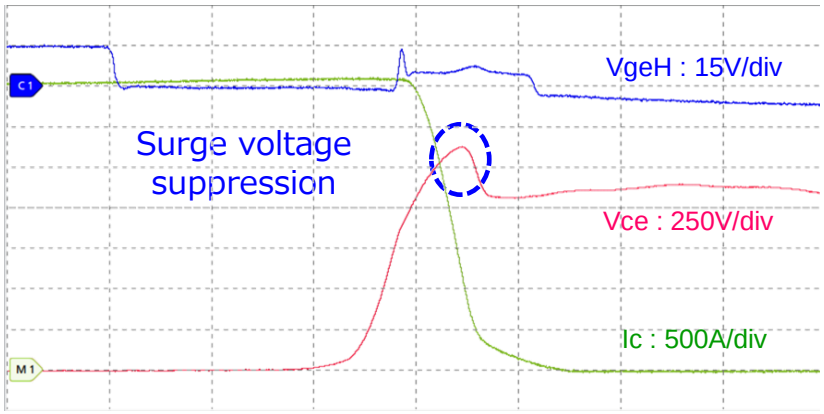
Soft turn-off





Active clamp





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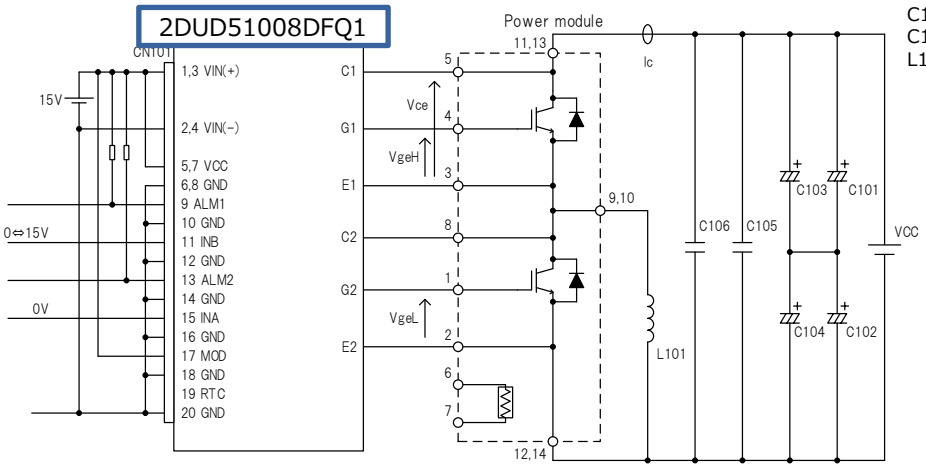
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1-4 Waveform of Tamura gate driver (2 Pulse test)

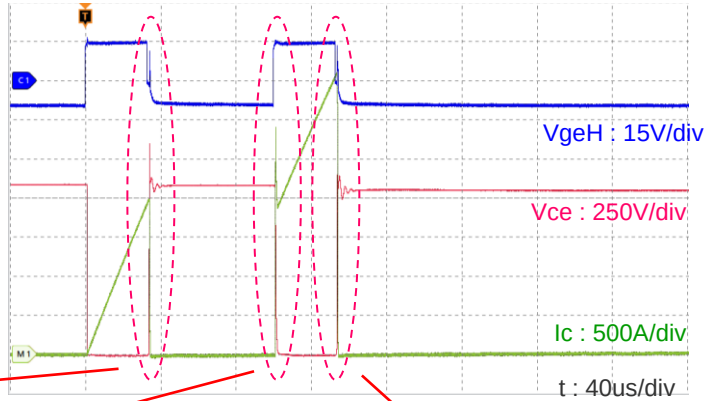
IGBT : 2MBI1800XXG170-50

DC Link : 1100V, Ron : 0.22Ω, Roff : 1.5Ω, Upper arm, Tj=25℃

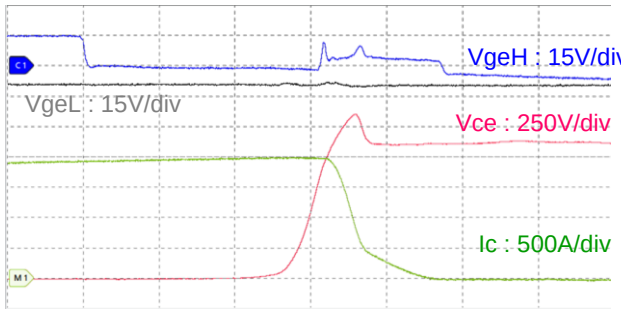
Highly stable gate drive with proprietary drive circuit and active clamp circuit (patent pending)



C101-104 : 3300uF(Ls : 20nH)
C105,106 : 3.0uF(Ls : 25nH)
L101: 16uH

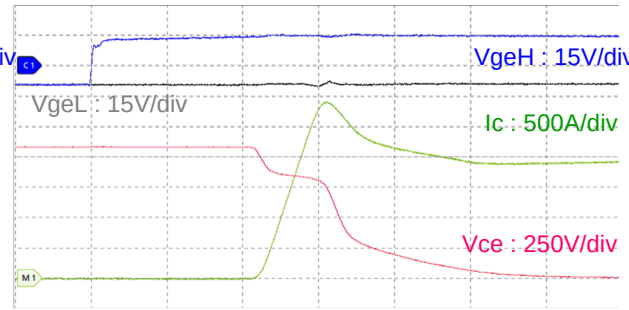


Turn OFF / Ic =1800A



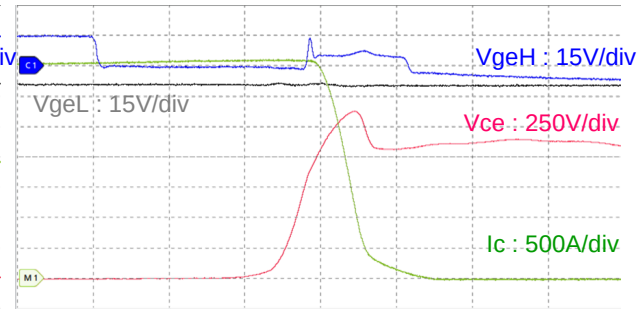
Item	Measurement value	
Vcep	1349	V
dV/dt	6.1	kV/us
di/dt	11.6	kA/us
Eoff	601	mJ

