Solution Guide for Mitsubishi Electric NX type series.

Supported by Mitsubishi Electric

SUSTAINABLE DEVELOPMENT GOALS

TAMURA
Your One and Only Company

TAM-GDM-00023

Issued on 1st Apr '22 Unit division HQ Japan

Rev A

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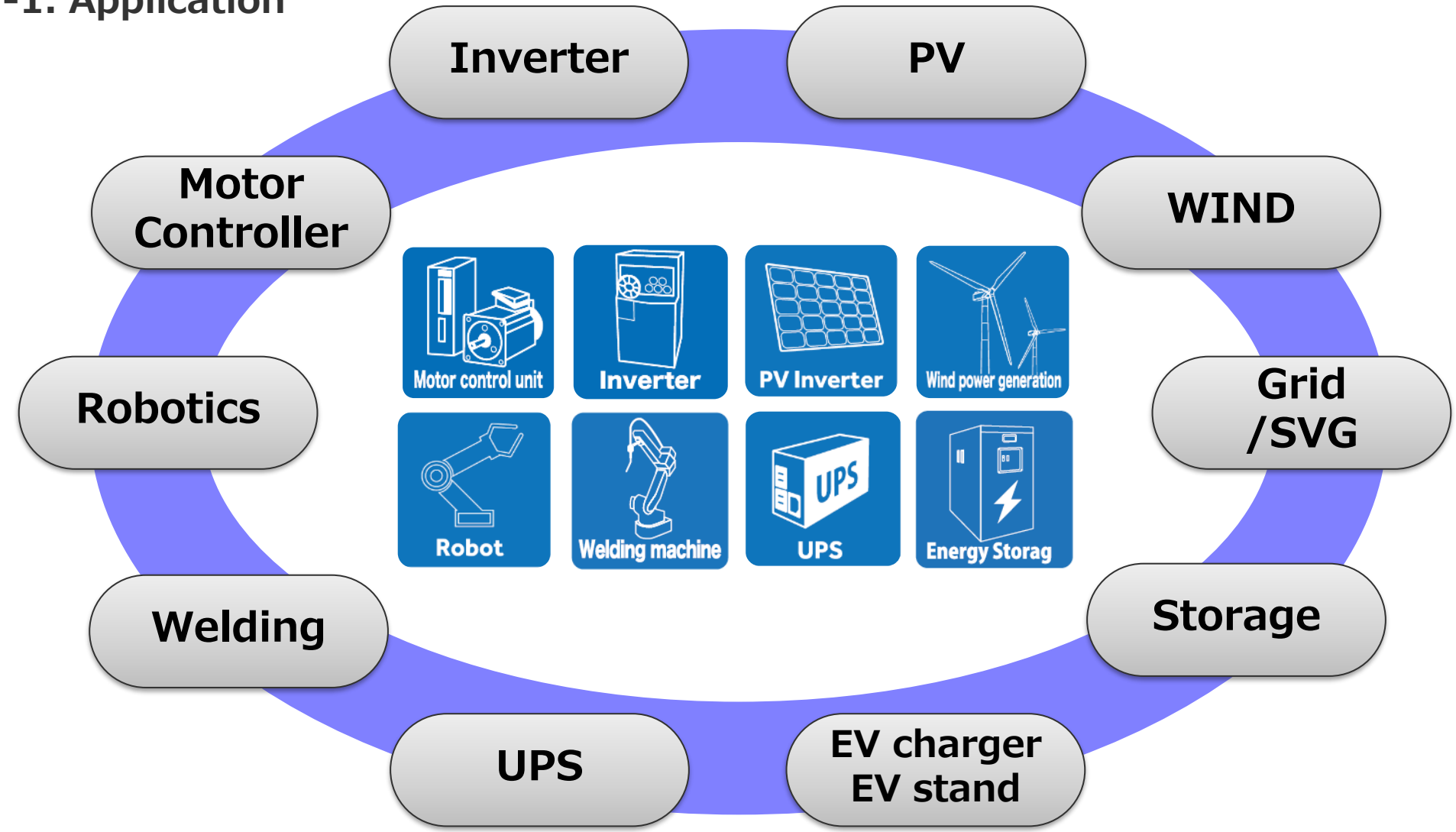
1. Solution Guide for Mitsubishi Electric NX type

1-1. Application



1. Solution Guide for Mitsubishi Electric NX type

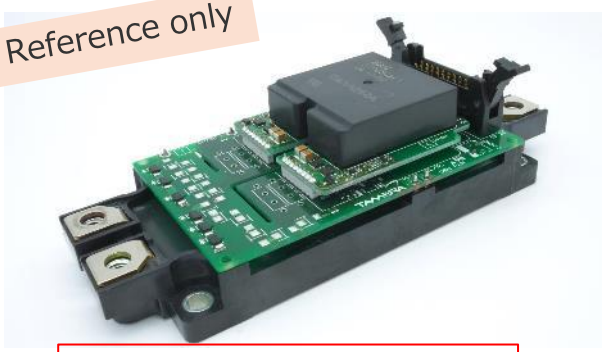
1-2. Tamura Gate Driver 7 key points

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

1. Solution Guide for Mitsubishi Electric NX type

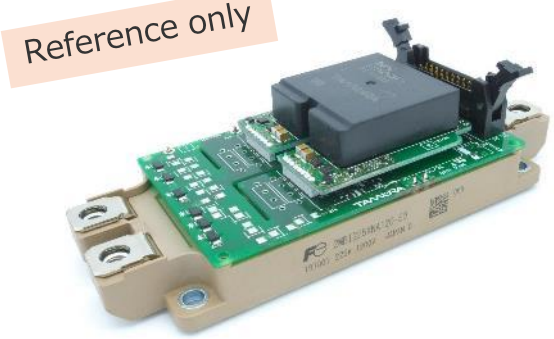
1-3 Product features

Reference only



Mitsubishi Electric
/ NX type

Reference only



Fuji Electric
/ DualXT

Reference only

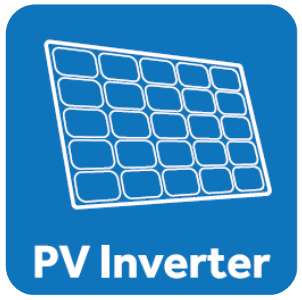
Infineon Technologies
/ EconoDUAL™

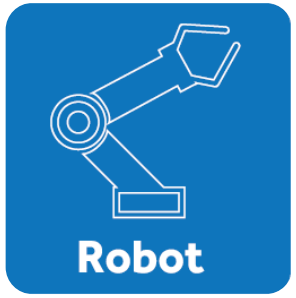
4W per channel

Frequency 200kHz (Max)

Peak Current 43A

Suitable for various applications !



