Solution Guide for Infineon Technologies AG EconoDUAL™

SUSTAINABLE DEVELOPMENT GOALS

Supported by Infineon Technologies AG

TAMURA
Your One and Only Company

TAM-GDM-00018

Issued on 1st Apr '22 Unit division HQ Japan

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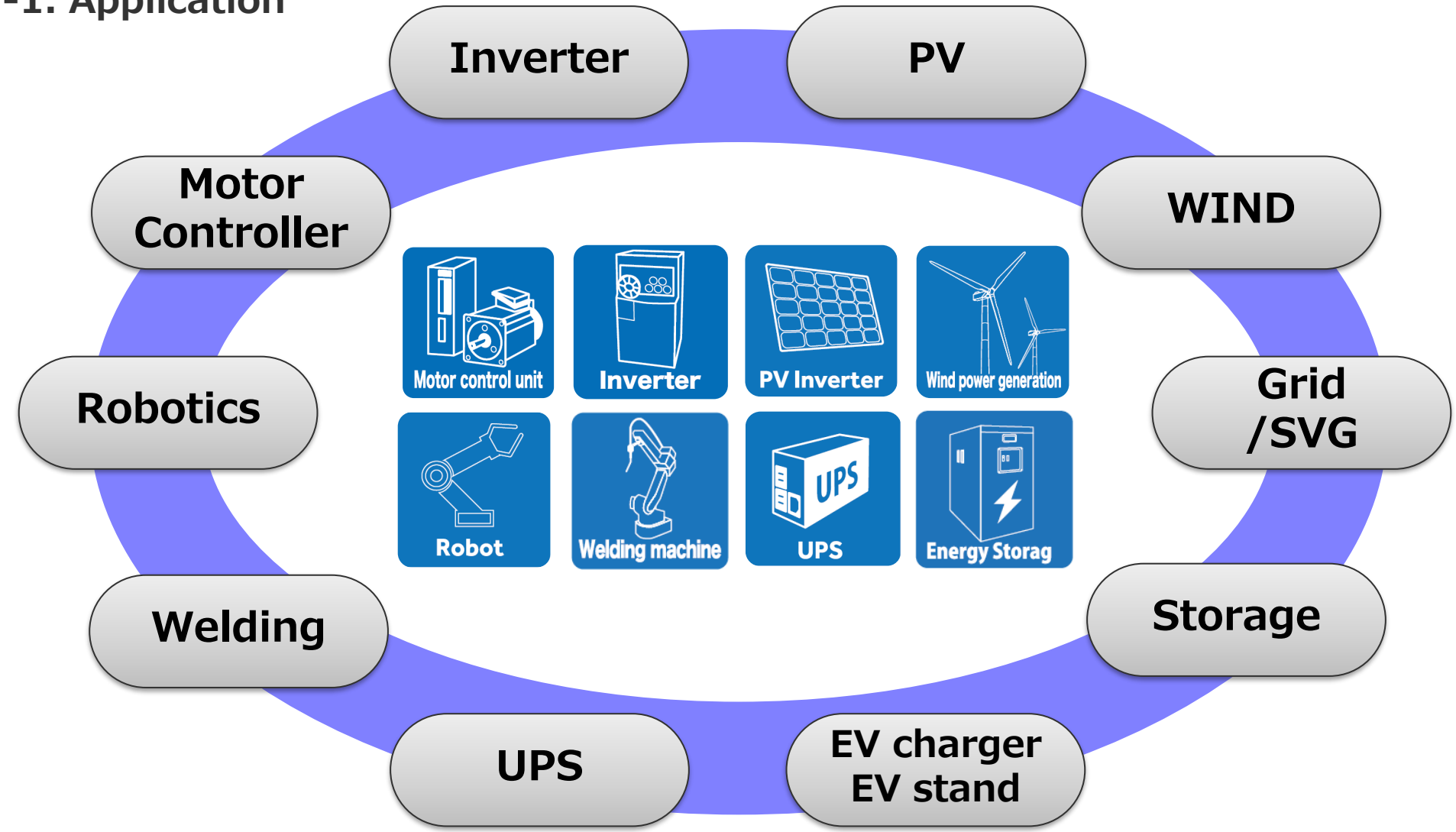
1. Solution Guide for EconoDUAL™

1-1. Application



1. Solution Guide for EconoDUAL™

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 EconoDUAL™

1-3 Product features

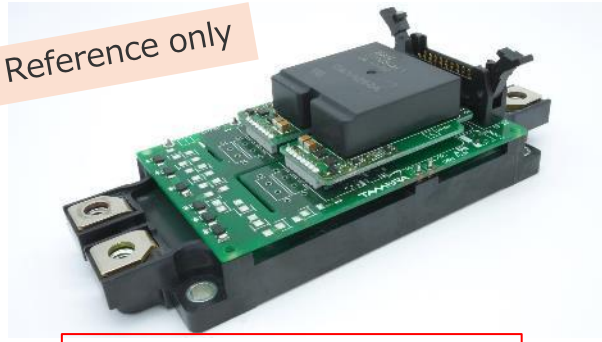
Reference only

Infineon Technologies
/ EconoDUAL™

Reference only

Fuji Electric
/ DualXT

Reference only



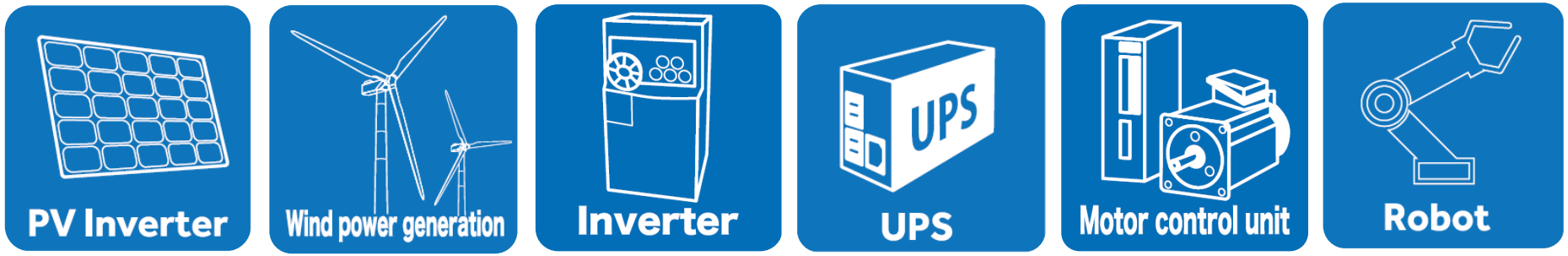
Mitsubishi Electric
/ NX type

4W per channel

Frequency 100kHz (Max)

Peak Current 43A

Suitable for various applications !