Turn ON / Ic =1800A



Item	Measurement value	
dV/dt	4.0	kV/us
di/dt	10.2	kA/us
Eon	895	mJ

Turn OFF / Ic =3600A



Item	Measurement value	
Vcep	1374	V
dV/dt	5.8	kV/us
di/dt	16.7	kA/us
Eoff	1155	mJ

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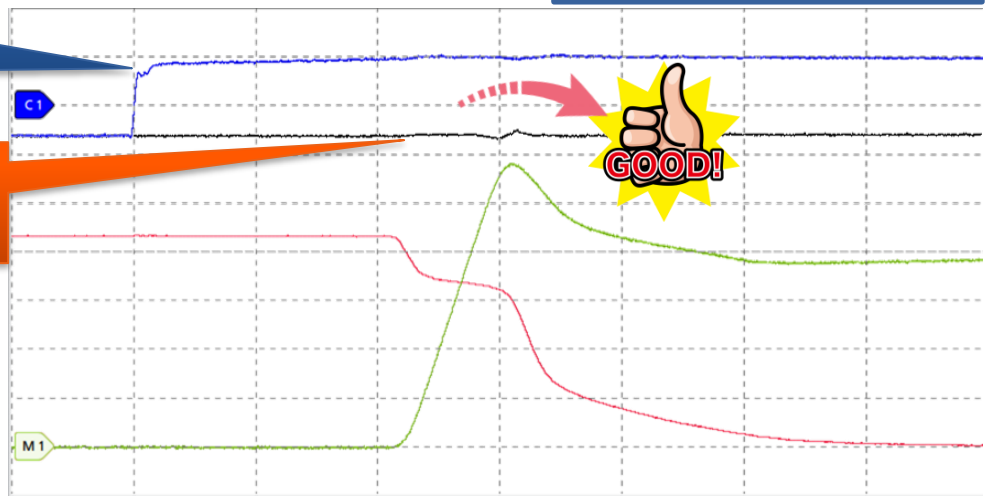
1-4. 2 Pulse test (Enlarged waveform)

IGBT : 2MBI1800XXG170-50

SW side gate (turn ON)
No ringing and no overshoot

OFF side gate
Stable L state without malfunction

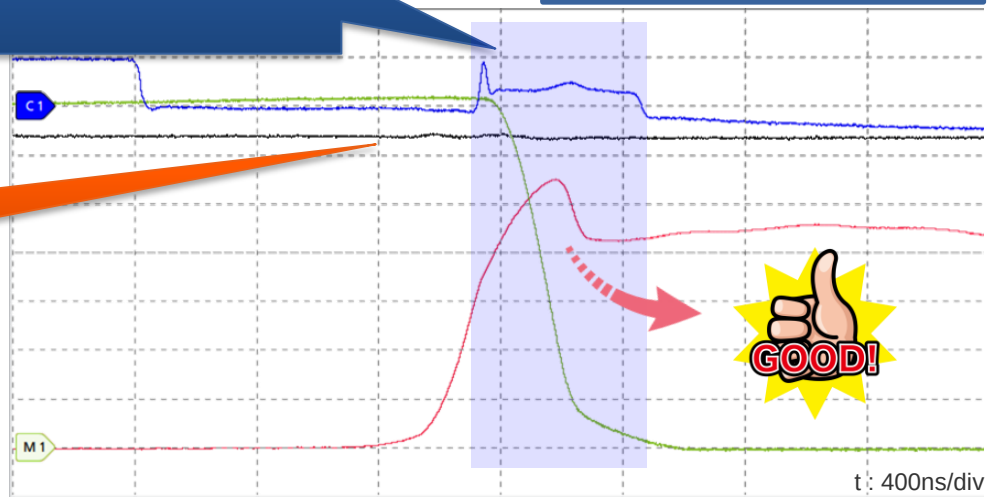
Turn ON / Ic =1800A



Gate resistance change area by our original active clamp circuit
(Normal turn-off ⇒ shift to soft turn-off)
⇒ Assist Vce Peak voltage reduction before clamping by TVS
⇒ TVS conduction loss can be reduced

OFF side gate
Stable L state without malfunction

Turn OFF / Ic =3600A



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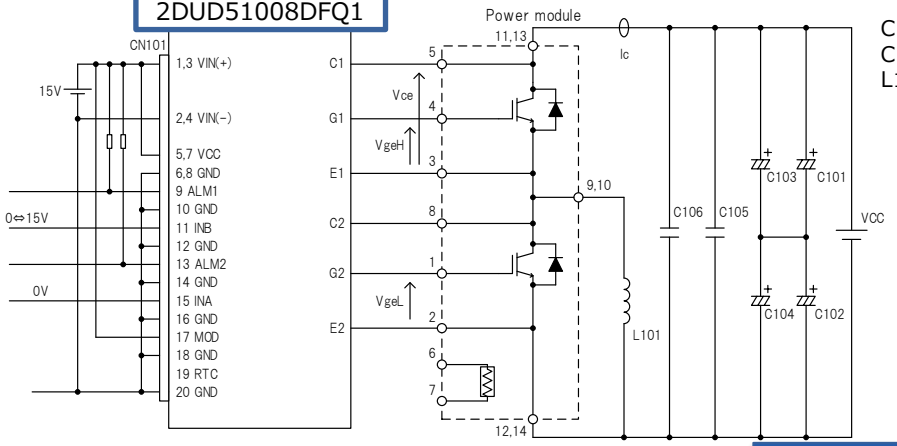
1. Solution Guide for FUJI Electric PrimePACK™

