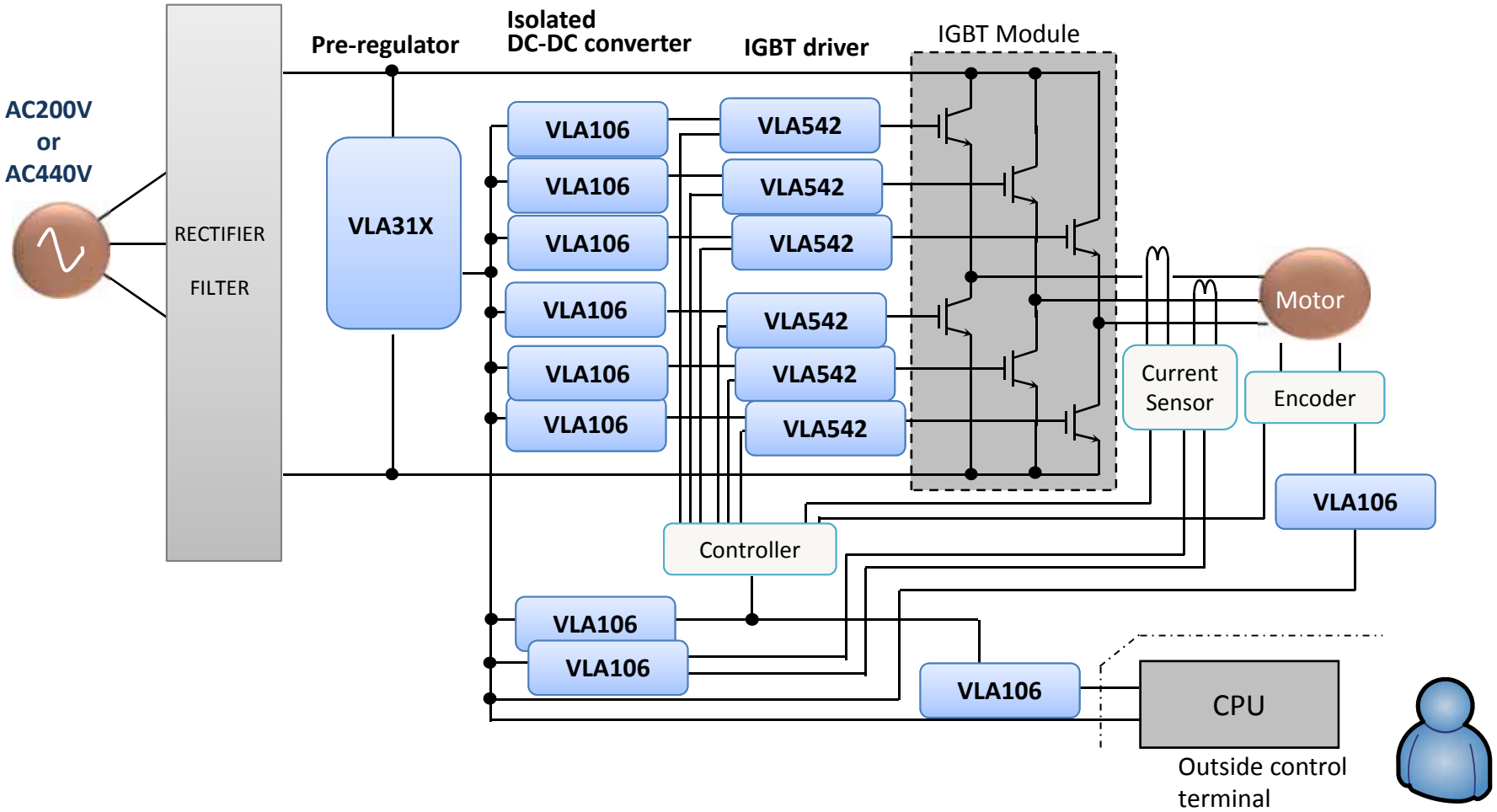
ISAHAYA POWER PRODUCTS

- ***IGBT driver & DCDC converter***

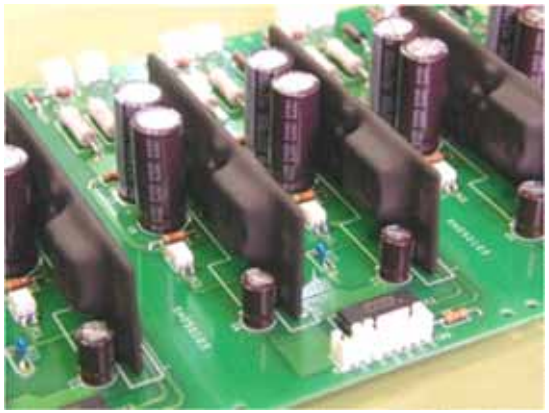
Dec. 2010
Isahaya Electronics corporation
Power Module Division

Our policy

We produce many types of Hybrid IC for inverter system!!

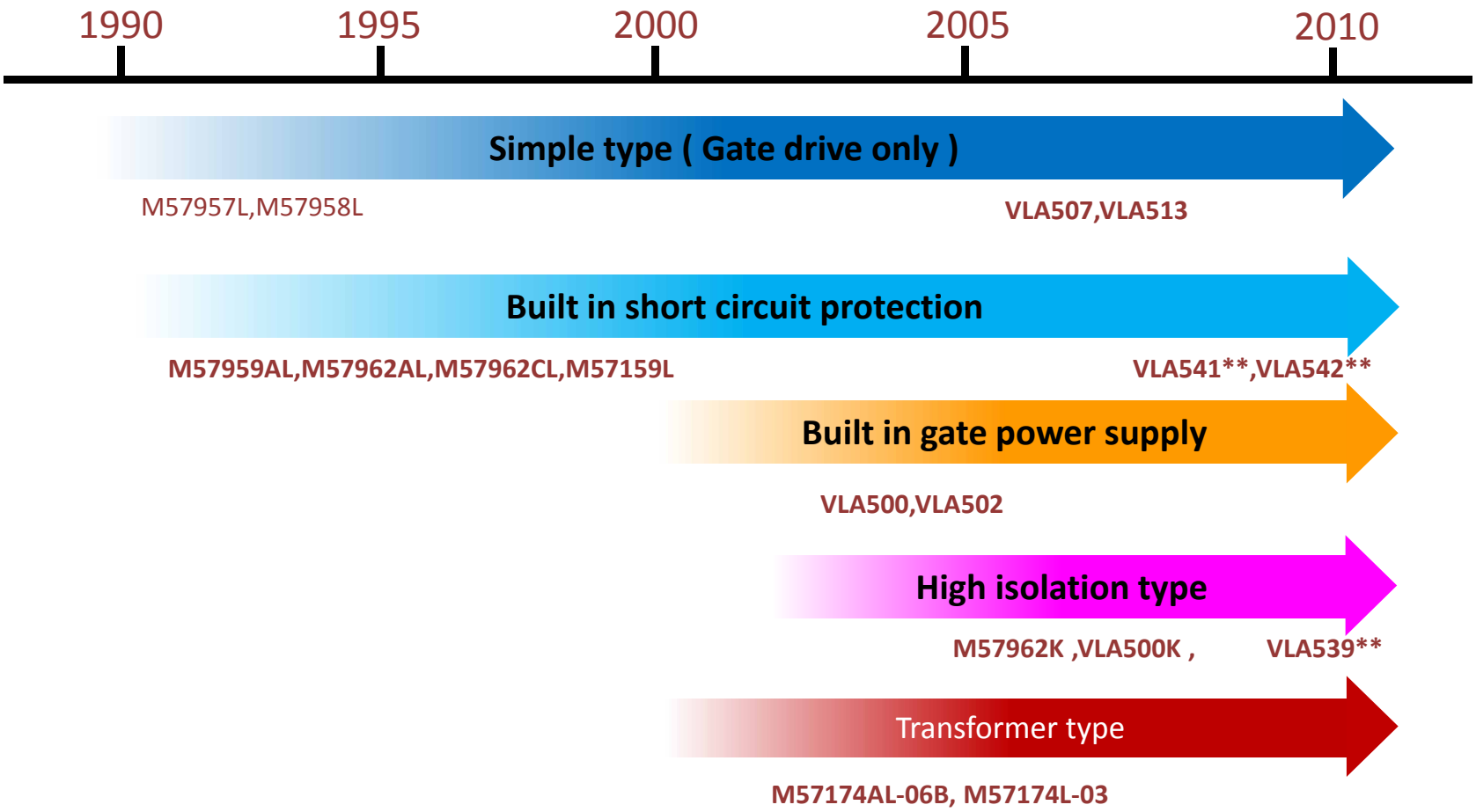


ISAHAYA IGBT drivers



Dec. 2010
Isahaya Electronics corporation
Power Module Division

History of ISAHAYA IGBT drivers



** : New Product

Features of ISAHAYA IGBT drivers(1)

Wide products range

Wide application range of 15A – 3600A class IGBT

Built in proven short circuit protection

It is effective to prevent short circuit destruction of IGBT.

SIL(Single In Line) structure

It is useful for downsizing equipment and designing motherboard.

Single In Line structure saves more space on mother board.

Additional support for power supplies

ISAHAYA can produce peripheral power supplies too, with drivers.