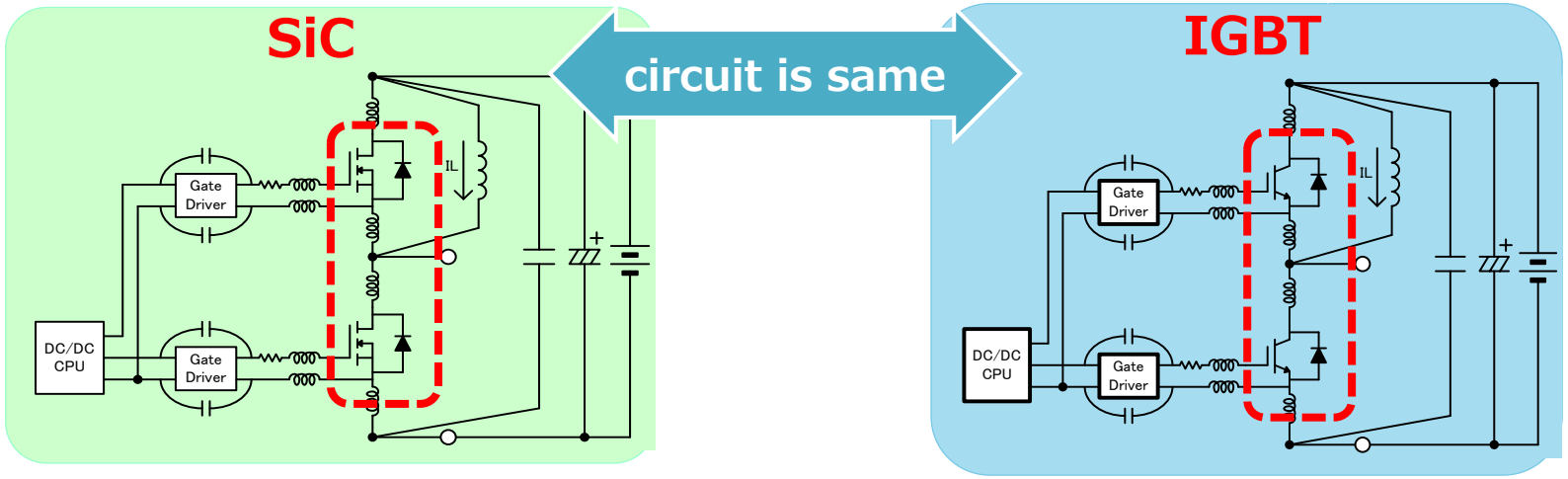


1. Solution Guide for EconoDUAL™

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	100kHz (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 EconoDUAL™

1-5. Performance comparison of other companies

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 ○	100kHz (Max)	20kHz (Max)
Output Perk current ○	43A	15A

Large drive capacity makes it ideal for large capacity IGBTs!

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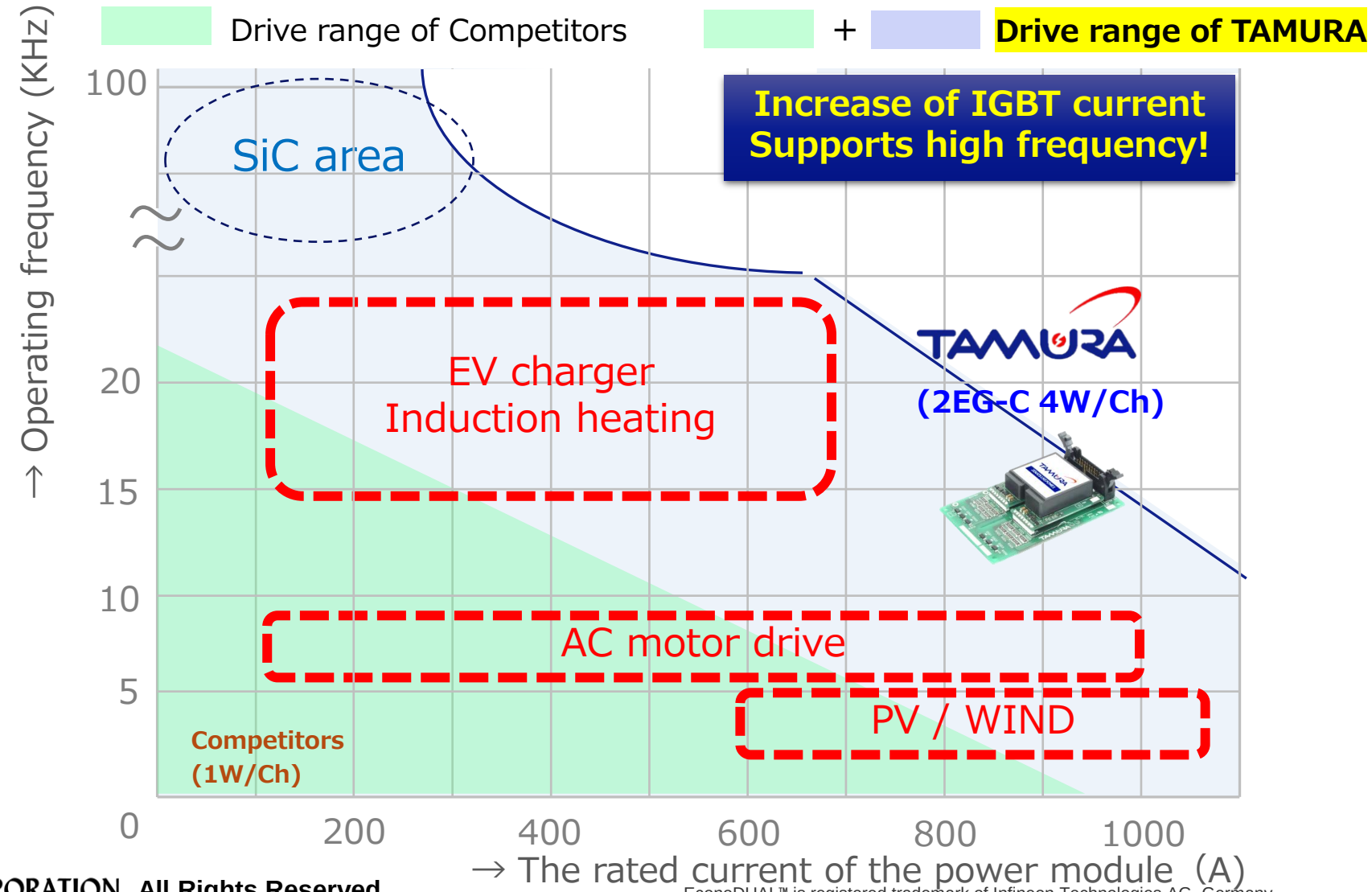
1. Solution Guide for EconoDUAL™