1-4 Waveform of Tamura gate driver (Short circuit test)

IGBT : 2MBI1800XXG170-50

DC Link : 1100V, Ron : 0.22Ω, Roff : 1.5Ω, Upper arm, Tj=25℃

2DUD51008DFQ1



C101-104 : 3300uF(Ls : 20nH)
C105,106 : 3.0uF(Ls : 25nH)
L101: 170nH

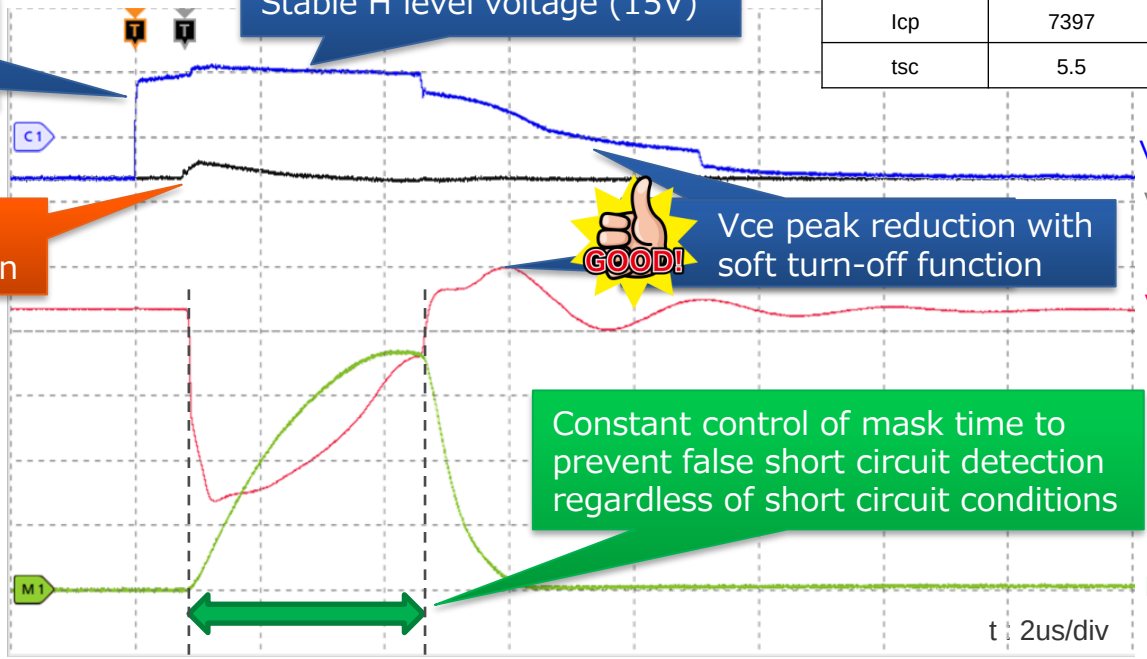
This driver suppresses the Vce peak voltage in the short circuit by our original circuit technology, and can control the mask time to prevent false short circuit detection.
(Patent pending)

Item	Measurement value	
Vcep	1247	V
Icp	7397	A
tsc	5.5	us

SW side gate (turn ON)
No ringing and no overshoot

Stable H level voltage (15V)

OFF side gate
Stable L state without malfunction



Vce peak reduction with soft turn-off function

Constant control of mask time to prevent false short circuit detection regardless of short circuit conditions