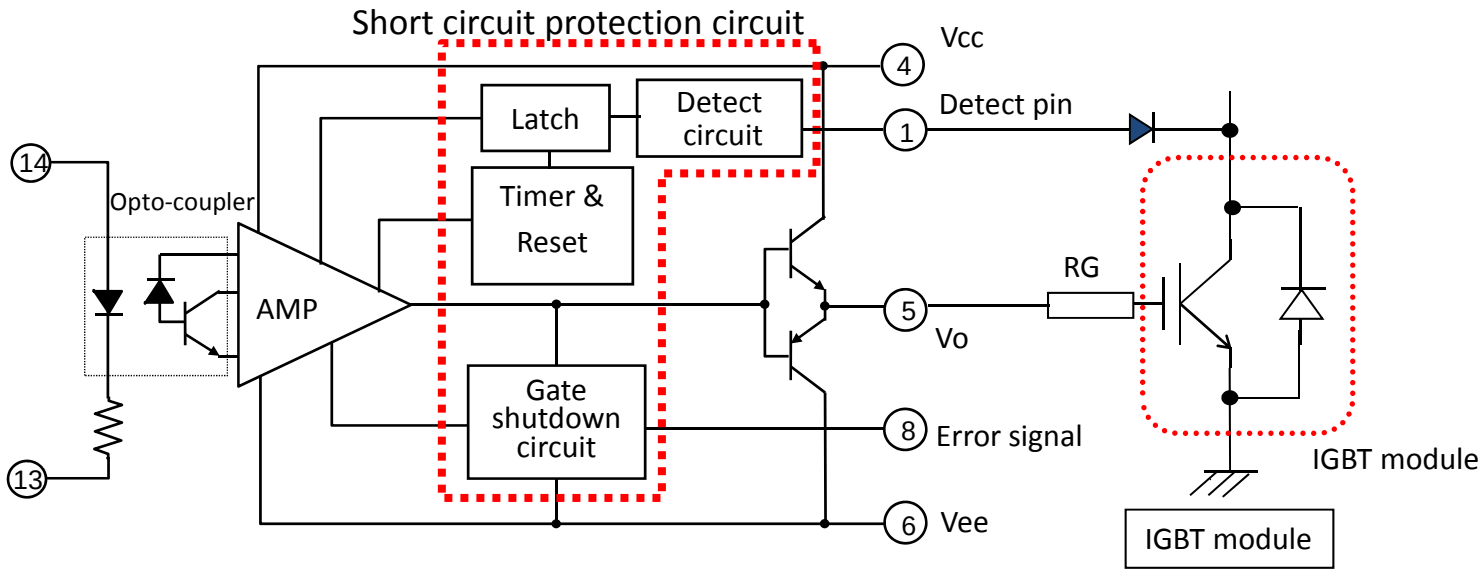
Standardization of equipment design

Analog system engineer is short now. And our Hybrid ICs contribute to parts standardization and improvement of design efficiency .

Features of ISAHAYA IGBT drivers(2)

Our most products have short circuit protection circuit built-in, and high speed and safe short circuit protection is possible. It is effective to prevent short circuit destruction of IGBT.

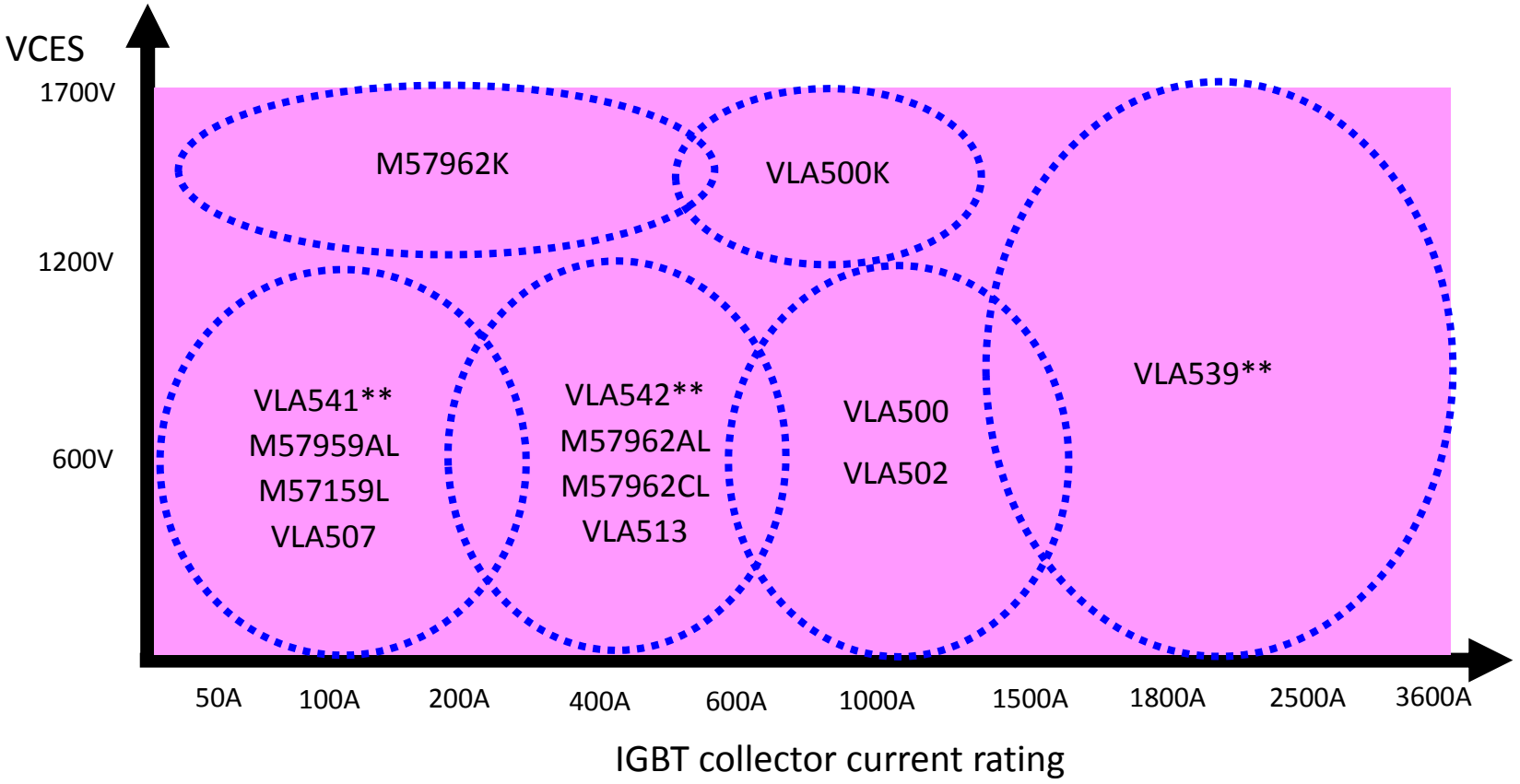
In the hybrid IC, short circuit protection circuit is arranged close by gate drive circuit, so that they can cooperate mutually, and protection of IGBT is carried out fast and safely.



New product VLA542-01R (Block diagram)

IGBT driver support map(Rough guide)

About general industrial application,
ISAHAYA IGBT drivers support almost all IGBT modules



** : **New product**

IGBT driver main products line up

Type name	Output peak current (A)	Isolation Voltage (Vrms)	Short circuit Protection circuit	Built in DCDC converter for gate drive	Adjusting fall time on activity of short circuit protection
VLA507	3	2500	No	No	No
VLA513	5	2500	No	No	No
M57159L	1.5	2500	Yes	No	No
M57959AL	2	2500	Yes	No	No
M57962AL	5	2500	Yes	No	No
M57962CL	5	2500	Yes	No	Yes
M57962K	5	3750	Yes	No	No
VLA541**	3	2500	Yes	No	No
VLA542**	5	2500	Yes	No	No
VLA500	12	2500	Yes	Yes	Yes
VLA502	12	2500	Yes	Yes	Yes
VLA500K	12	4000	Yes	Yes	Yes
VLA539**	24	4000	Yes	Yes	Yes

**** : New product**

Note ; VLA541 is pin compatible with M57959AL.
VLA542 is pin compatible with M57962AL.

Selection table for MITSUBISHI IGBT modules (1/2)

<For NF series> ***NF series : 5th generation Mitsubishi IGBT modules***

VCES \ IC	50A	75A	100A	150A	200A	300A	400A	600A	900A	1400A
600V	NO IGBT	**M57159L**		**VLA541**		**VLA542 M57962CL**			NO IGBT	
1200V	**M57159L**		**VLA541**		**VLA542 M57962CL**			**VLA500**		

<For A series> ***A series : 5th generation Mitsubishi IGBT modules***

VCES \ IC	75A	100A	150A	200A	300A	400A	600A
1200V	NO IGBT	**VLA541**			**VLA542 M57962CL**		
1700V	**M57962K**						NO IGBT

<For 6th Generation series>

VCES \ IC	35A	50A	75A	100A	150A	200A	300A	400A	450A	600A	1000A 1100A	1500A	1800A	2500A
1200V	**M57159L**					**VLA541**		**VLA542**			**VLA500**		**VLA539**	
1700V	NO IGBT	**M57962K**									**VLA500K**	**VLA539**		NO IGBT

Note ; VLA541 is pin compatible with M57959AL. VLA542 is pin compatible with M57962AL

Selection table for MITSUBISHI IGBT modules (2/2)

<For NFH & NFM series> *NFH & NFM series : MITSUBISHI high frequency switching IGBT modules*