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

Switching frequency range (image)



IGBT:FF900R12ME7_B11 (Infineon Technologies)

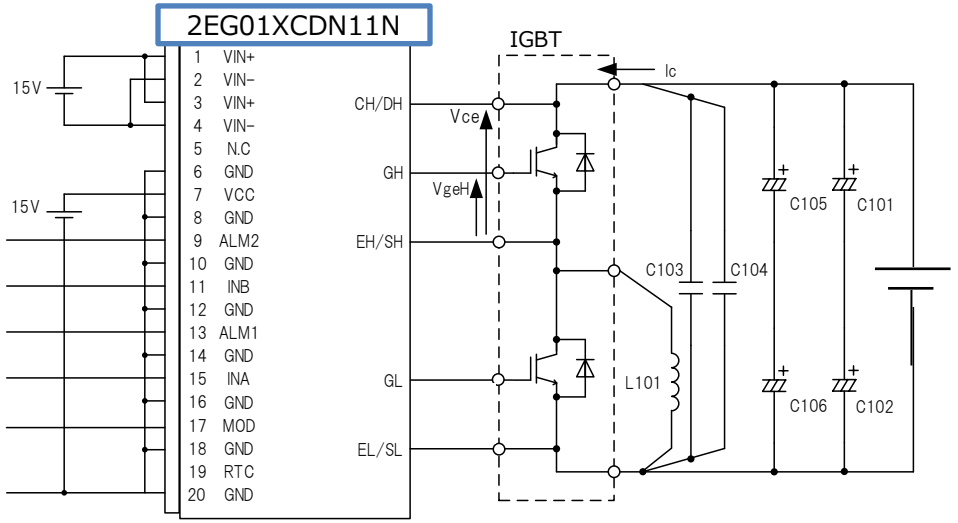
2EG01XCDN11N Switching Test Data

1. Solution Guide for EconoDUAL™

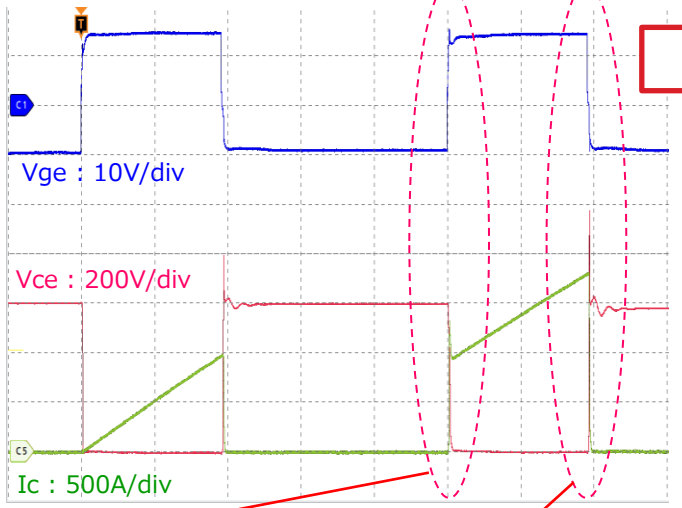
1-7 Single drive solution /2 Pulse test

DC Link : 600V, Ron=Roff : 0.51Ω, Upper arm, Tj=150℃

High temp test

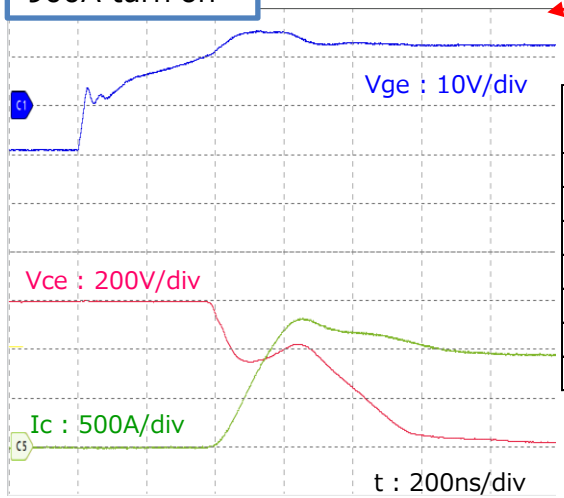


IGBT : FF900R12ME7_B11 (Infineon)
C101,102,105,106 : 2700uF(Ls : 20nH)
C103,104: 4.7uF (Ls : 20nH)
L101: 22uH



t : 20us/div

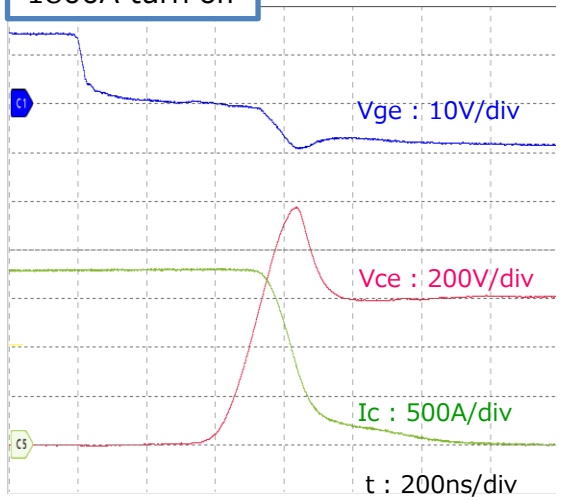
900A turn on



t : 200ns/div

Item	Measurement value	
DC Link	600	V
Ic	900	A
dV/dt	2.7	kV/us
di/dt	7.5	kA/us
td(on)	0.40	us
tr	0.12	us
Eon	172	mJ

1800A turn off



t : 200ns/div

Item	Measurement value	
DC Link	600	V
Ic	1800	A
Vcep	973	V
dV/dt	5.2	kV/us
di/dt	12.4	kA/us
td(off)	0.56	us
tf	0.28	us
Eoff	240	mJ