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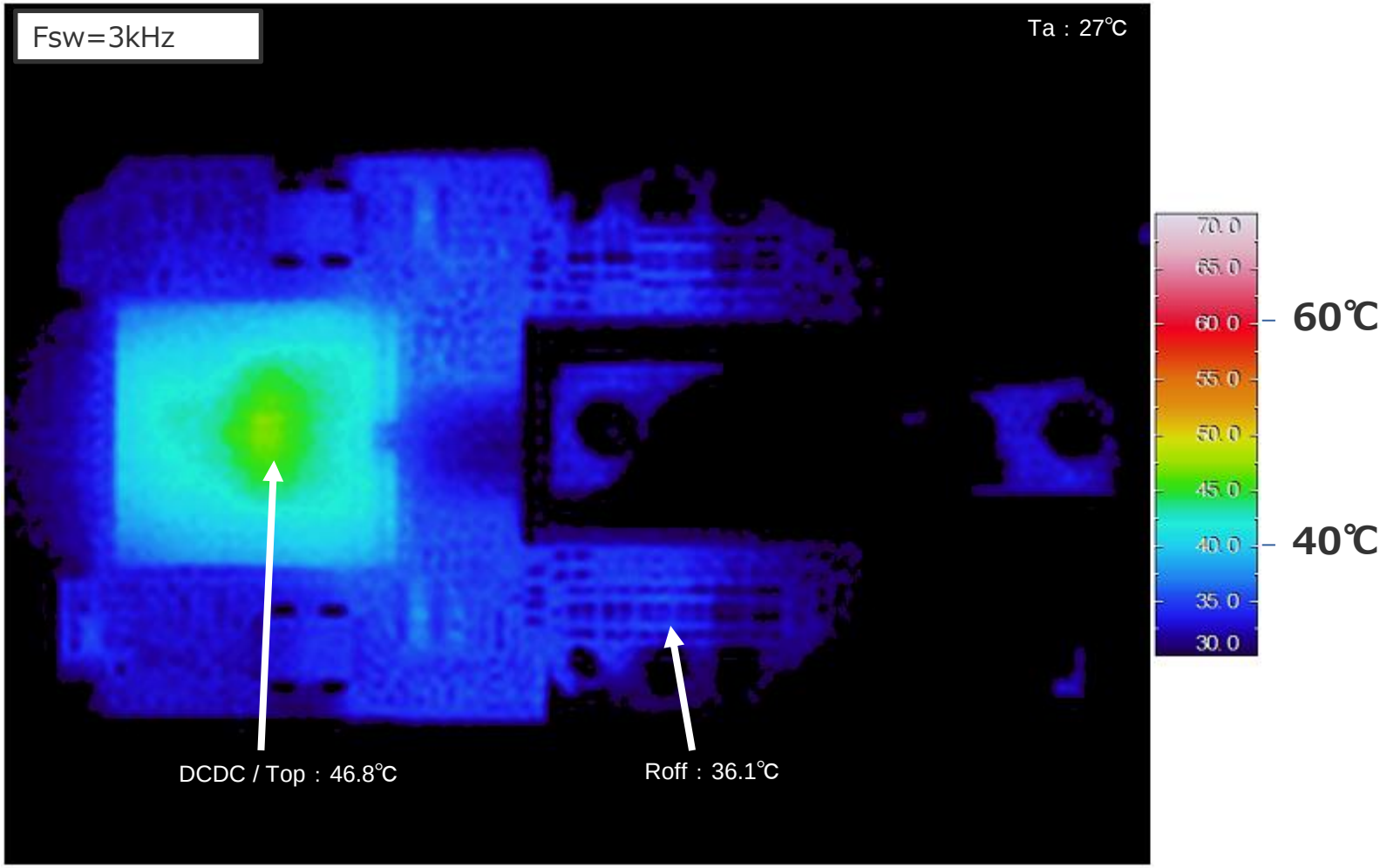
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1-4. Temperature rise (Reference data)

IGBT : 2MBI1800XXG170-50

Operating temperature range: -40~85℃

Low temperature rise ⇒ **Δt < 20 ℃**
IGBT: 2MBI1800XXG170-50 (Qg = 12.5uC), at 3kHz operation



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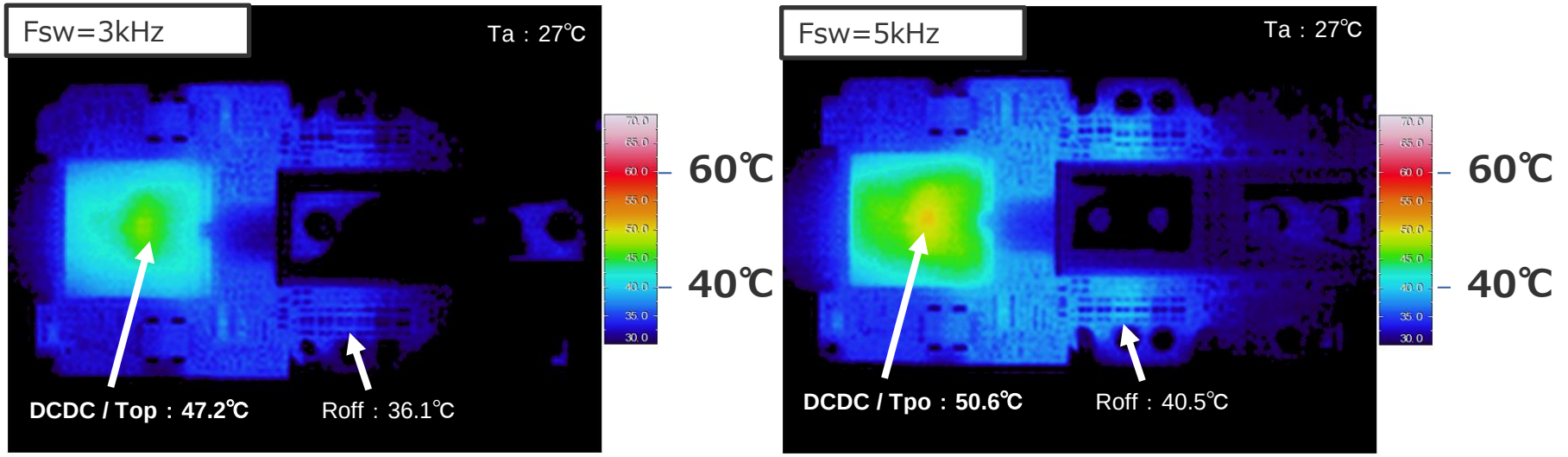
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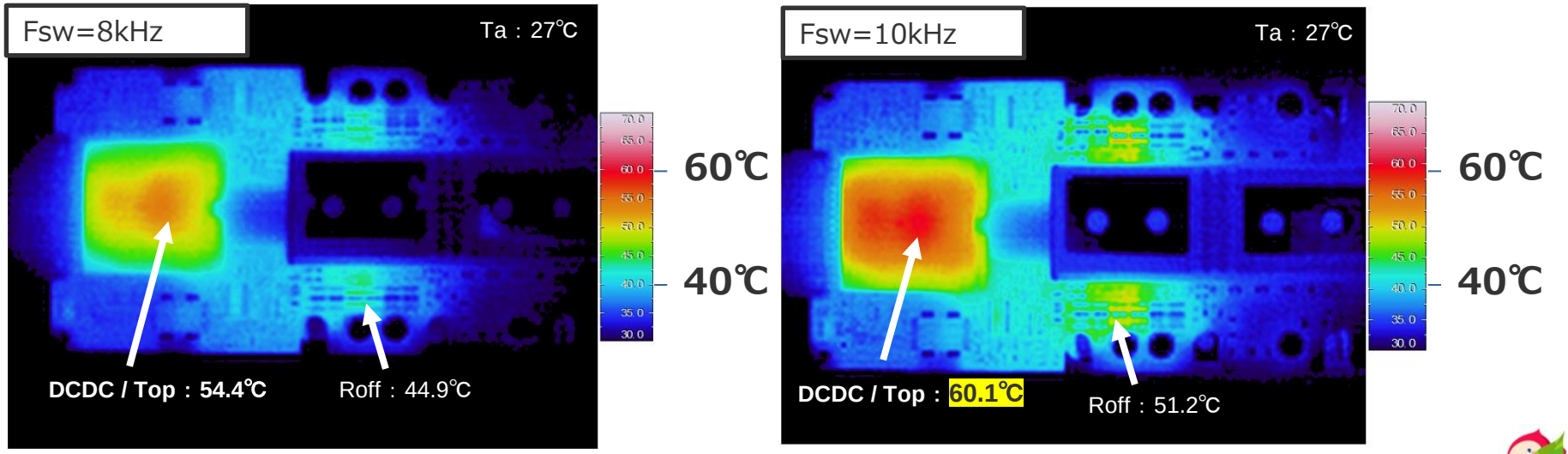
1-4. Temperature rise (Reference data)