< Up to 30kHz use >

VCES \ IC	100A	150A	200A	300A	400A	600A
600V	VLA507	VLA513				VLA502
1200V	VLA507		VLA513			VLA502

< Up to 60kHz use >

VCES \ IC	100A	150A	200A	300A	400A	600A
600V	VLA513			VLA502		NO Driver
1200V	VLA513			VLA502		

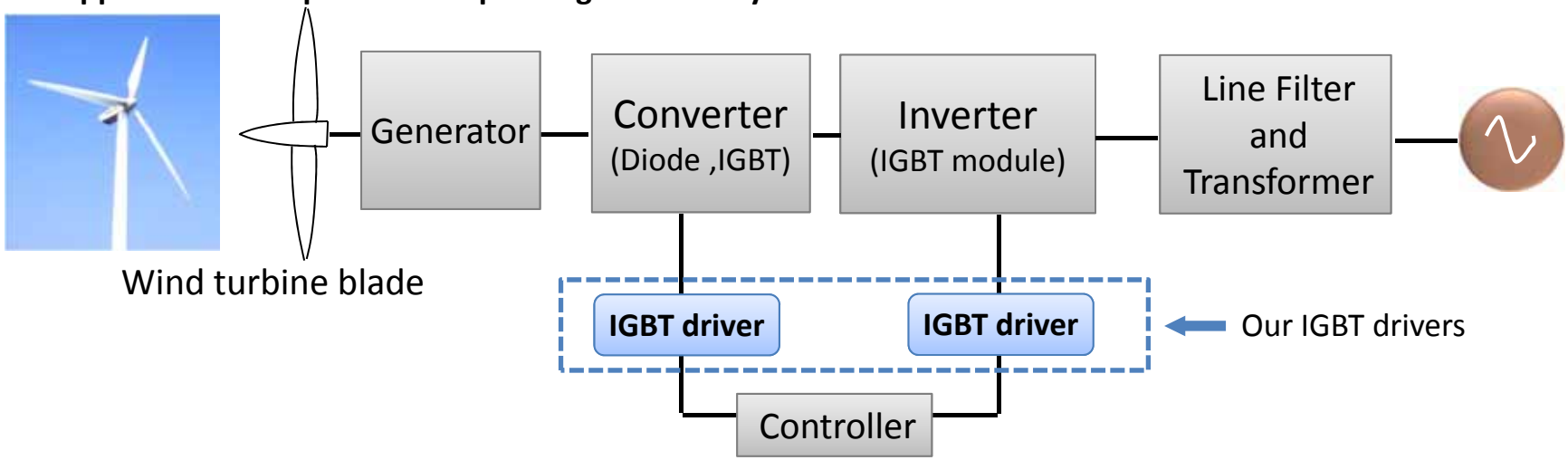
Note) 600V,100A Class ➔ CM100DUS-12F
600V,150A Class ➔ CM150DUS-12F

High power IGBT driver series

Correspondence of MITSUBISHI MPD & ISAHAYA Driver

IGBT driver			Mitsubishi MPD
Type name	Isolation	Output peak current	
VLA500-01R	2500Vrms	12A	CM900DU-24NF CM1400DU-24NF CM1500DY-24S
VLA500K-01R	4000Vrms	12A	CM1000DU-34NF CM1100DY-34S
VLA539-01R	4000Vrms	24A	CM2500DY-24S CM1800DY-34S

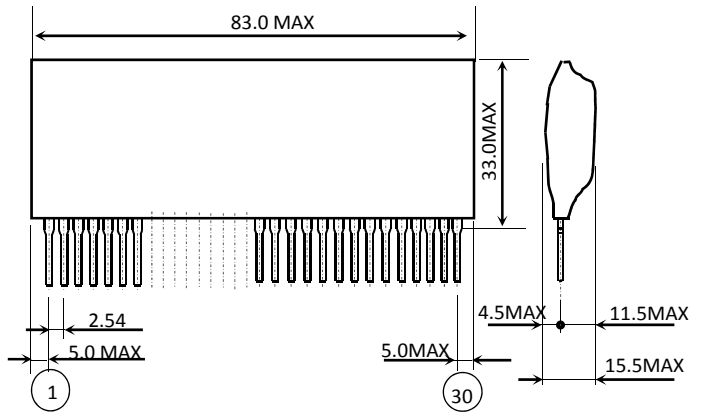
Application example for wind power generation system



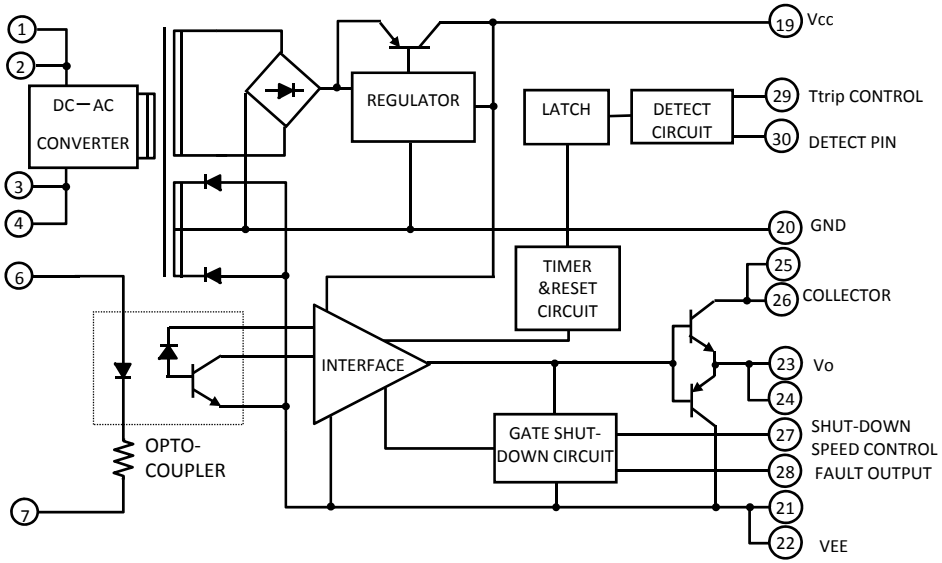
Built-in power supply type IGBT driver “VLA500-01R”

OUTLINE DRAWING

Dimensions: mm



BLOCK DIAGRAM



FEATURES

-Built in the isolated DC-DC converter for gate drive
-Output peak current is + / -12A(max)
-SIP allows more space on mother board
-Built-in short circuit protection circuit
(With Timer & Reset circuit)
-Electrical isolation voltage is 2500Vrms (for 1 minute)

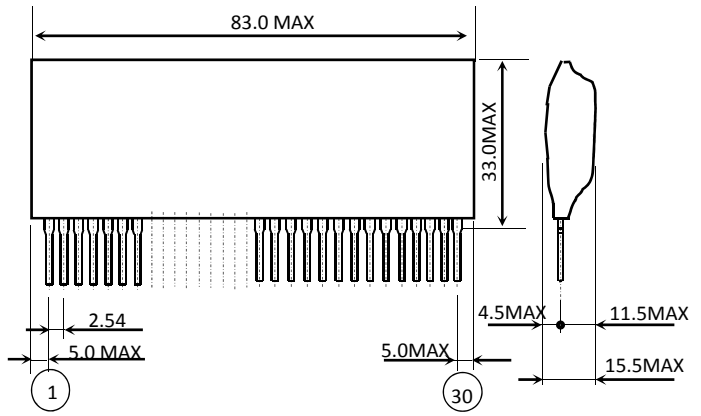
Recommended IGBT modules

VCES = 600V series up to 600A class
VCES = 1200V series up to 1400A class

Built in power supply type IGBT driver “VLA500K-01R”

OUTLINE DRAWING

Dimensions: mm



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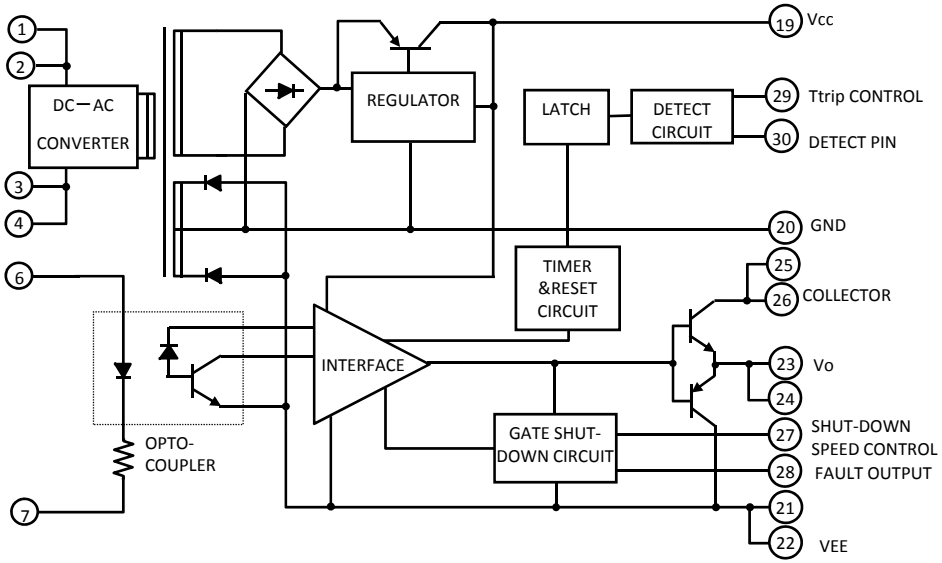