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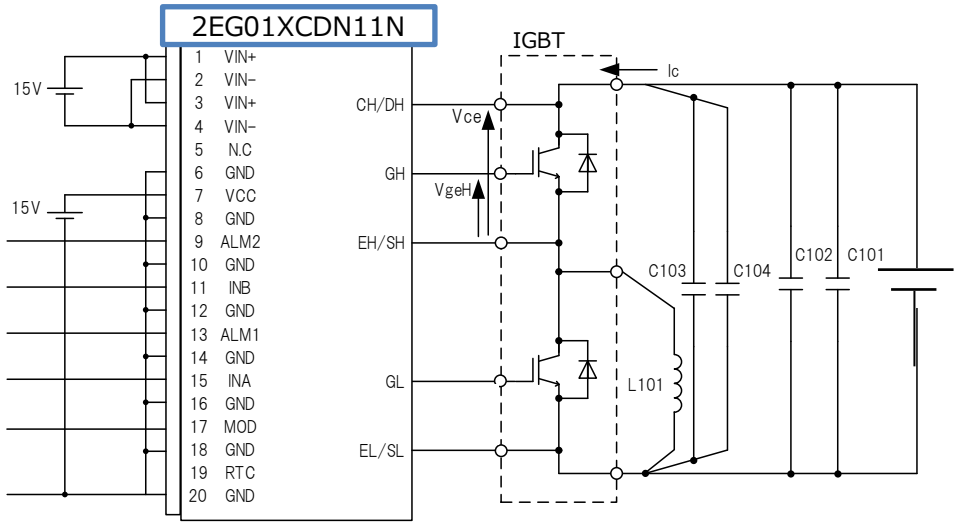
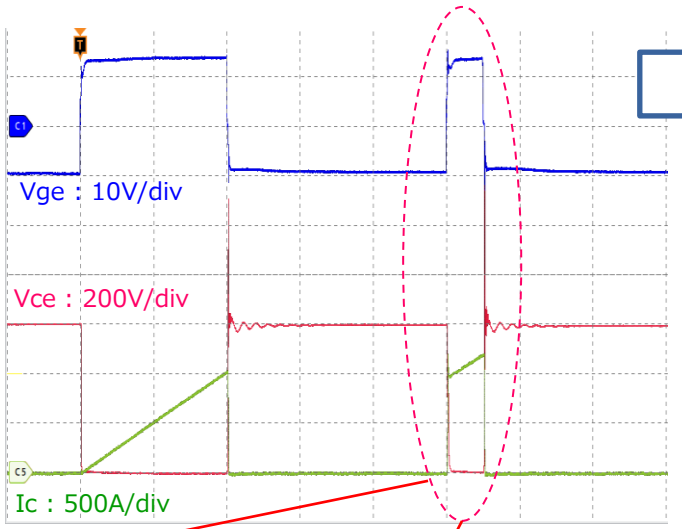
1. Solution Guide for EconoDUAL™

1-7 Single drive solution /2 Pulse test

DC Link : 600V, Ron=Roff : 0.51Ω, Upper arm, Tj=-40℃

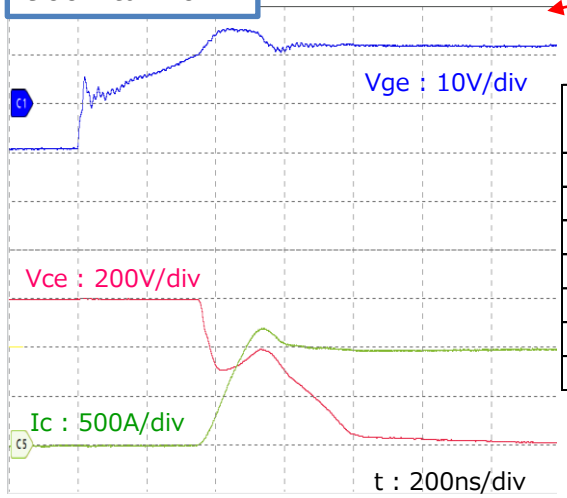


IGBT : FF900R12ME7_B11 (Infineon)
C101,102 : 1500uF(Ls : 50nH)
C103,104 : 4.7uF (Ls : 20nH)
L101: 22uH



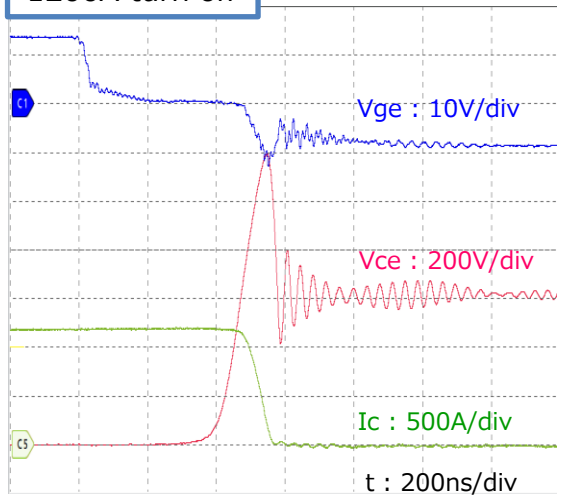
Low temp test

900A turn on



Item	Measurement value	
DC Link	600	V
Ic	900	A
dV/dt	4.2	kV/us
di/dt	9.2	kA/us
td(on)	0.36	us
tr	0.10	us
Eon	108	mJ

1200A turn off



Item	Measurement value	
DC Link	600	V
Ic	1200	A
Vcep	1197	V
dV/dt	8.0	kV/us
di/dt	16.3	kA/us
td(off)	0.47	us
tf	0.07	us
Eoff	82	mJ