IGBT : 2MBI1800XXG170-50

Low temperature rise ⇒ **Δt < 33 ℃**
IGBT: 2MBI1800XXG170-50 (Qg = 12.5uC), at 10kHz operation

Operating temperature range: -40~85℃



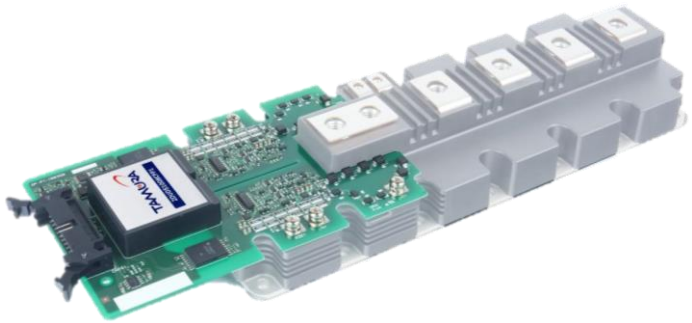


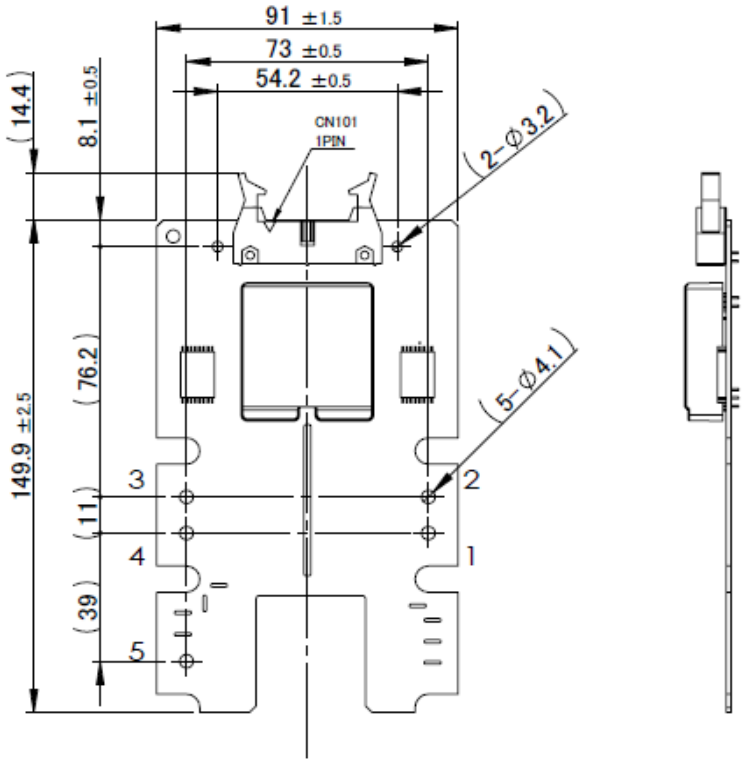
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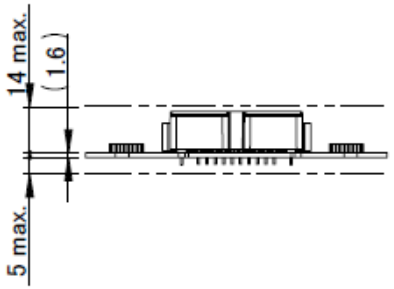
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1-5 Products appearance and line-up

FUJI Electric
PrimePACK™ 2in1 Type





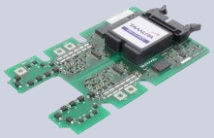


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1. Solution Guide for FUJI Electric PrimePACK™

1-5. Product line-up for FUJI Electric PrimePACK™ 2in1 Type

Package	Output power (Ref.)	Ic	Part No	TAMURA Driver			
				2DUD-P		Output Voltage /Withstand Voltage	Protection
		Vce = 1200V					
	150kW	900	2MBI900XXA120P-50		2DUD51008xFP *	+15V -10V / AC5000V	Soft turn off + Active Clamp
			2MBI900XXA120E-50				
	250kW	1200	2MBI1200XXE120P-50				
			2MBI1200XXE120E-50				
		1400	2MBI1400XXB120P-50				
	350kW	1800	2MBI1800XXF120P-50				
		Vce = 1700V					
	150kW	650	2MBI650XXA170-50		2DUD51008xFP *	+15V -10V / AC5000V	Soft turn off + Active Clamp
	350kW	1200	2MBI1200XXE170-50				
	250kW	1000	2MBI1000XXB170-50				
	350kW	1400	2MBI1400XXB170-50				
	550kW	1800	2MBI1800XXF170-50		2DUD51008xFP3		

*Consider evaluation on customer's request.