FEATURES

>Built in the isolated DC-DC converter for gate drive
>Output peak current is + / -12A(max)
>SIP allows more space on mother board
>Built in short circuit protection
>Electrical isolation voltage is 4000Vrms (for 1 minute)
>CMOS compatible input interface

RECOMMENDED IGBT MODULES

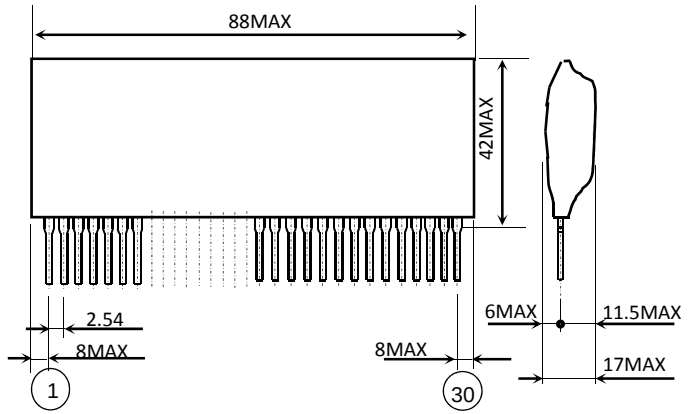
VCES = 1700V series ~ 1200A class
VCES = 1200V series ~ 1400A class

High power type IGBT driver “VLA539-01R”

New product

OUTLINE DRAWING

Dimensions: mm



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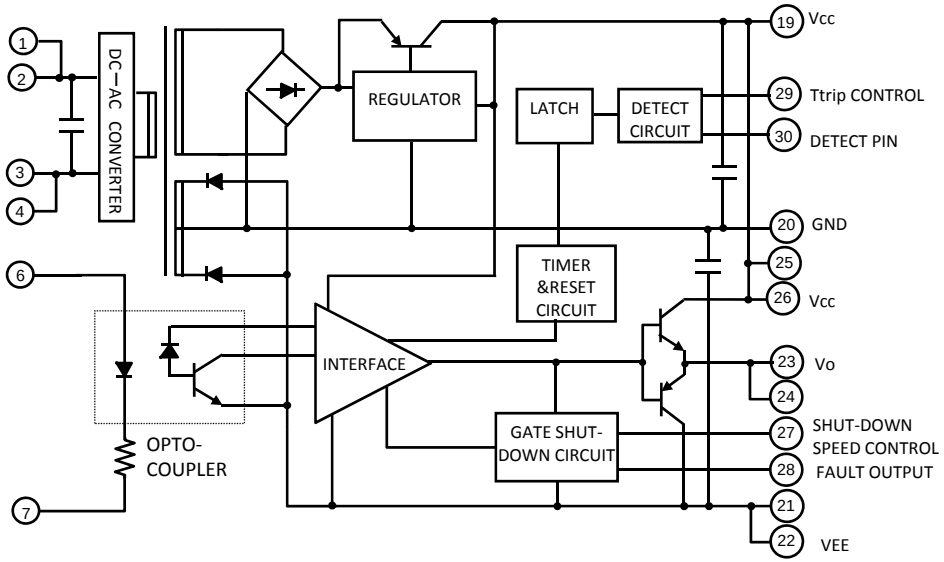


FEATURE

>Built in the isolated DC-DC converter for gate drive
>Output peak current is +/-24A(max)
>SIP allows more space on mother board
>Built in short circuit protection
>Electrical isolation voltage is 4000Vrms (for 1 minute)
>CMOS compatible input interface

RECOMMENDED IGBT MODULES

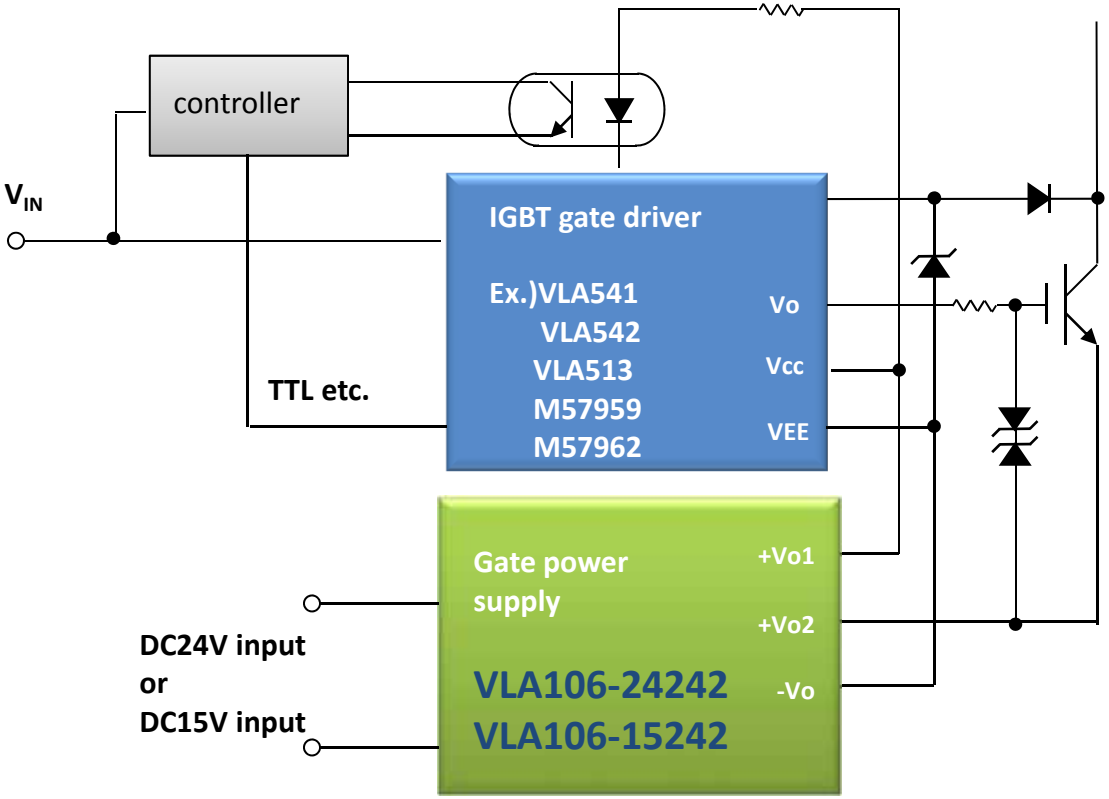
VCES = 1700V series ~ 3600A class
VCES = 1200V series ~ 3600A class

DCDC converters for IGBT driver

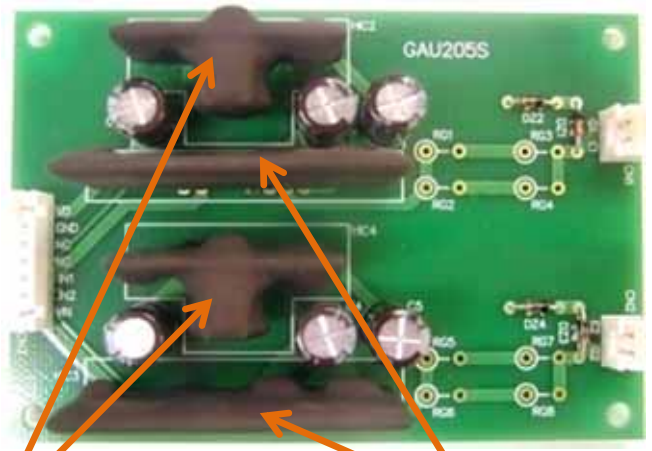



Power supply for IGBT gate drive VLA106-15242 / -24242

It is needed the isolated power supply to gate driver.
The VLA106 series can produce +15V for Vcc and -8V for VEE of gate driver.



Evaluation board kit "GAU205S-15252"