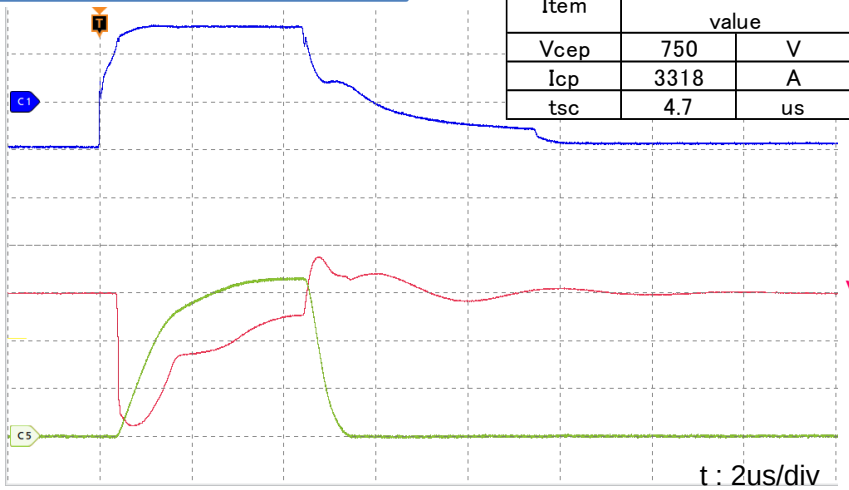
1. Solution Guide for EconoDUAL™

1-7 Single drive solution/Arm short circuit

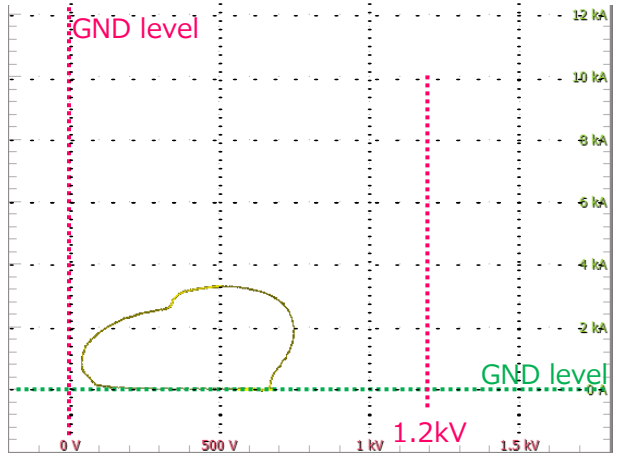
DC Link : 600V,　Ron=Roff : 0.51Ω,　Upper arm,　Tj=150℃