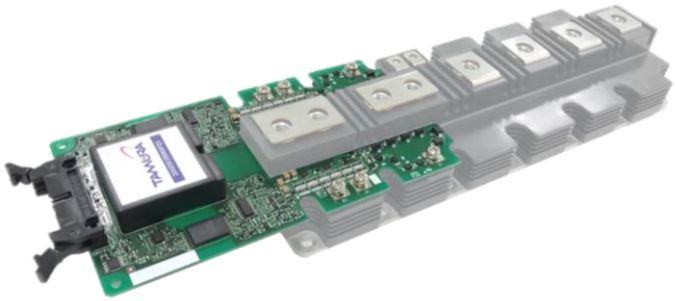
*x: Signal input voltage selectable "E" => 3.3~15V "F" => 15V

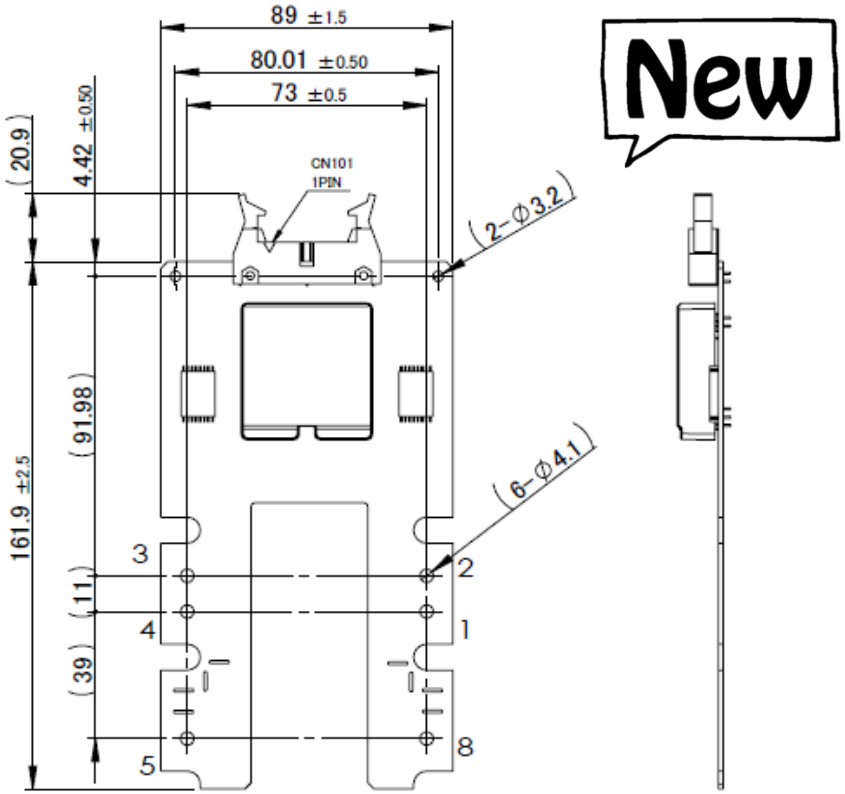
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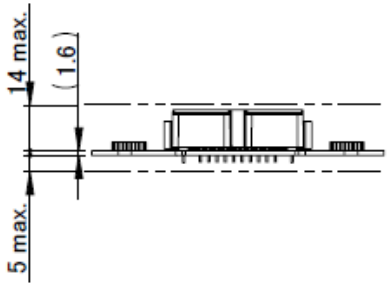
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1-5 Products appearance and line-up

FUJI Electric
PrimePACK™3+ 2in1 Type







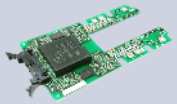
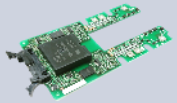
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1. Solution Guide for FUJI Electric PrimePACK™

1-5. Product line-up for FUJI Electric PrimePACK™ 3+ 2in1 Type

New

Package	Output power (Ref.)	Ic	Part No	TAMURA Driver			
				2DUD-Q		Output Voltage /Withstand Voltage	Protection
		Vce = 1200V					
	750kW	2400	**2MBI2400XRXF120-50**		**2DUD51008FFQ2**	+15V -10V / AC5000V	Soft turn off + Active Clamp
		Vce = 1700V					
	550kW	1800	**2MBI1800XXG170-50**		**2DUD51008FFQ1**		