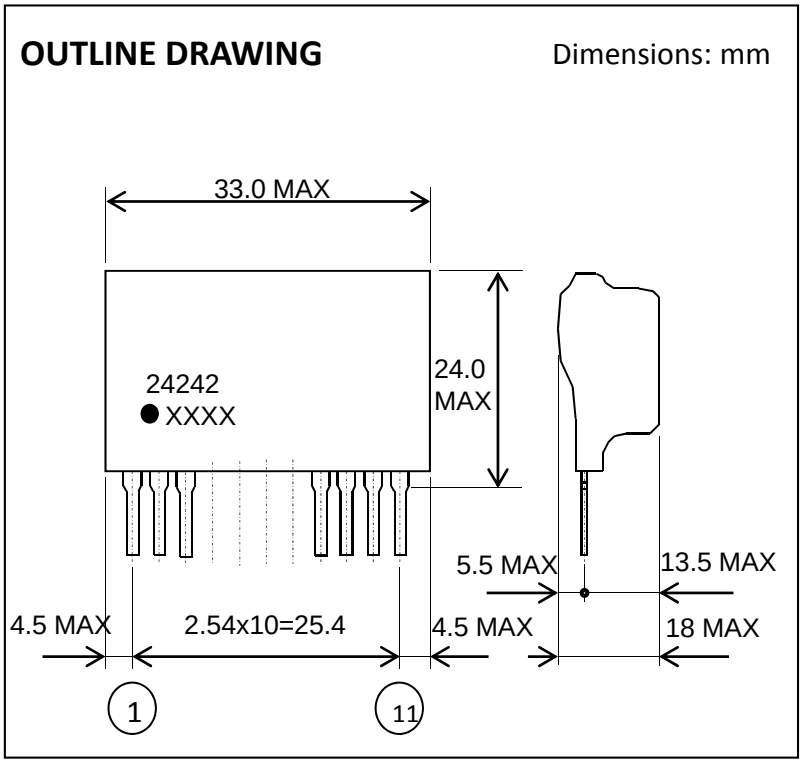
Gate power supply
VLA106-15242

IGBT driver

Isolated DC-DC converter for IGBT gate power supply

VLA106-15242 / -24242

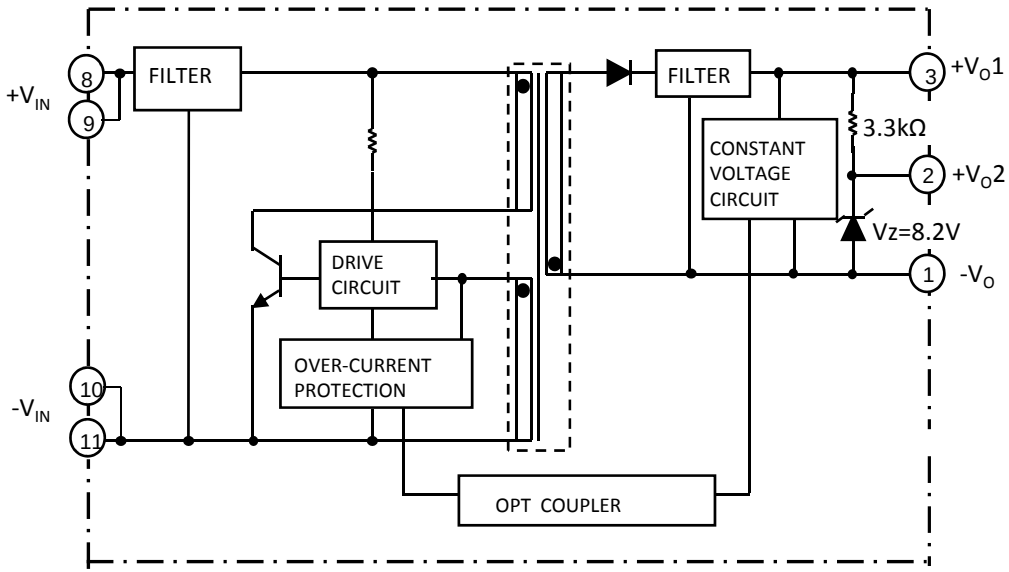
OUTLINE DRAWING Dimensions: mm



FEATURES

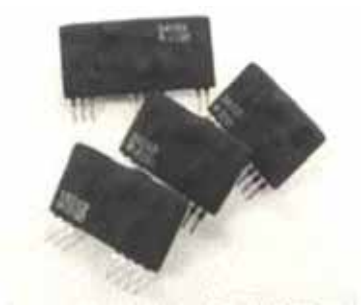
-Input voltage range: 12 to 18 V DC (-15242)
21.6 to 26.4V DC (-24242)
-Output: +24V, 100mA (output power : 2.4W)
(Output can be separated to +16V and -8V for Vcc and VEE)
-Thin-profile and lightweight design
-Isolation between input and output : 2500Vrms, 1min
-Built-in over-current protection circuit

BLOCK DIAGRAM



DCDC converters for IPM



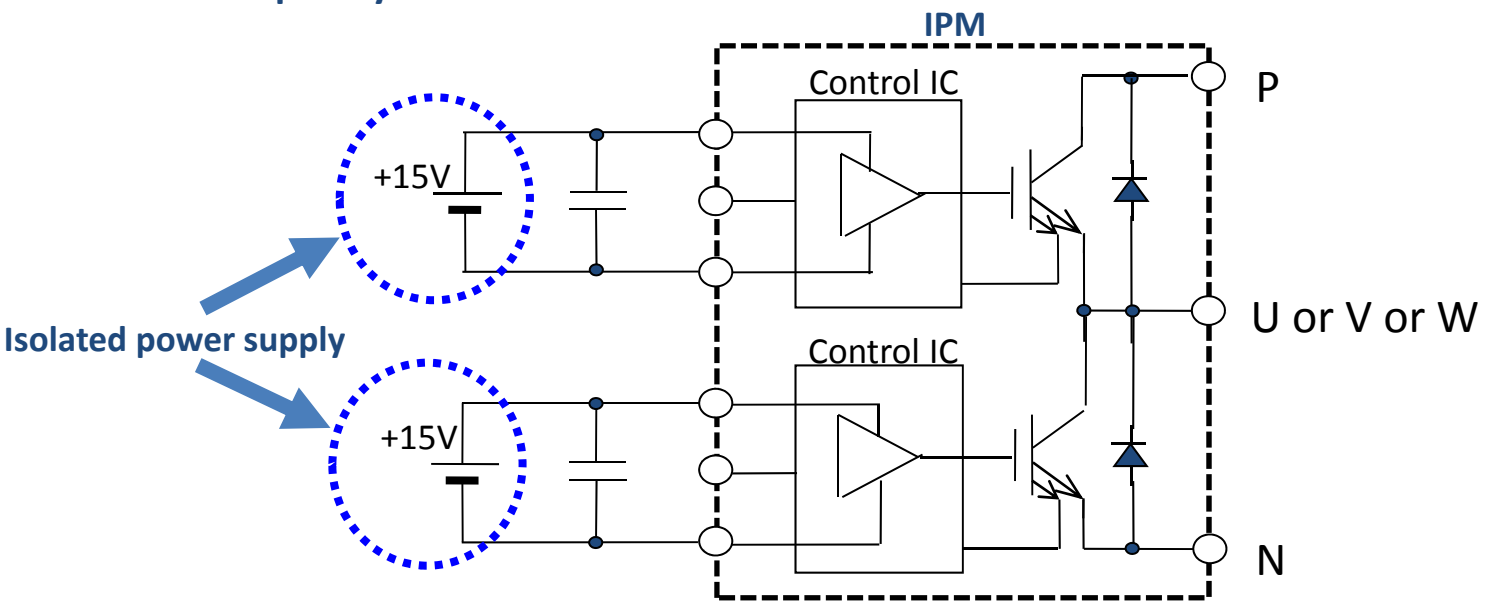



Power supply for IPM drive

For control IPM, isolated power supply(+15V) is necessary to every IPM control IC. And every element need the total current of Icc(stable bias current of IC) and Idrive(Average gate drive current) . These parameters are obtained as follows.

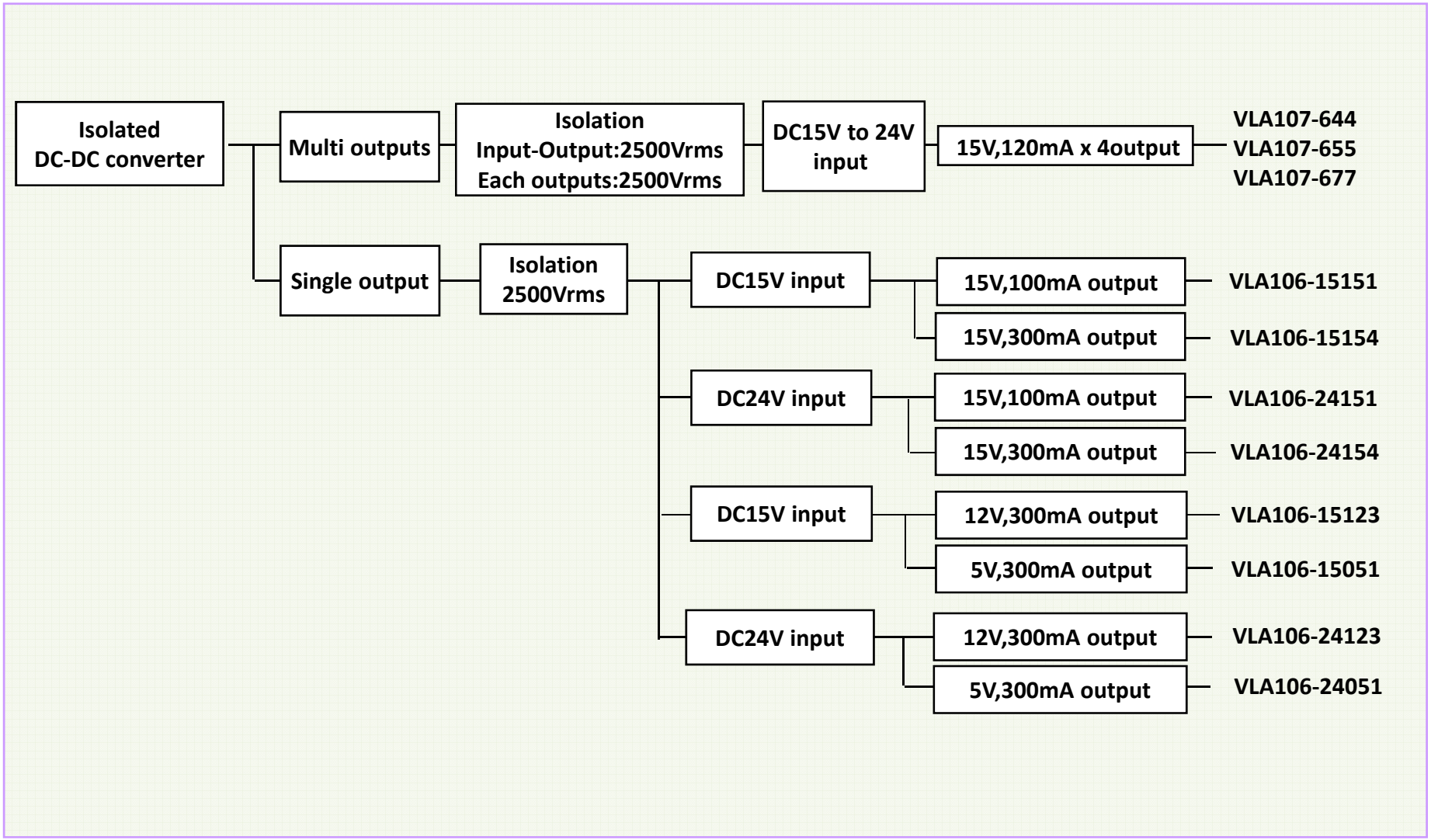
Icc : Read from data sheet of IPM
Idrive : Qg x f
Qg : Gate charge of inner IGBT chip(at 15V)
f : Carrier frequency

You can read from data sheet as Icc + Idrive in the performance curve of circuit current V.S. carrier frequency.