Load inductance : 170nH

Item	Measurement value	
Vcep	750	V
Icp	3318	A
tsc	4.7	us

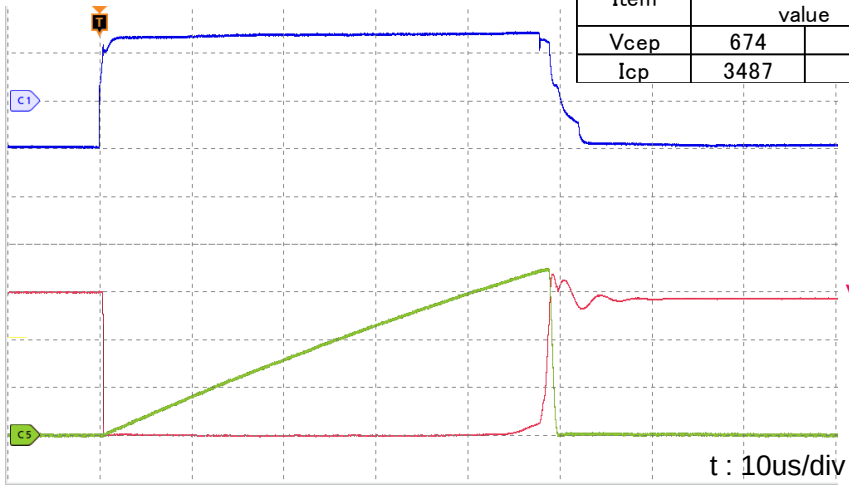


SOA

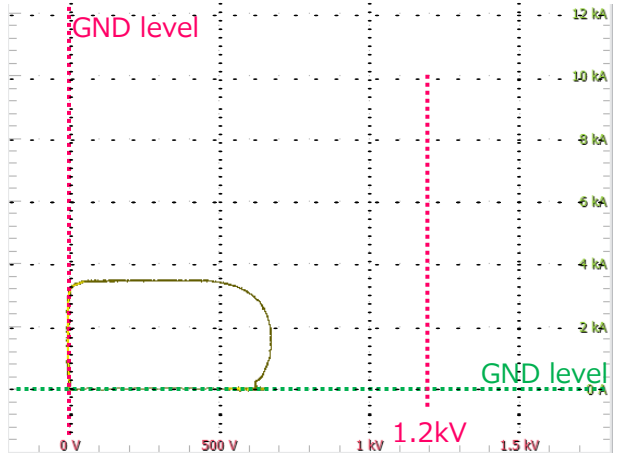


Load inductance : 7uH

Item	Measurement value	
Vcep	674	V
Icp	3487	A



SOA



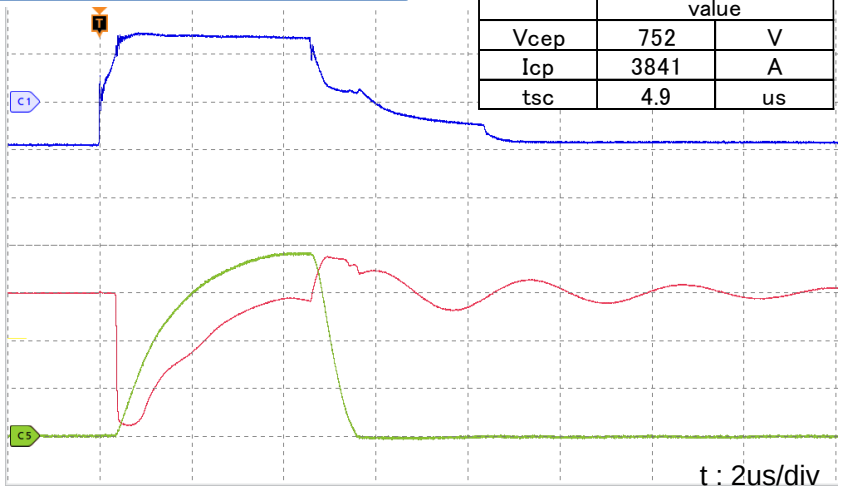
1. Solution Guide for EconoDUAL™

1-7 Single drive solution/Arm short circuit

DC Link : 600V,　Ron=Roff : 0.51Ω,　Upper arm,　Tj=-40℃

Load inductance : 170nH

Item	Measurement value	
Vcep	752	V
Icp	3841	A
tsc	4.9	us



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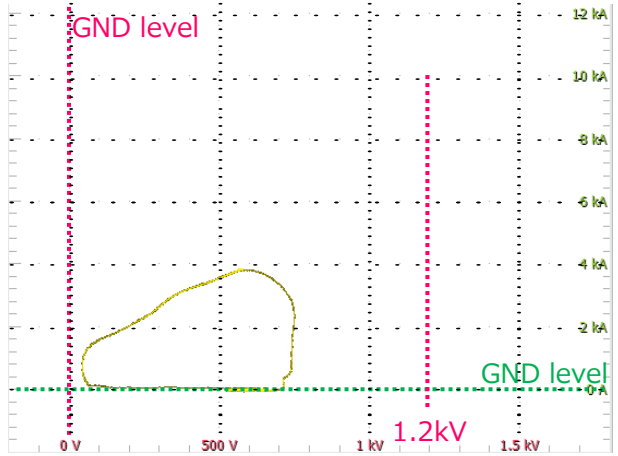
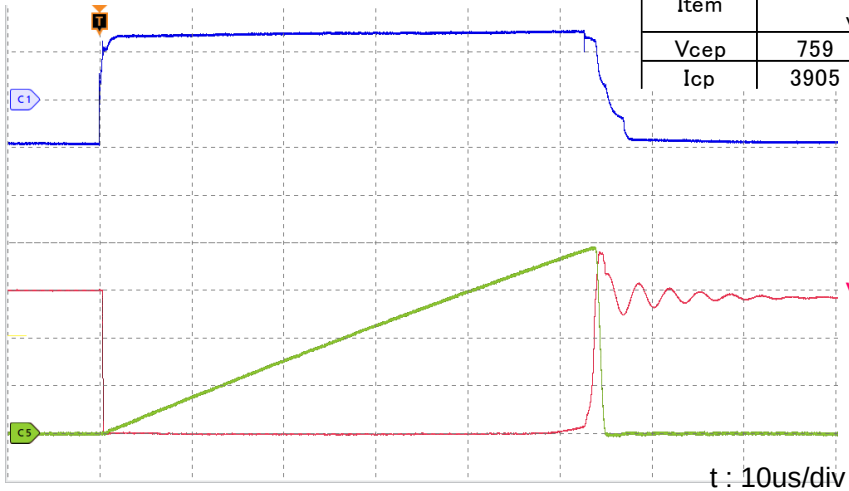
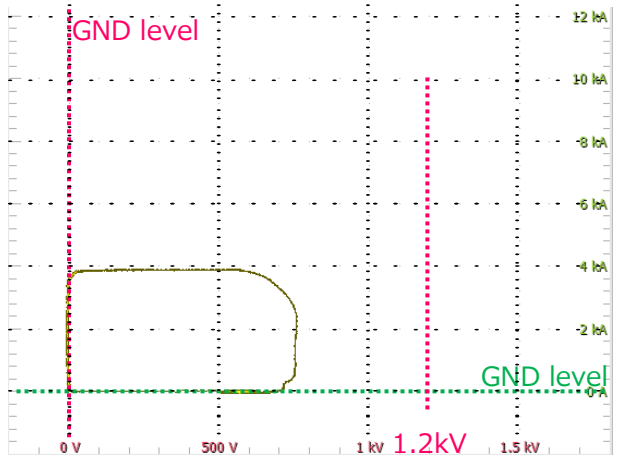


Load inductance : 7uH

Item	Measurement value	
Vcep	759	V
Icp	3905	A



SOA

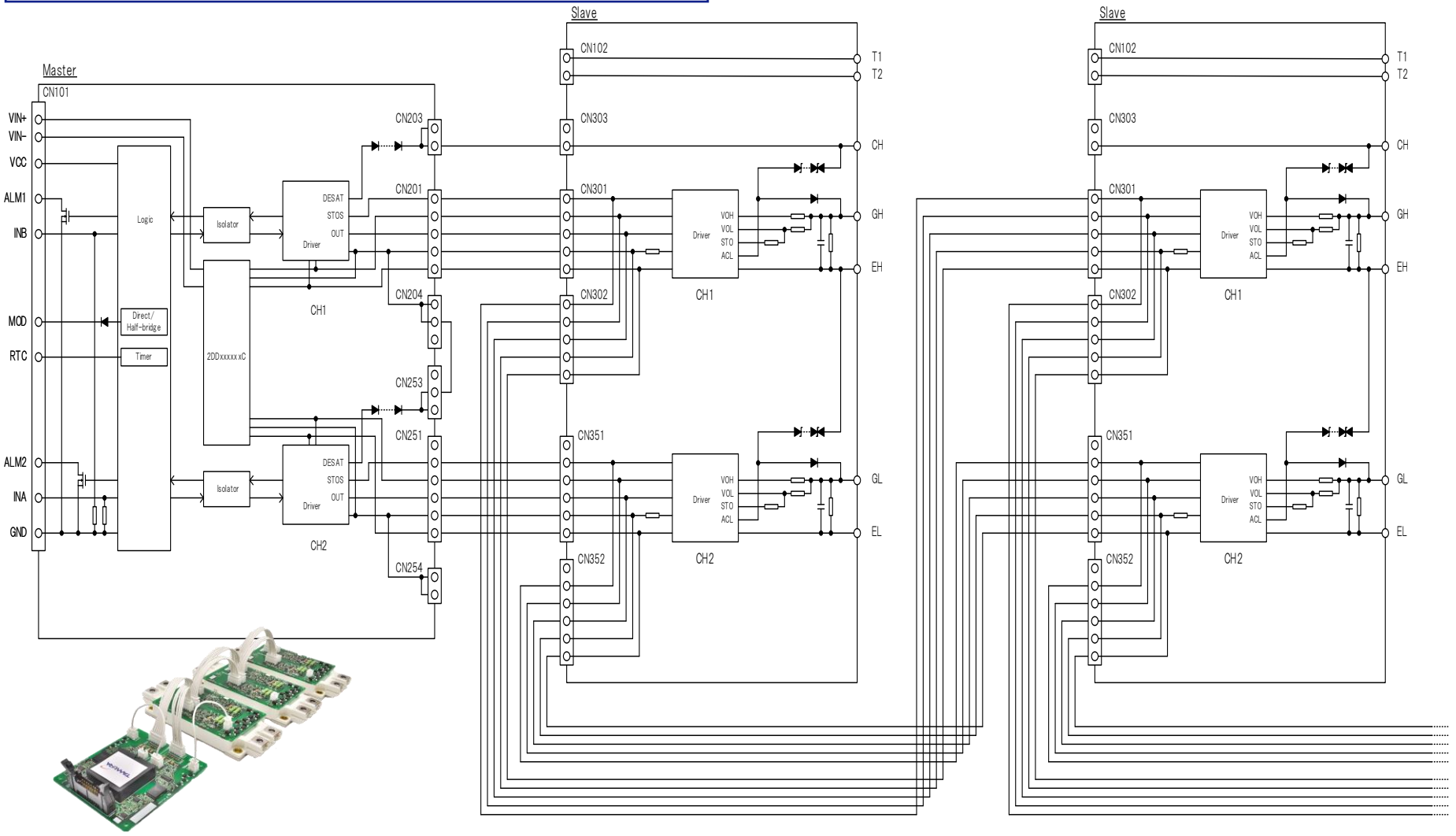


1. Solution Guide for EconoDUAL™

1-8 Application example (parallel drive configuration)