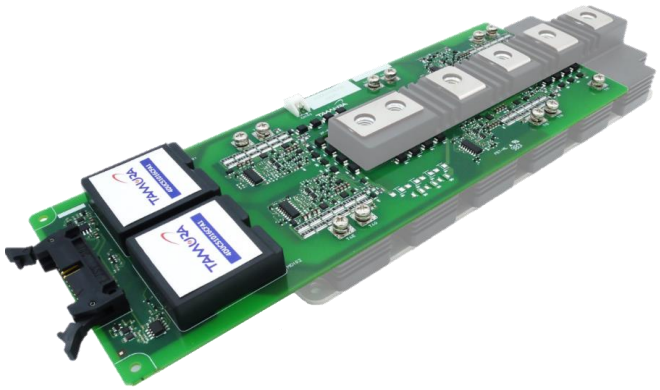
Signal input voltage 15V

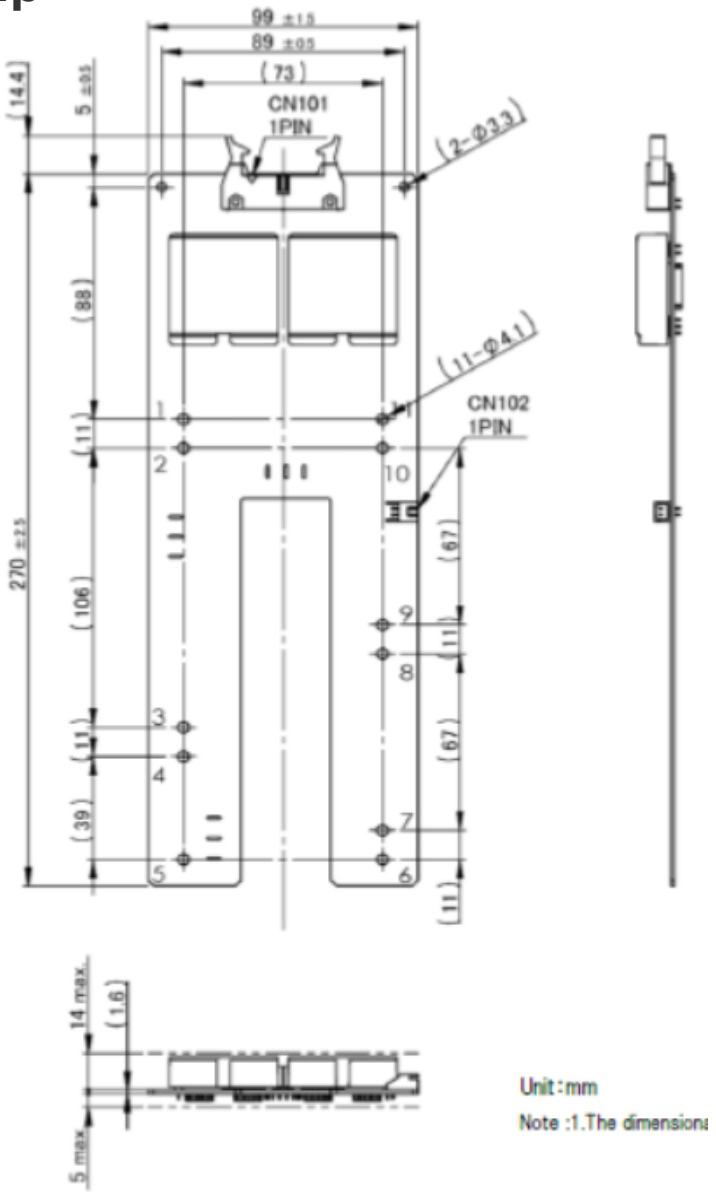
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1-5 Products appearance and line-up

FUJI Electric
PrimePACK™ 4in1 Type

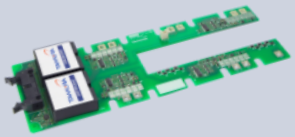
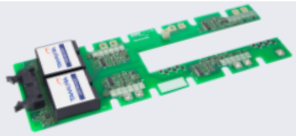
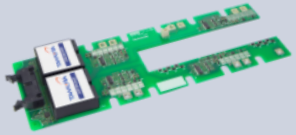




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1-5. Product line-up for FUJI Electric PrimePACK™ 4in1 Type

Package	Output power (Ref.)	Ic	Part No	TAMURA Driver 4DU - A or N		Output Voltage /Withstand Voltage	Protection
		Vce = 1200V (T1,T2) T-Type					
	100kW	450	4MBI450VB-120R1-50		4DUC51016xFA *	+15V -10V / AC5000V	Soft turn off
	125kW	650	4MBI650VB-120R1-50				
	200kW	900	4MBI900VB-120R1-50		4DUC51016xFA1		
			4MBI900VB-120RA-50		4DUC51016xFA2		
		Vce = 1700V (T1,T2) T-Type					
	150kW	450	4MBI450VB-170R2-50		4DUC51016xFA *		
	200kW	600	4MBI600VB-170R2-50				
		Vce = 1200V (T1,T2) I-Type					
	150kW	600	4MBI600VC-120-50		4DUD51016xFN1	+15V -10V / AC5000V	Soft turn off + Active Clamp

*Consider evaluation on customer's request.

x: Signal input voltage selectable "E" => 3.3~15V "F" => 15V

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Index

1) Solution Guide for FUJI Electric PrimePACK™
1-1 Application
1-2 Tamura Gate Driver 7 key points
1-3 Each protection function to ensure reliability
(Low stray capacity / Wider input voltage / Various protection)
1-4 Waveform of Tamura gate driver
(2 pulse / Short circuit / Temperature rise)
1-5 Products appearance and line-up