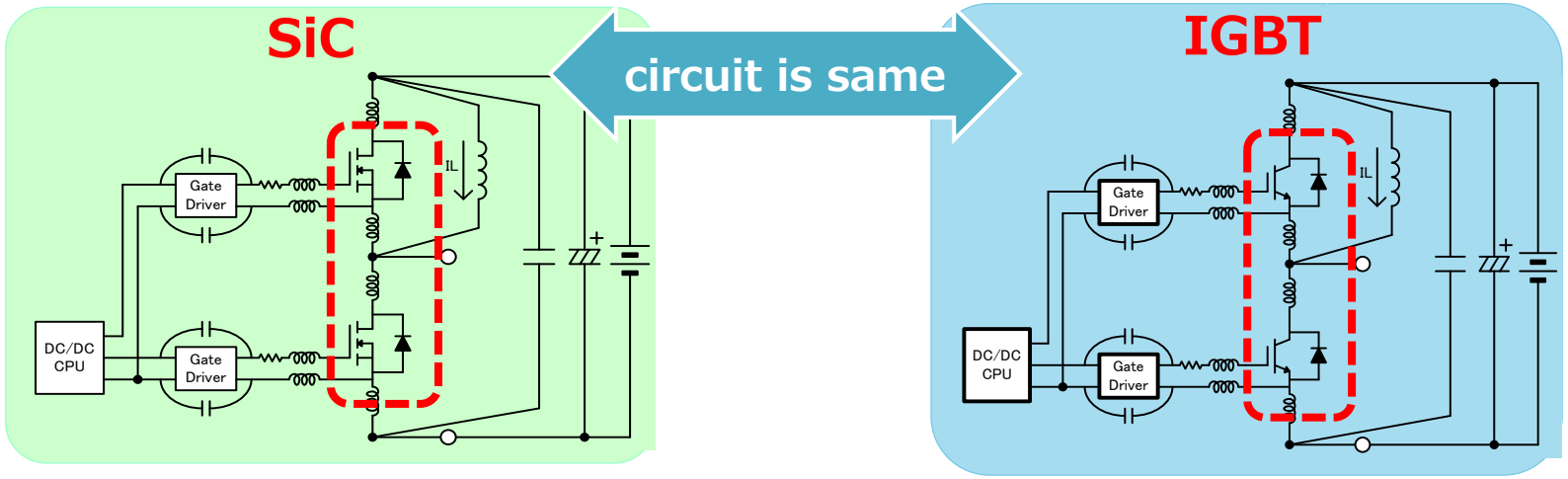


1. Solution Guide for Mitsubishi Electric NX type

1-4. Gate Driver differences (SiC and IGBT)

Item	Condition (SiC-MOSFET)	Condition (IGBT)
Gate drive circuit	2 (Half bridge)	2 (Half bridge)
Gate voltage (H)/(L)	18V/-5V	15V/-10V
Protection function	DESAT, Miller clamp	DESAT, STO,ACL
Operating frequency	200kHz (MAX)	20kHz (MAX)
Stray capacity	12pF	30-40pF
Response	85nsec (TYP)	350nsec (TYP)

Cover with all items!



If the SiC-MOSFET can be driven, the IGBT can be driven easily!

1. Solution Guide for Mitsubishi Electric NX type

1-5. Performance comparison of other companies

Rev A

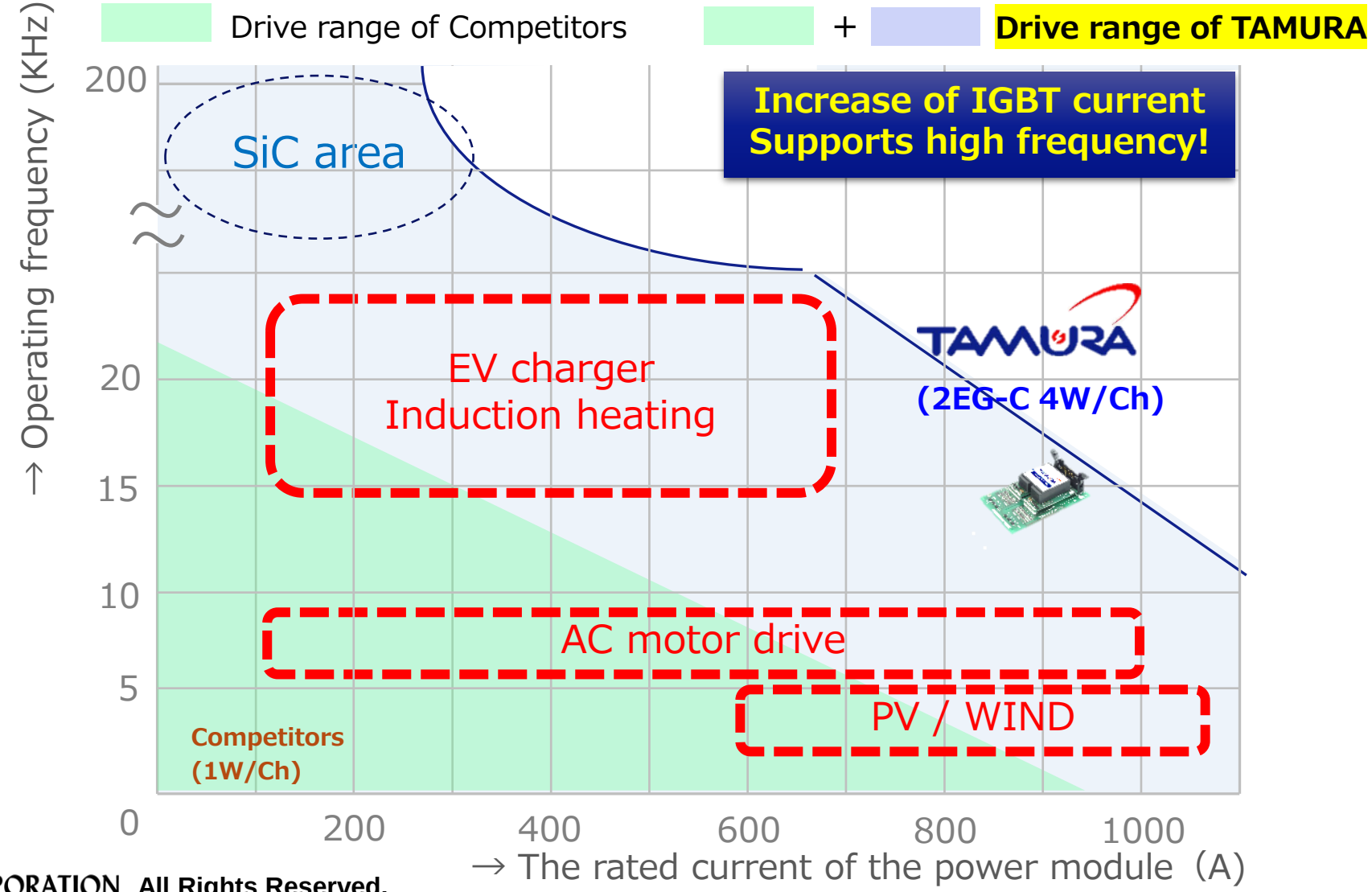
Item	TAMURA	Company A
Power module	SiC-MOSFET/IGBT	IGBT
Input Voltage	13-28V	15V
Output Voltage	15V/-10V	15V/-10V
Output power ○	4W	1W
Frequency ○	200kHz (Max)	20kHz (Max)
Output Perk current ○	43A	15A