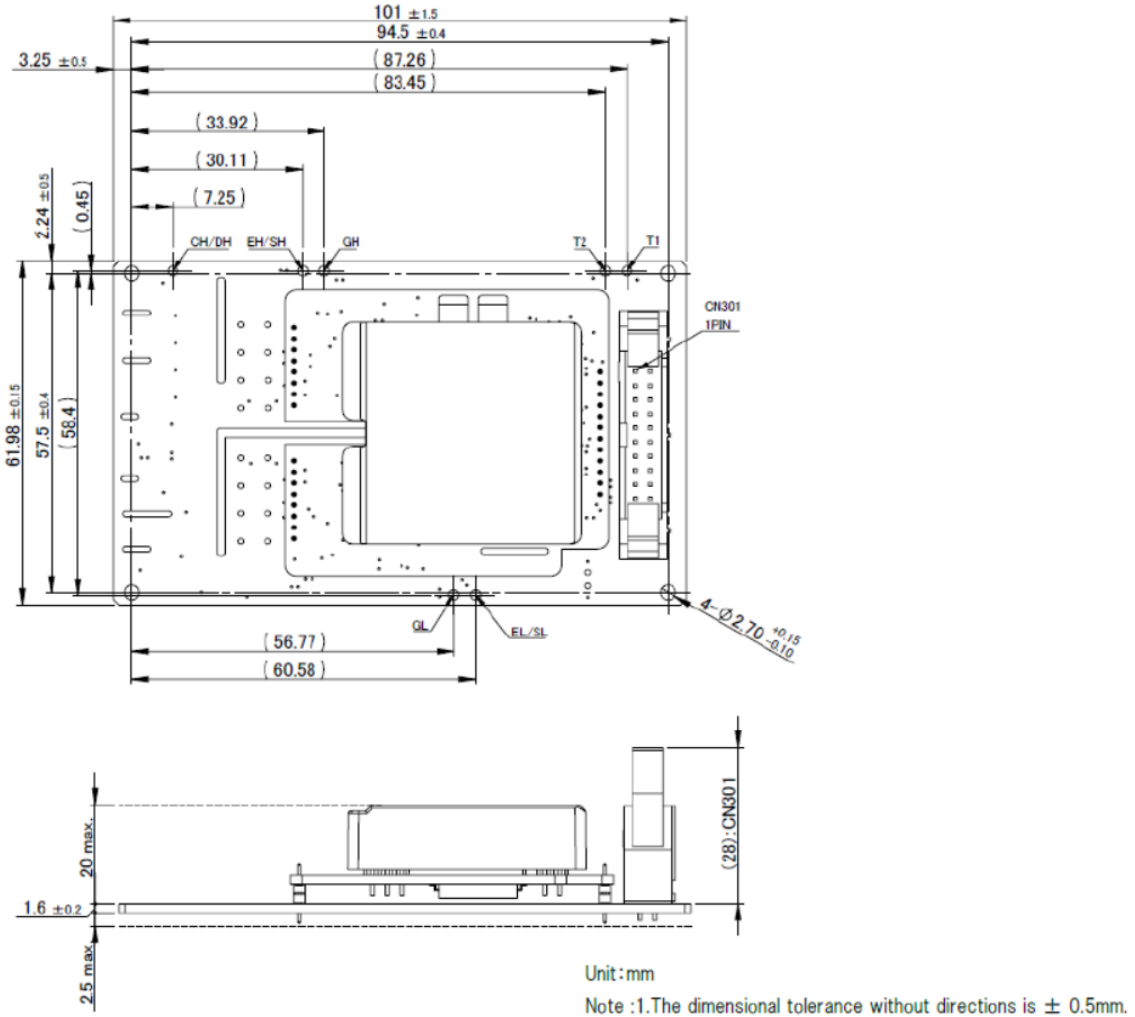
Connection diagram in parallel drive

Please contact us if you are interested !



1. Solution Guide for EconoDUAL™

1-9 Products appearance and line-up



Unit:mm

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

1. Solution Guide for EconoDUAL™

1-9. Product line-up for Infineon Technologies EconoDUAL™ 2in1 Type

Package	Output power (Ref.)	Ic	Part No	TAMURA Driver 2EG-C / D	TAMURA Driver 2CG-B/2CG-D	TAMURA Driver 2DD
			Vce = 1200V			
	20kW	150	FF150R12MS4G	 2EG01XCCN11N *1 2EG01XCDN11N *1 2EG??zyxN11N - ?? *2	2CG010BBC11N (+15/-10V) Soft turn off ---------- 2CG010DBC11N (+15/-10V) Soft turn off +Active clamp 	2DD151008C (+15V/-10V) 
	30kW	225	FF225R12ME4			
			FF225R12MS4			
	50kW	300	FF300R12ME4			
			FF300R12MS4			
	100kW	450	FF450R12ME4			
	125kW	600	FF600R12ME4			
	150kW	900	FF900R12ME7			
			Vce = 1700V			
	TBC	225	FF225R17ME4	 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	FF300R17ME4			
		450	FF450R17ME4			
		600	FF600R17ME4			
		750	T.B.D			
		900	T.B.D			