2) Introduction of One Tamura

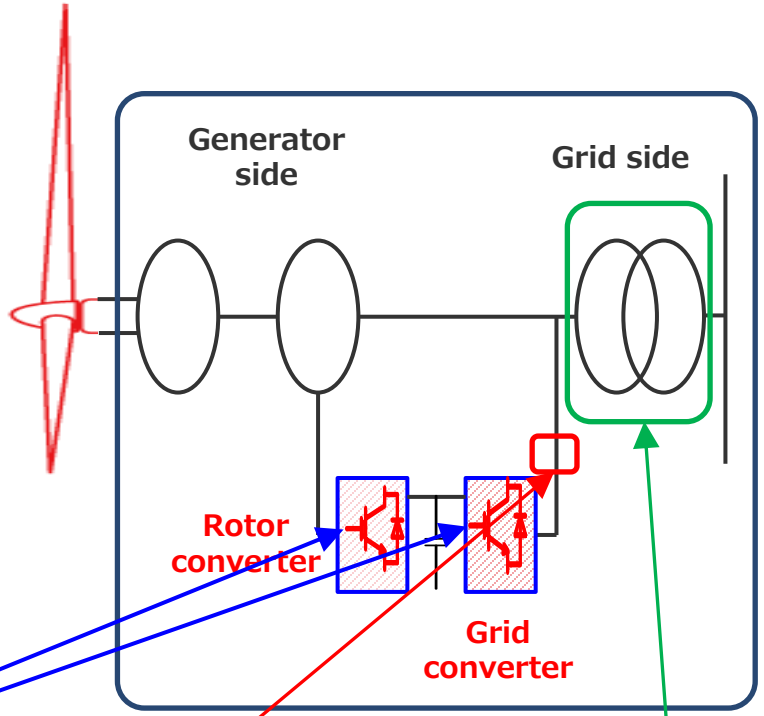
Appendix) Information & Contact

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2. Introduction of One Tamura (Wind Power converters)



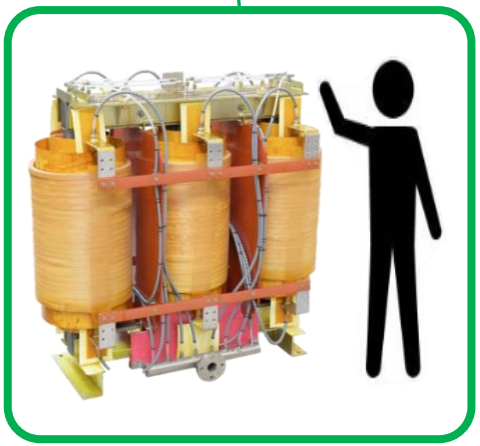




Gate Driver Unit



Current sensor



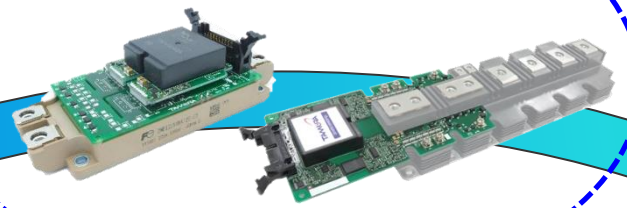
Reactor

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2. Introduction of One Tamura (General application)

Power electronics technology and main products

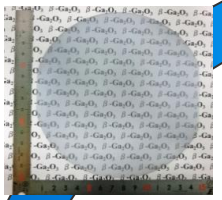
Gate driver
Circuit technology



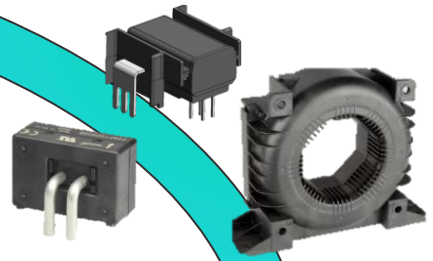
Gate Driver Unit

Device technology
Novel Crystal Technology, Inc.

Ga_2O_3

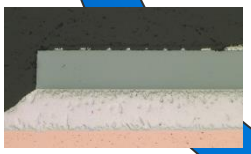


Module technology
Current sensor



Power electronics technology and main products

Soldering technology

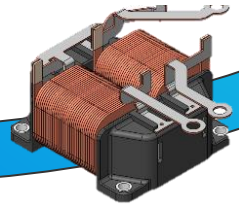


Electric Chemicals
Soldering material
Die attach material
TIM material

Reflow soldering system



Automotive reactor



Reactor for PF
(2 in 1)

Passive components

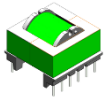


Reactor
Trans
Coil

Large reactor/ transformer



Toroidal coil



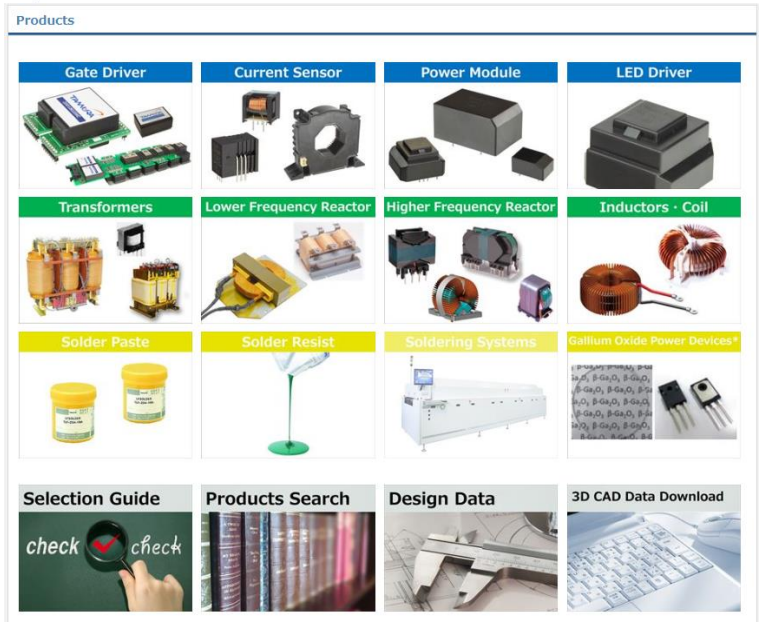
SW-Trans

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Appendix) Information & Contact

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!

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