Large drive capacity makes it ideal for large capacity IGBTs!

1. Solution Guide for Mitsubishi Electric NX type

1-6 High power of DC-DC converter (Performance comparison)

Switching frequency range (image)



1. Solution Guide for Mitsubishi Electric NX type

1-7 Feature of Tamura gate driver

IGBT:CM800DX-24T1 (Mitsubishi Electric)

2EG01XCDN11N Switching Test Data

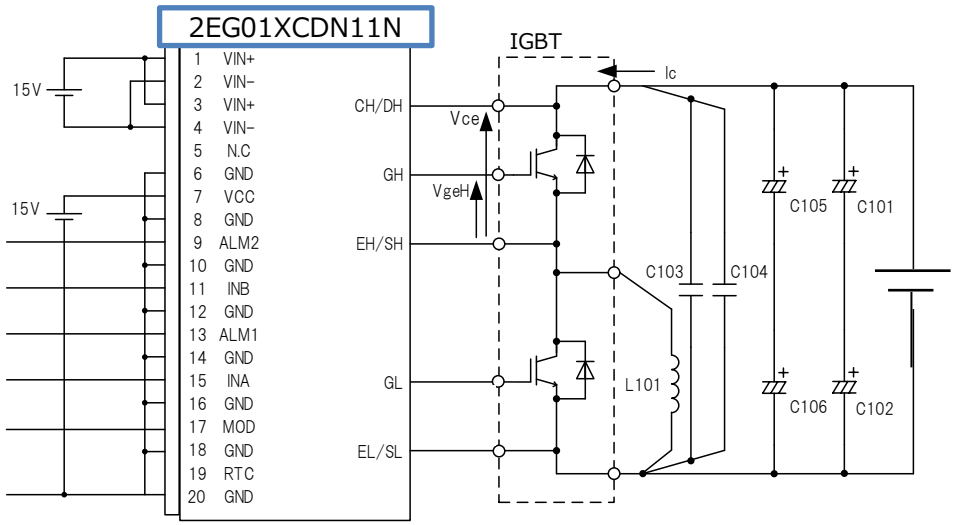
1. Solution Guide for Mitsubishi Electric NX type

Rev A

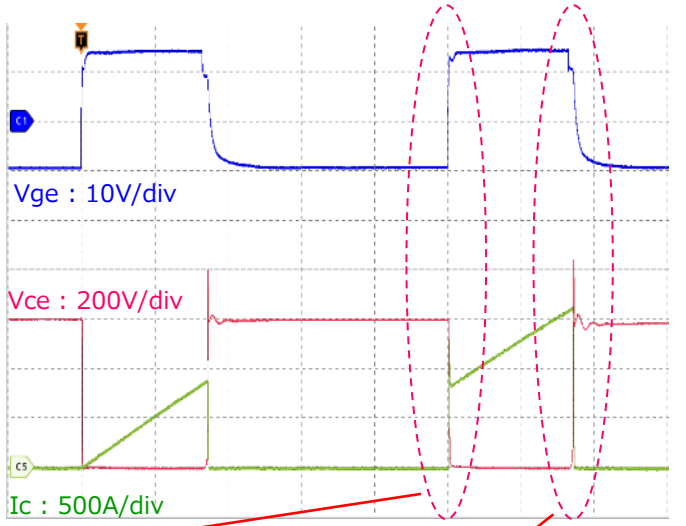
1-7 Single drive solution /2 Pulse test

DC Link : 600V, Ron : 1Ω, Roff : 10Ω, Upper arm, Tj=150℃

High temp test

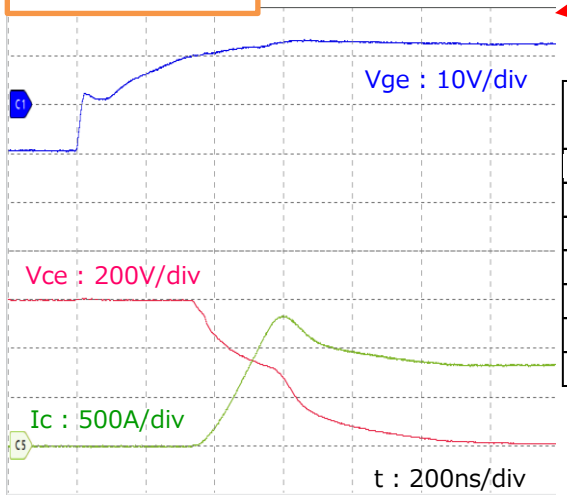


IGBT : CM800DX-24T1 (Mitsubishi)
C101,102,105,106 : 2700uF(Ls : 20nH)
C103,104: 4.7uF (Ls : 20nH)
L101: 22uH



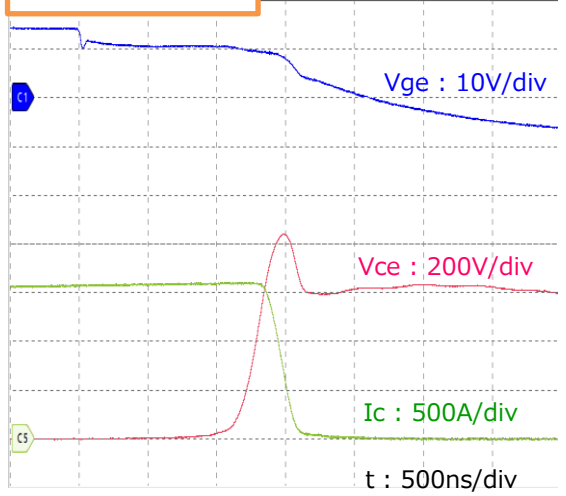
t : 20us/div

800A turn on



Item	Measurement value	
DC Link	600	V
Ic	800	A
dV/dt	2.2	kV/us
di/dt	7.2	kA/us
td(on)	0.37	us
tr	0.14	us
Eon	99	mJ