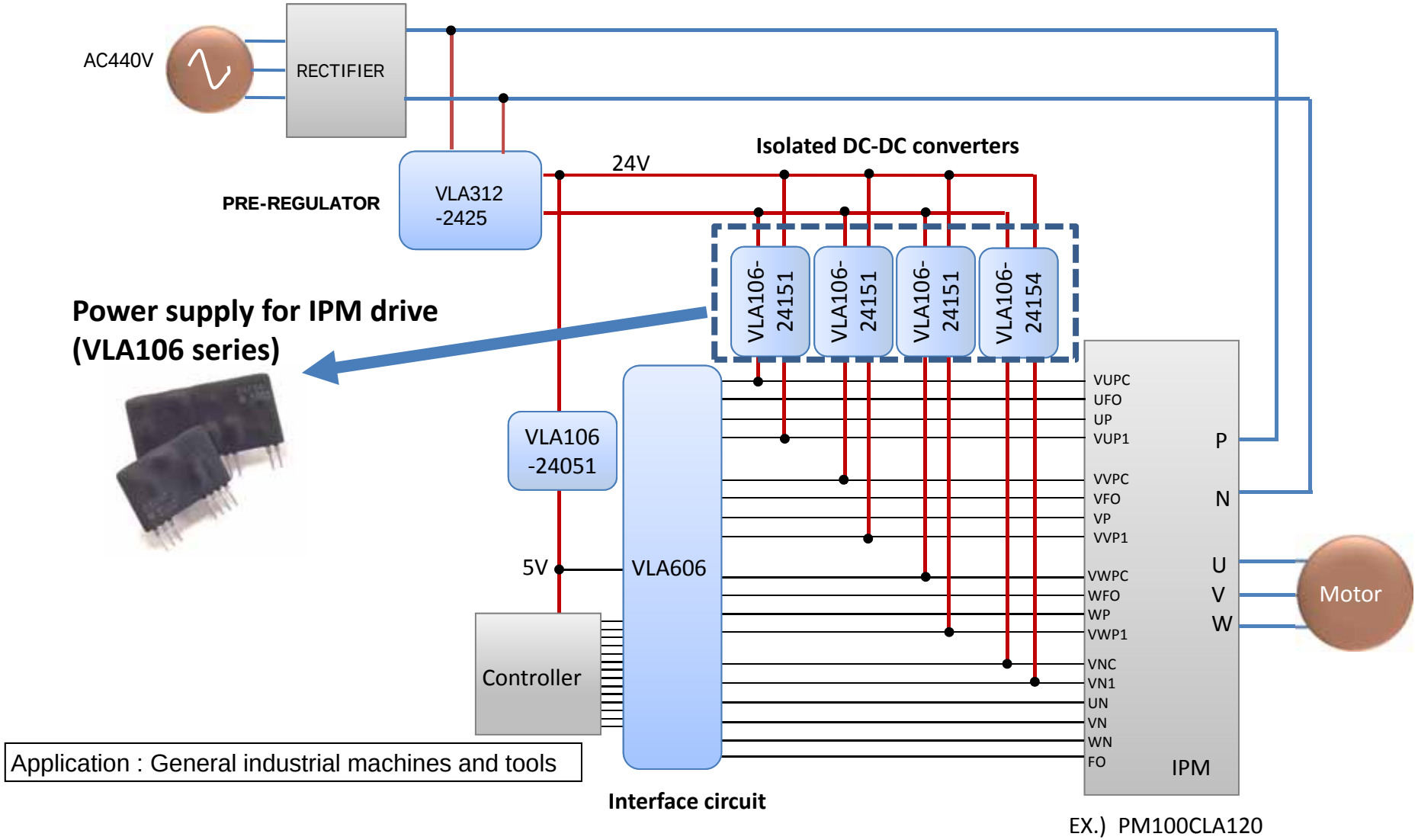


ISAHAYA DCDC converters are suitable as these isolated power supply for IPM control.

DC-DC converter products tree for IPM drive

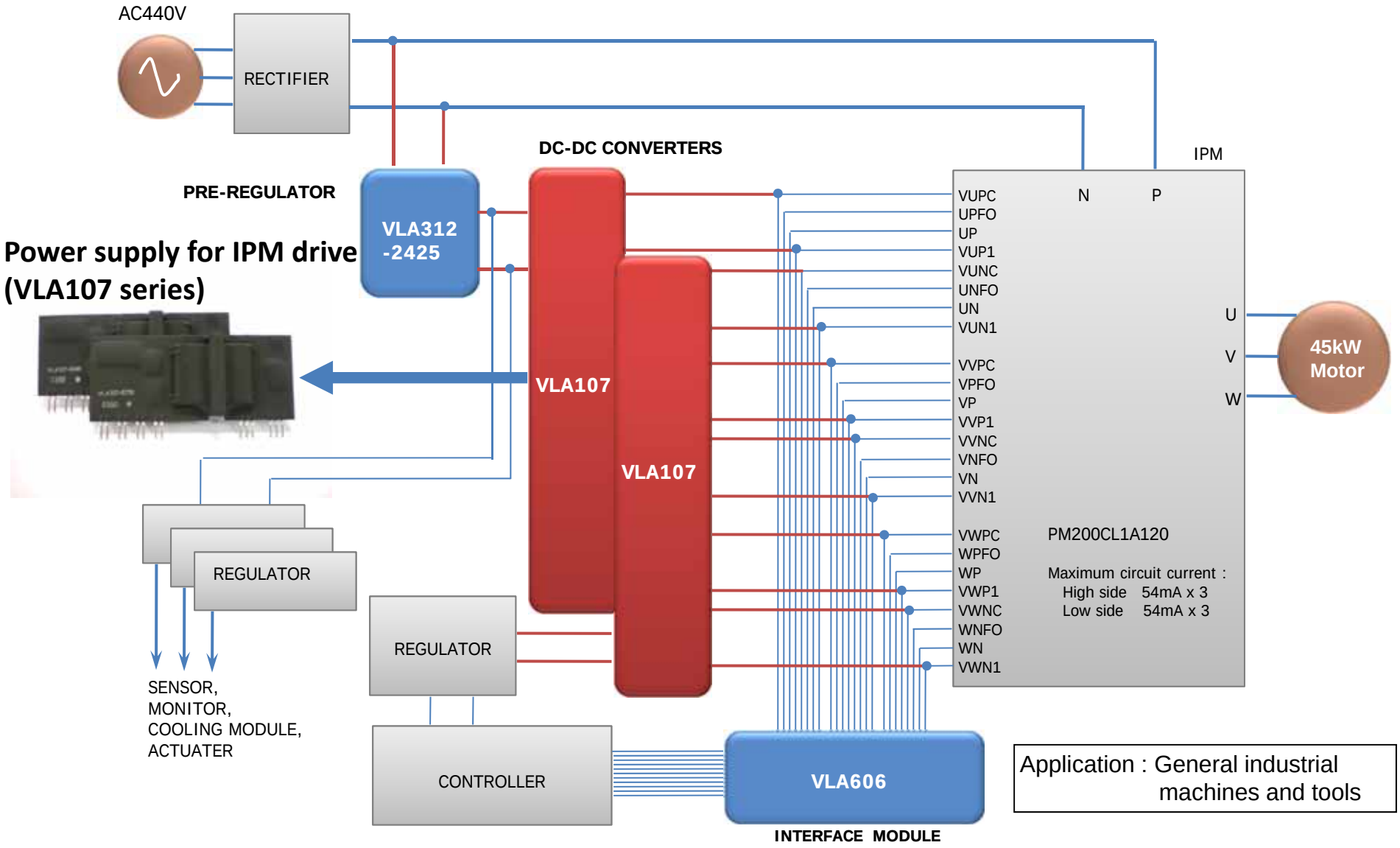


Application example by ISAHAYA DC-DC converter for IPM INVERTER (1/2)



Application : General industrial machines and tools

Application example by ISAHAYA DC-DC converter for IPM INVERTER(2/2)



Selection table for MITSUBISHI IPM (1/2)

AC220V LINE

IPM (L series)	Maximum circuit current (mA)		Power supply
	N-side	P-side	
PM50RLA/RLB060	34	10	VLA106-24151 x 4 or VLA106-15151 x 4 or VLA107 x 1
PM50CLA/CLB060	29	10	
PM75RLA/RLB060	46	14	
PM75CLA/CLB060	38	14	
PM100RLA060	52	15	
PM100CLA060	44	15	
PM150RLA060	71	21	
PM150CLA060	48	21	
PM200RLA060	81	27	
PM200CLA060	79	27	
PM300RLA060	113	34	(VLA106-24151 x 3 + VLA106-24154 x 1) or (VLA106-15151 x 3 + VLA106-15154 x 1) or VLA107 x 1
PM300CLA060	108	34	
PM450CLA060	61x3	61	VLA106-24151 x 6 or VLA106-15151 x 6 or VLA107 x 2
PM600CLA060	75x3	75	

It is also available the VLA106-24051 or VLA106-15051 as 5V power supply for controller and the VLA606-01R for interface.