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

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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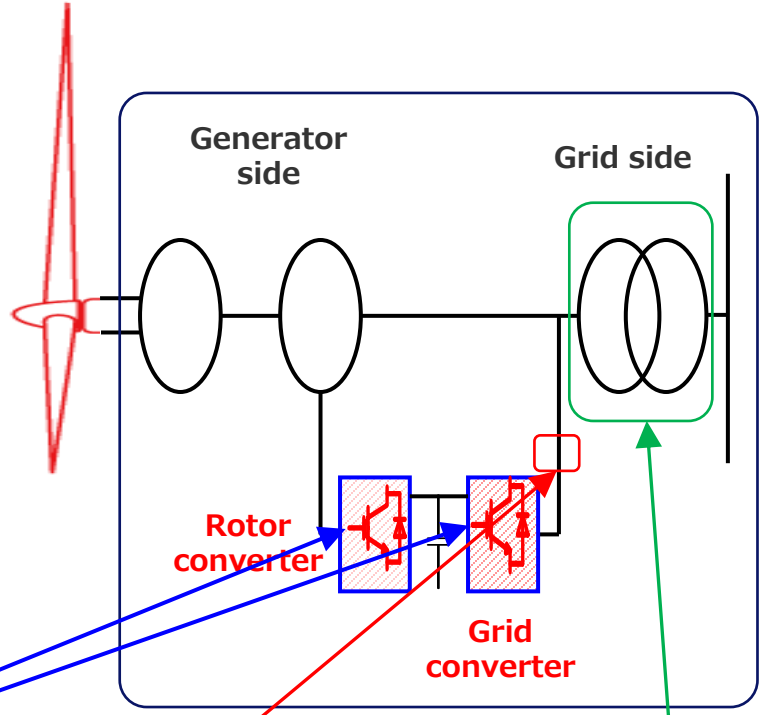
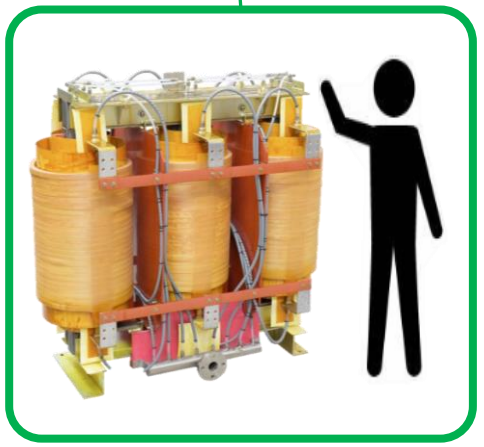
2) Introduction of One Tamura (Wind Power converters)



Gate Driver Unit

Current sensor

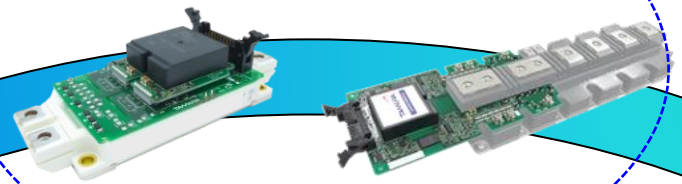


Reactor

2) Introduction of One Tamura (General application)

Power electronics technology and main products

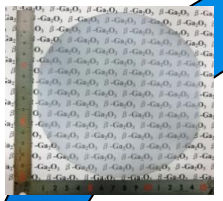
Gate driver
Circuit technology



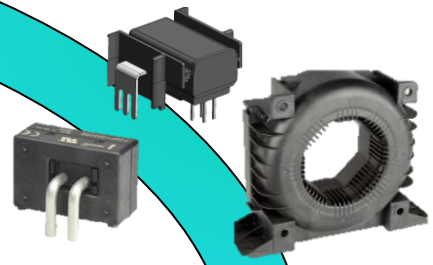
Gate Driver Unit

Device technology
Novel Crystal Technology, Inc.

Ga_2O_3

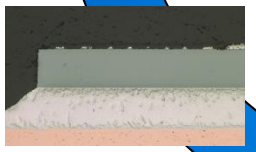


Module technology
Current sensor



Power electronics technology and main products

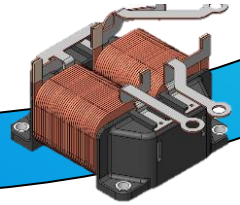
Soldering technology



Electric Chemicals
Soldering material
Die attach material
TIM material

Reflow soldering system

Automotive reactor



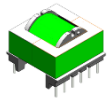
Reactor for PF
(2 in 1)

Passive components

Reactor
Trans
Coil

Large reactor/ transformer

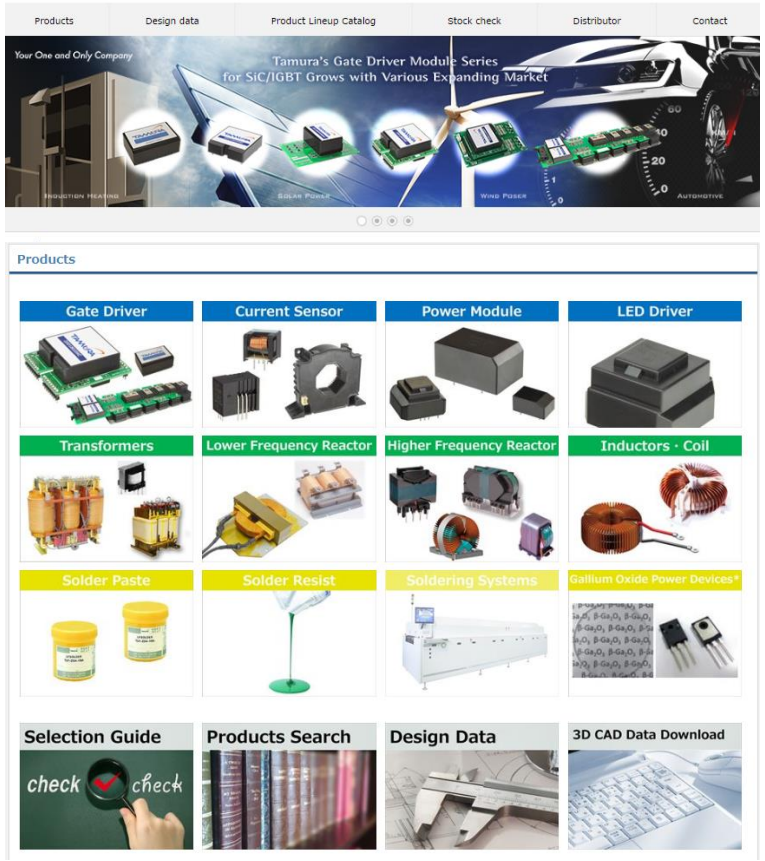
Toroidal coil



SW-Trans

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!

Feel free to inquire! ↓

https://www.tamuracorp.com/electronics/en/contact/