1600A turn off



Item	Measurement value	
DC Link	600	V
Ic	1600	A
Vcep	838	V
dV/dt	3.4	kV/us
di/dt	8.4	kA/us
td(off)	1.38	us
tf	0.19	us
Eoff	261	mJ

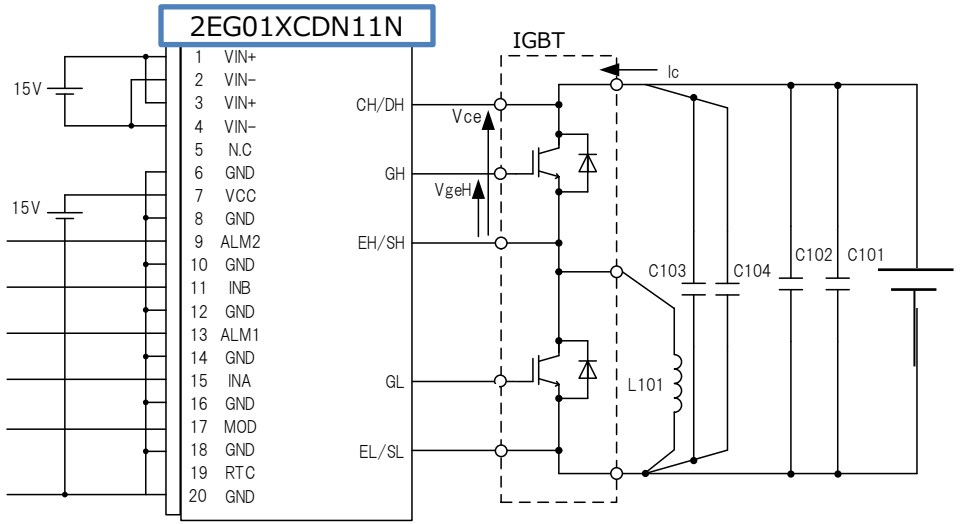
1. Solution Guide for Mitsubishi Electric NX type

Rev A

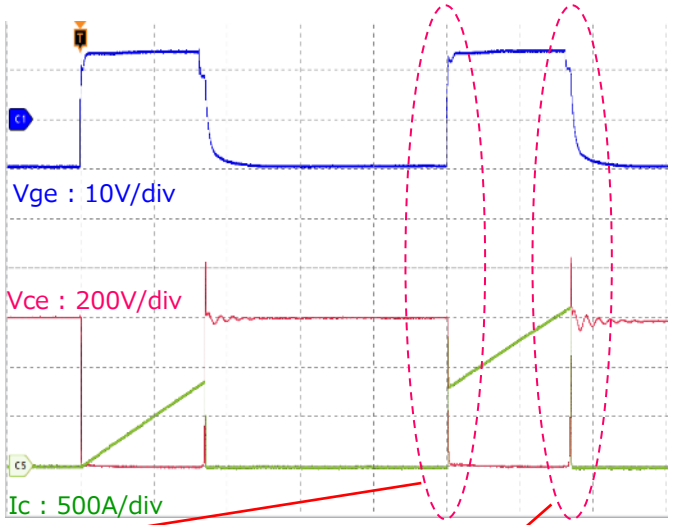
1-7 Single drive solution /2 Pulse test

DC Link : 600V, Ron : 1Ω, Roff : 10Ω, Upper arm, Tj=-40℃

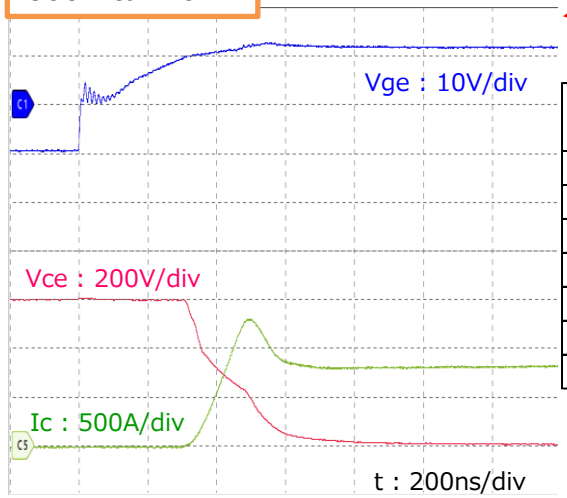
Low temp test



IGBT : CM800DX-24T1 (Mitsubishi)
C101,102 : 1500uF(Ls : 50nH)
C103,104 : 4.7uF (Ls : 20nH)
L101: 22uH

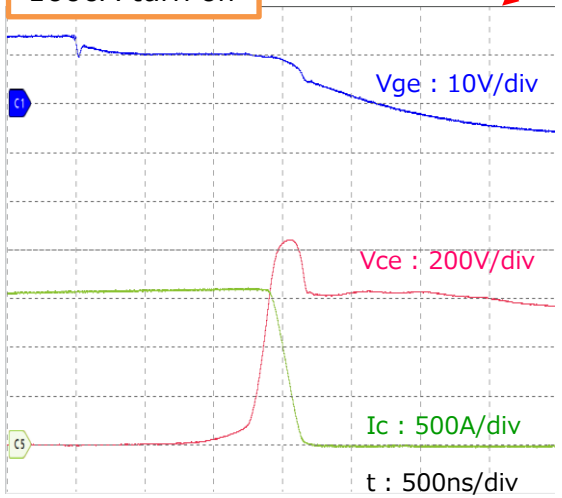


800A turn on



Item	Measurement value	
DC Link	600	V
Ic	800	A
dV/dt	3.2	kV/us
di/dt	8.9	kA/us
td(on)	0.33	us
tr	0.08	us
Eon	46	mJ

1600A turn off



Item	Measurement value	
DC Link	600	V
Ic	1600	A
Vcep	840	V
dV/dt	4.3	kV/us
di/dt	8.0	kA/us
td(off)	1.45	us
tf	0.18	us
Eoff	236	mJ