IPM (L1/S1 series)	Maximum circuit current (mA)		Power supply
	N-side	P-side	
PM50RL1C060	27	9	VLA106-24151 x 4 or VLA106-15151 x 4 or VLA107 x 1
PM50RL1A/RL1B060	34	9	
PM50CL1A/CL1B060	29	9	
PM75RL1A/RL1B060	42	12	
PM75CL1A/CL1B060	35	12	
PM100RL1A060	48	14	
PM100CL1A060	42	14	
PM150RL1A060	66	18	
PM150CL1A060	57	18	
PM200RL1A060	98	26	(VLA106-24151 x 3 + VLA106-24154 x 1) or (VLA106-15151 x 3 + VLA106-15154 x 1) or VLA107 x 1
PM200CL1A060	83	26	
PM300RL1A060	129	33	
PM300CL1A060	109	33	
PM50CS1D060	26	9	VLA106-24151 x 4 or VLA106-15151 x 4 or VLA107 x 1
PM75CS1D060	33	12	
PM100CS1D060	42	13	
PM150CS1D060	53	18	
PM200CS1D060	63	22	

Selection table for MITSUBISHI IPM (2/2)

AC440V LINE

IPM (L series)	Maximum circuit current (mA)		Power supply
	N-side	P-side	
PM25RLA/RLB120	33	10	VLA106-24151 x 4 or VLA106-15151 x 4 or VLA107 x 1
PM25CLA/CLB120	26	10	
PM50RLA/RLB120	46	14	
PM50CLA/CLB120	41	14	
PM75RLA/RLB120	57	18	
PM75CLA/CLB120	48	18	
PM100RLA120	72	23	
PM100CLA120	69	23	
PM150RLA120	103	32	(VLA106-24151 x 3 + VLA106-24154 x 1) or (VLA106-15151 x 3 + VLA106-15154 x 1) or VLA107 x 1
PM150CLA120	91	32	
PM200CLA120	54 x 3	54	VLA106-24151 x 6 or VLA106-15151 x 6 or VLA107 x 2
PM300CLA120	75 x 3	75	
PM450CLA120	75 x 3	75	

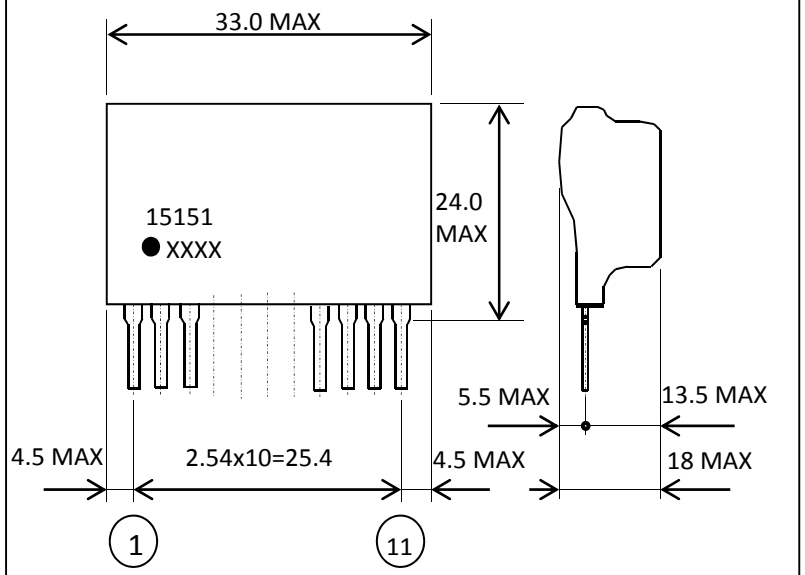
IPM (L1/S1 series)	Maximum circuit current (mA)		Power supply
	N-side	P-side	
PM25RL1C120	33	12	VLA106-24151 x 4 or VLA106-15151 x 4 or VLA107 x 1
PM25CL1A/CL1B120	35	12	
PM25RL1A/RL1B120	42	12	
PM50CL1A/CL1B120	56	18	
PM50RL1A/RL1B120	65	18	
PM75CL1A/CL1B120	77	25	
PM75RL1A/RL1B120	91	25	(VLA106-24151 x 3 + VLA106-24154 x 1) or (VLA106-15151 x 3 + VLA106-15154 x 1)
PM100RL1A120	122	34	
PM100CL1A120	104	34	
PM150RL1A120	172	43	
PM150CL1A120	150	43	
PM25CS1D120	29	10	VLA106-24151 x 4 or VLA106-15151 x 4 or VLA107 x 1
PM50CS1D120	47	17	
PM75CS1D120	64	22	
PM100CS1D120	85	29	

It is also available the VLA106-24051 or VLA106-15051 as 5V power supply for controller and the VLA606-01R for interface.

Isolated DC-DC converter for IPM drive

VLA106-15151 / -24151

OUTLINE DRAWING Dimensions: mm



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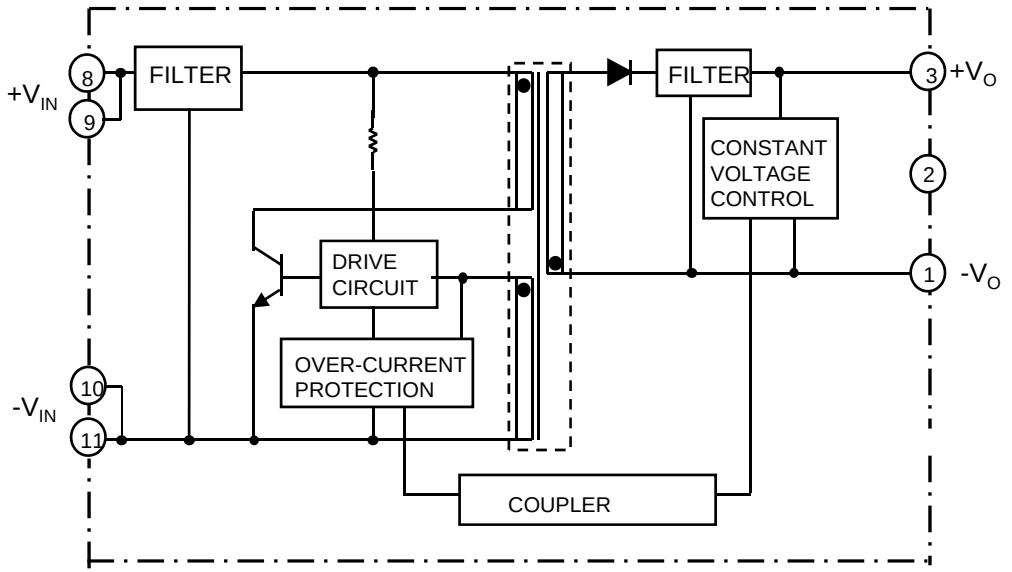


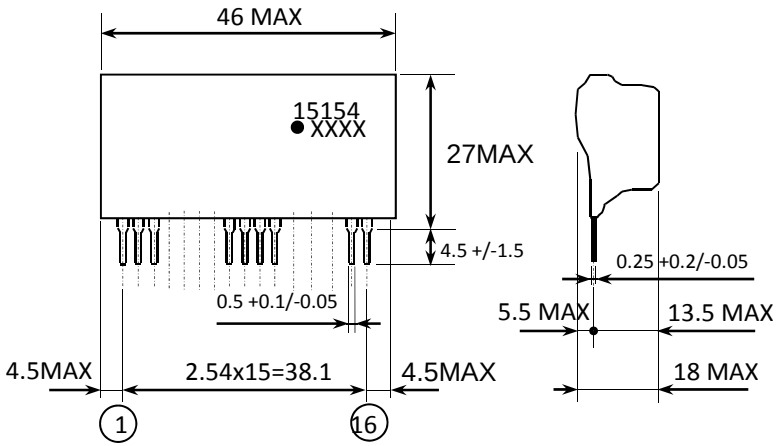
FEATURES

-Input voltage range: 12 to 18 V DC (-15151)
21.6 to 26.4V DC (-24151)
-Output: +15V, 100mA (output power : 1.5W)
-Thin-profile and lightweight design
-Isolation between input and output : 2500Vrms, 1min
-Built-in over-current protection circuit

Isolated DC-DC converter for IPM drive

VLA106-15154 / -24154

OUTLINE DRAWING Dimensions: mm



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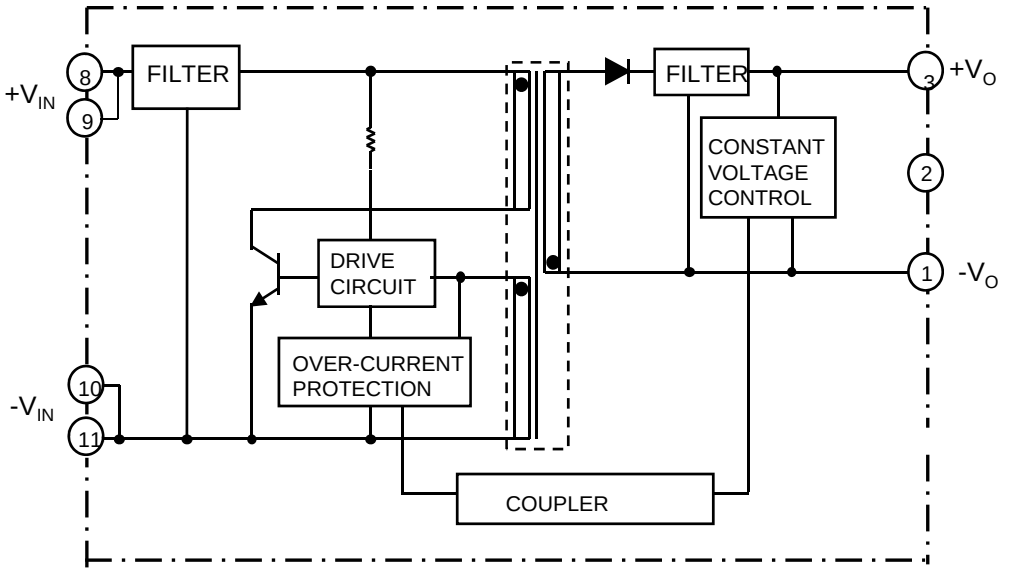


FEATURES

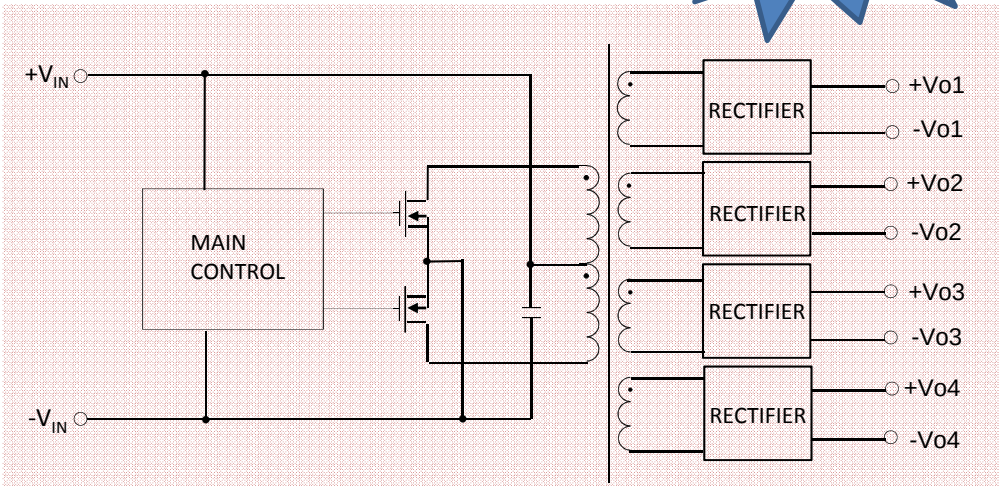
-Input voltage range: 12 to 18 V DC (-15154)
21.6 to 26.4V DC (-24154)
-Output: +15V, 300mA (output power : 4.5W)
-Thin-profile and lightweight design
-Isolation between input and output : 2500Vrms, 1min
-Built-in over-current protection circuit (Automatic return)

Multi outputs isolated DC-DC converter for IPM power supply

New product

VLA107-644 / -655

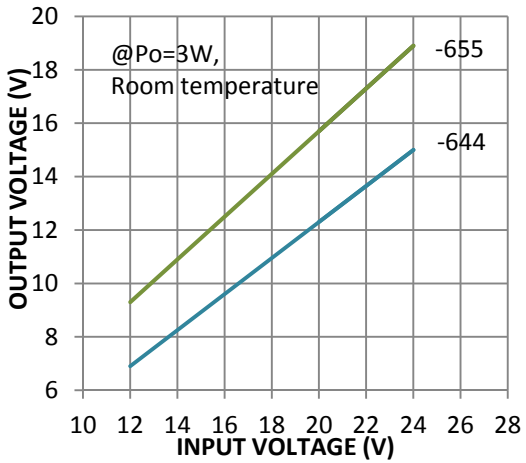
BLOCK DIAGRAM



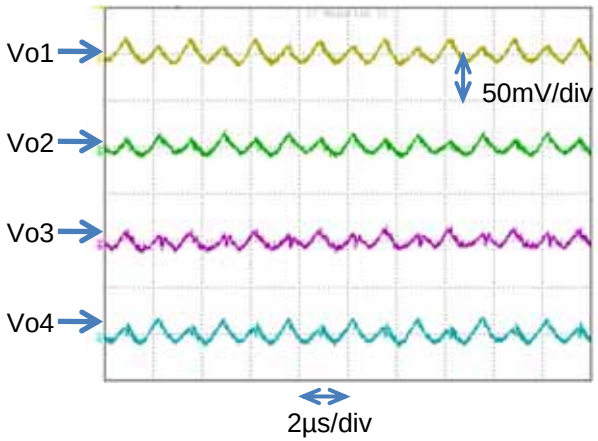
FEATURES

-Low noise
-Input voltage range : 12 to 24V DC
-Output : +15V / 120mA x 4 outputs
-Isolation strength : 2500Vrms, 1min
-4 output terminals are isolated
each other (2500Vrms, 1min)
-No use optical coupler

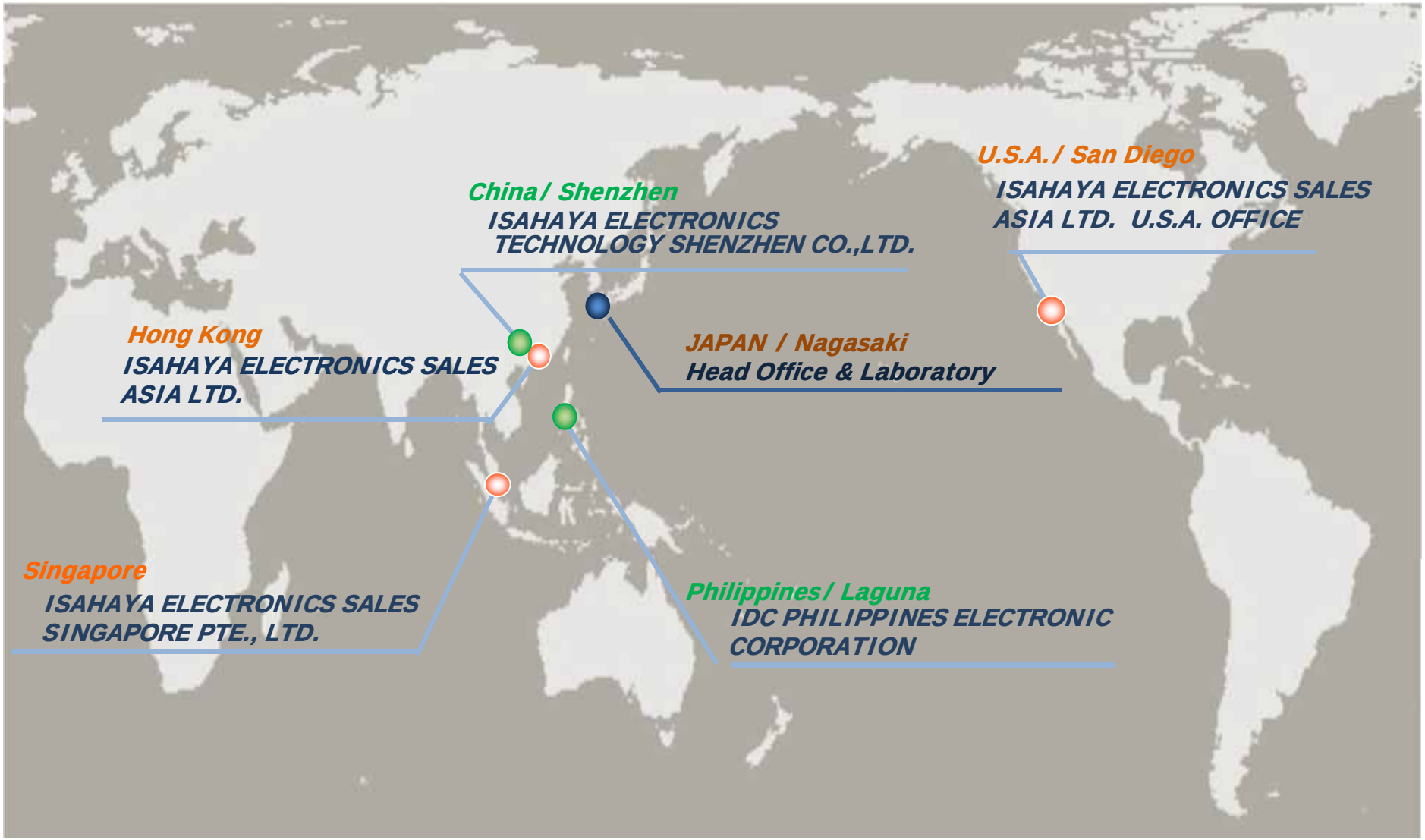
<<Input-Output voltage tracking>>



<<Output ripple waveform>>



ISAHAYA POWER PRODUCTS



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