1. Solution Guide for Mitsubishi Electric NX type

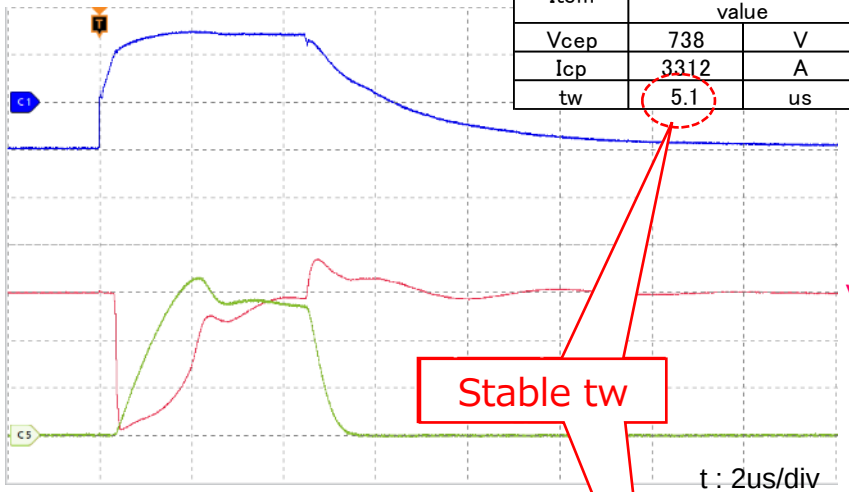
1-7 Single drive solution/Arm short circuit

Rev A

DC Link : 600V,　Ron : 1Ω,　Roff : 10Ω,　Upper arm,　Tj=150℃

Load inductance : 170nH

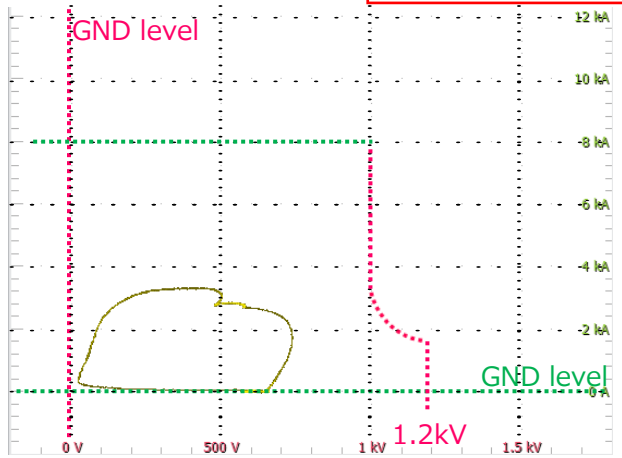
Item	Measurement value	
Vcep	738	V
Icp	3312	A
tw	5.1	us



Stable tw

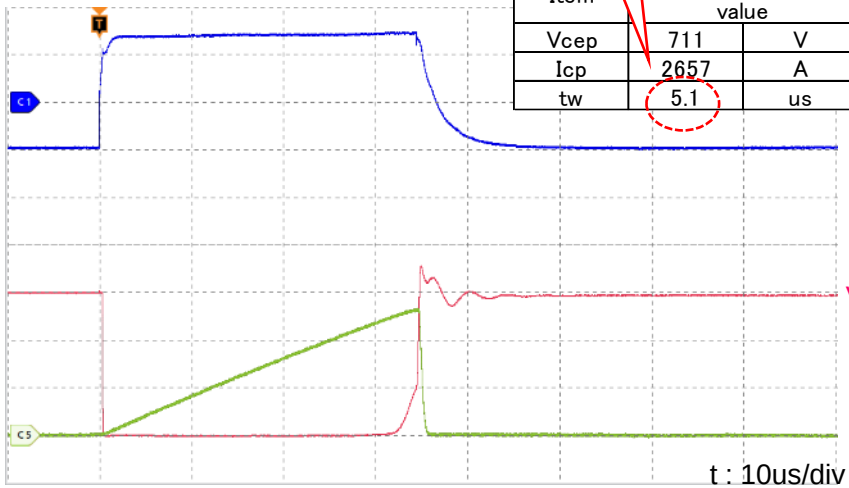
SOA

High temp test



Load inductance : 7uH

Item	Measurement value	
Vcep	711	V
Icp	2657	A
tw	5.1	us



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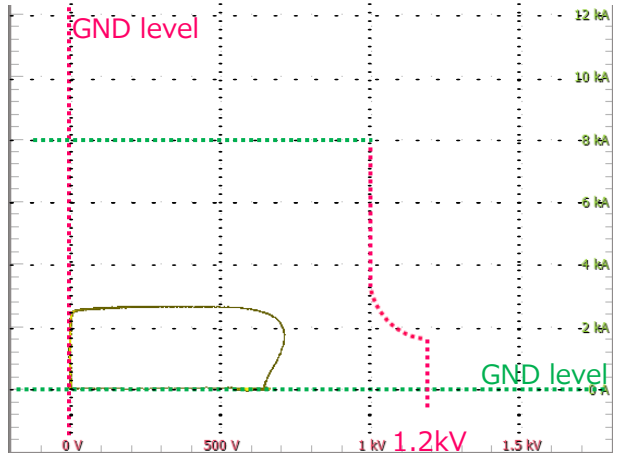


1. Solution Guide for Mitsubishi Electric NX type

1-7 Single drive solution/Arm short circuit

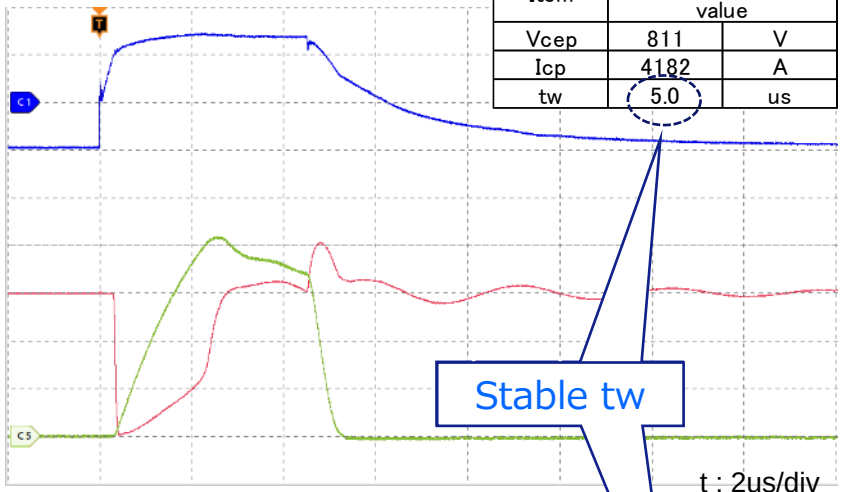
Rev A

DC Link : 600V,　Ron : 1Ω,　Roff : 10Ω,　Upper arm,　Tj=-40℃

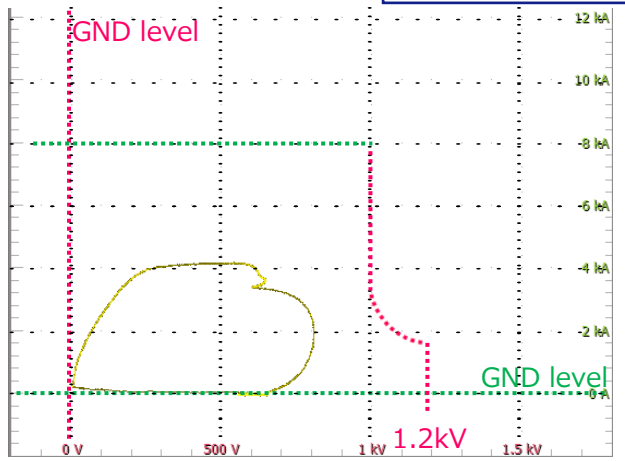
Low temp test

Load inductance : 170nH

Item	Measurement value	
Vcep	811	V
Icp	4182	A
tw	5.0	us

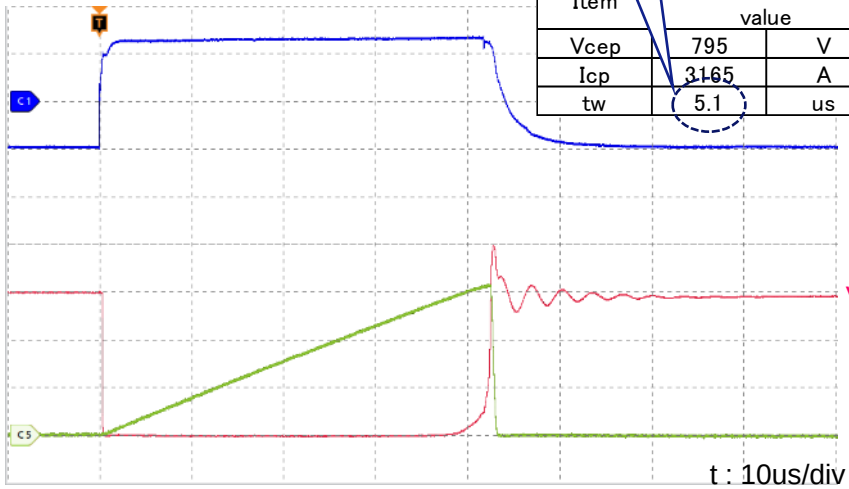


SOA



Load inductance : 7uH

Item	Measurement value	
Vcep	795	V
Icp	3165	A
tw	5.1	us



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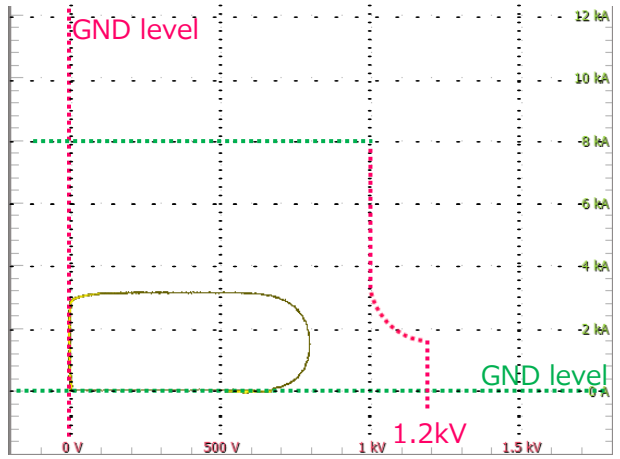
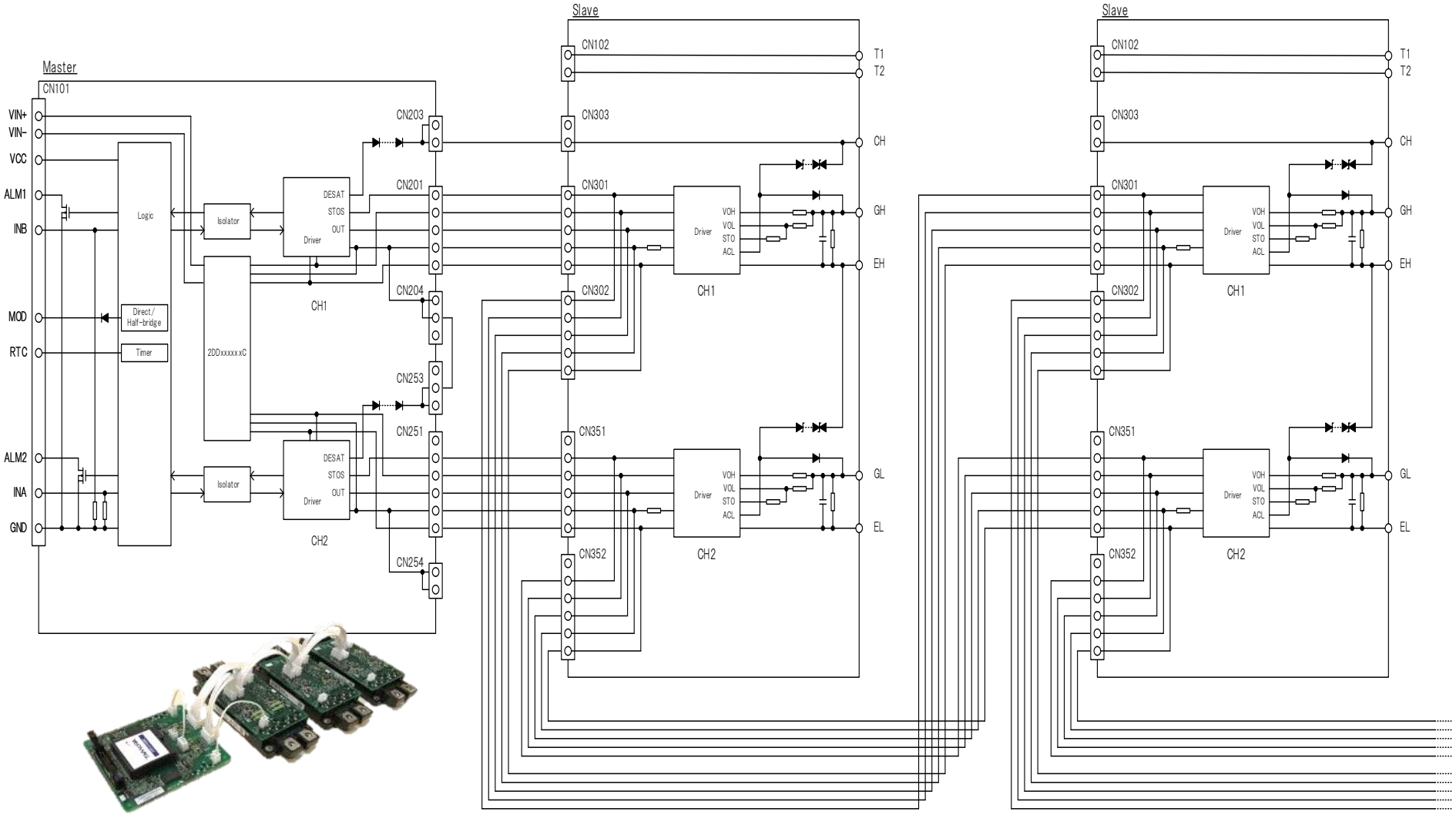


1. Solution Guide for Mitsubishi Electric NX type

1-8 Application example (parallel drive configuration)

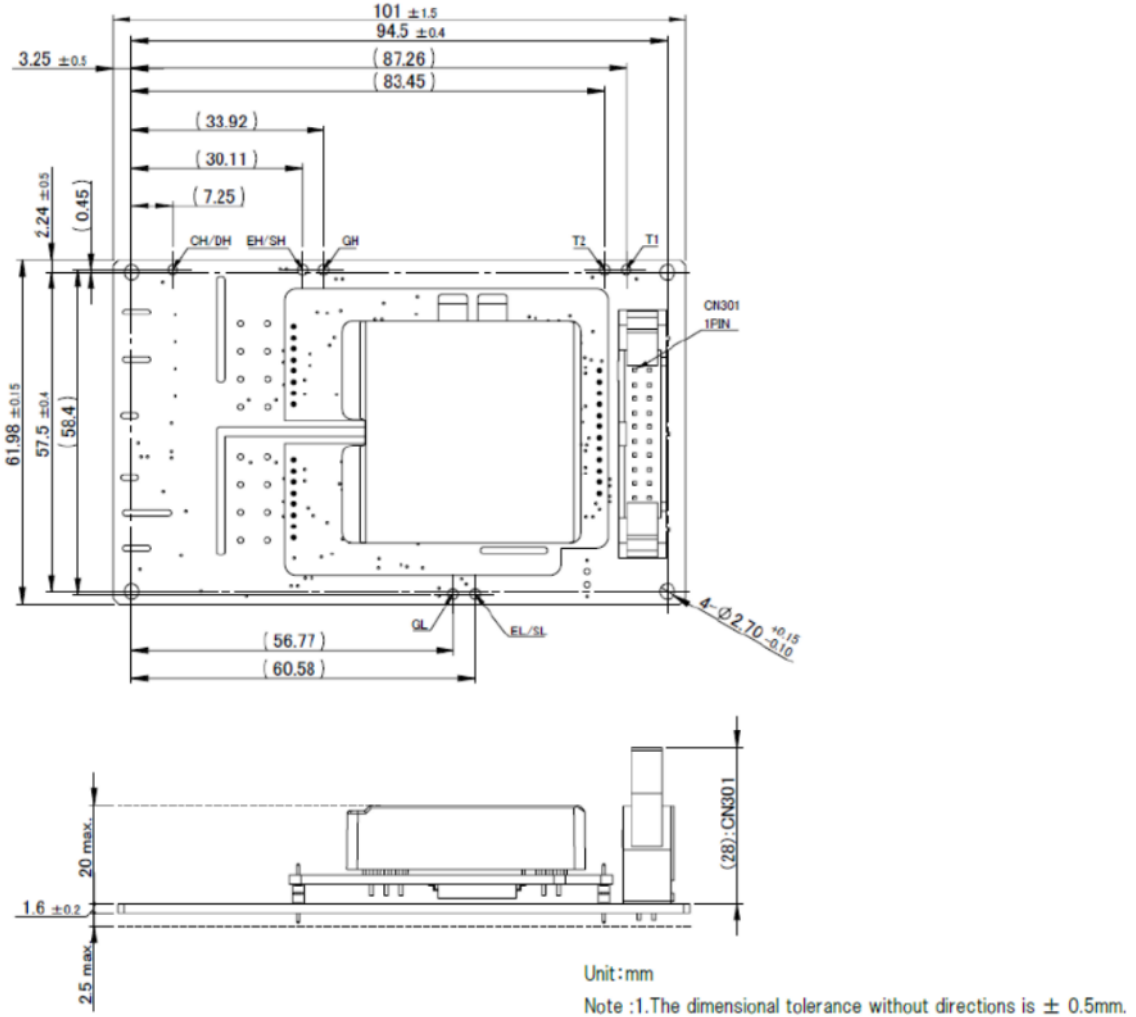
Connection diagram in parallel drive

Please contact us if you are interested !



1. Solution Guide for Mitsubishi Electric NX type

1-9 Products appearance and line-up



1. Solution Guide for Mitsubishi Electric NX type

1-9 Products appearance and line-up

Rev A

*1 Catalog products. Please confirm stock.
*2 Not in stock due to optimization required. Please contact us.

Package	Output power (Ref.)	Ic	Part No	TAMURA Driver 2EG-C / D		2CG-B/2CG-D	2DD
				Vce = 1200V			
	30kW	225	CM225DX-24T1		2EG01XCCN11N *1 2EG01XCDN11N *1 2EG??zyxN11N - ?? *2	2CG010BBC11N (+15/-10V) Soft turn off ---------- 2CG010DBC11N (+15/-10V) Soft turn off +Active clamp 	2DD151008C (+15V/-10V) 
			CM225DX-24T				
	50kW	300	CM300DX-24T1				
			CM300DX-24T				
	100kW	450	CM450DX-24T1				
			CM450DX-24T				
	125kW	600	CM600DX-24T1				
			CM600DX-24T				
	150kW	900	CM800DX-24T1				
				Vce = 1700V			
	TBC	225	CM225DX-34T		2EG01XCCN11N *1 2EG01XCDN11N *1 2EG??zyxN11N - ?? *2	2CG010BBC11N (+15/-10V) Soft turn off ---------- 2CG010DBC11N (+15/-10V) Soft turn off +Active clamp 	2DD151008C (+15V/-10V) 
		300	CM300DX-34T				
		450	CM450DX-34T				
		600	CM600DX-34T				

x: Signal input voltage selectable: "C" => 3.3~15V / "D" => 15V
y: Protection circuits: "C"=>Soft turn off / "D"=>Soft turn off + Active clamp
z: Gate resistors: "X" => Not mounted / "0" mounted
??: Semi-optimized code

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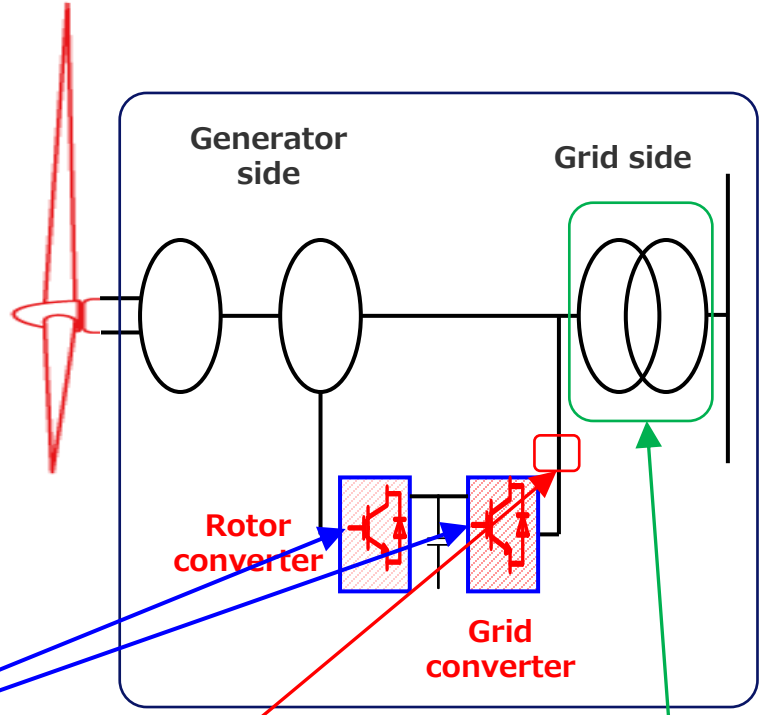
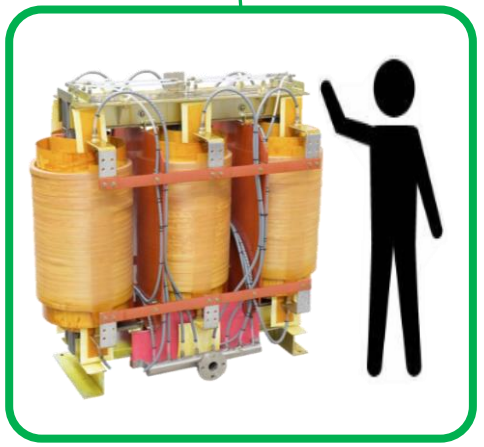
2) Introduction of One Tamura (Wind Power converters)

Rev A



Gate Driver Unit

Current sensor



Reactor

2) Introduction of One Tamura (General application)

TAMURA
Rev A

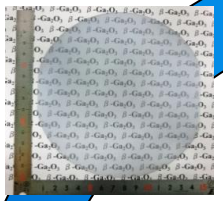
Power electronics technology and main products

Gate driver
Circuit technology

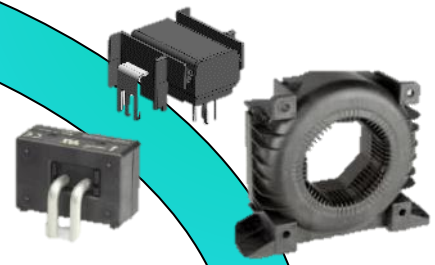
Gate Driver Unit

Device technology
Novel Crystal Technology, Inc.

Ga_2O_3



Module technology
Current sensor



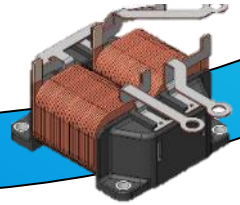
Power electronics technology and main products

Soldering technology

Electric Chemicals
Soldering material
Die attach material
TIM material

Reflow soldering system

Automotive reactor



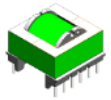
Reactor for PF
(2 in 1)

Passive components

Reactor
Trans
Coil

Large reactor/ transformer

Toroidal coil

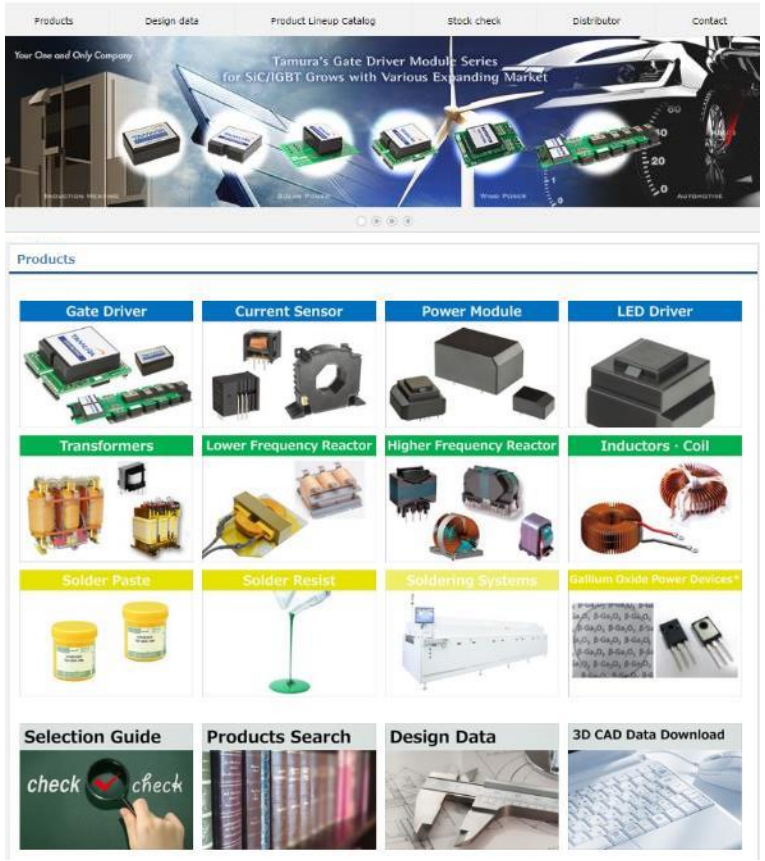


SW-Trans

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/