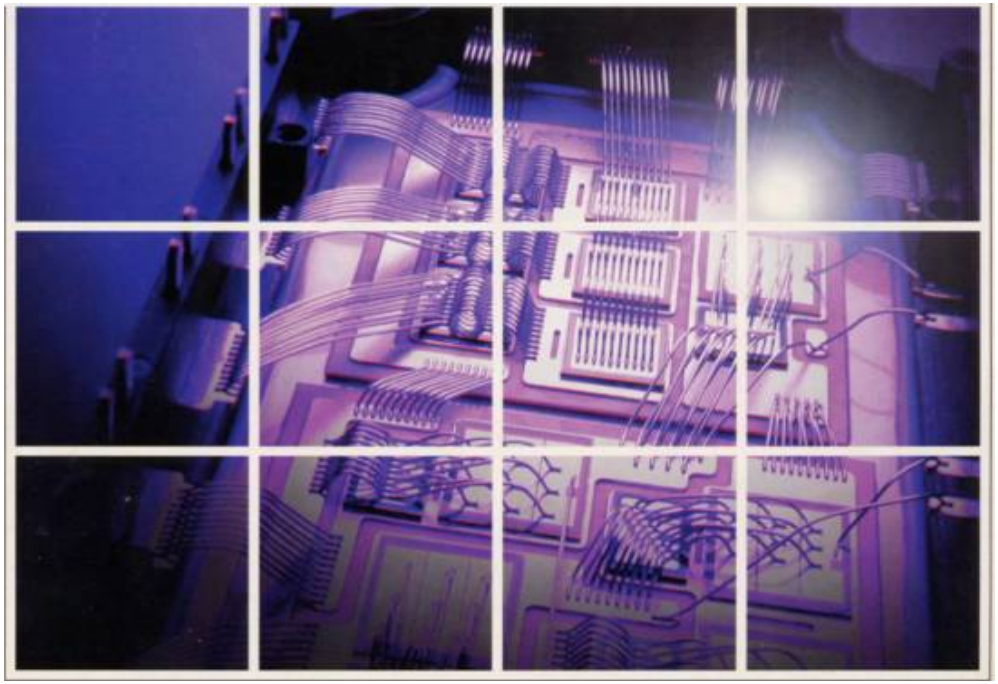
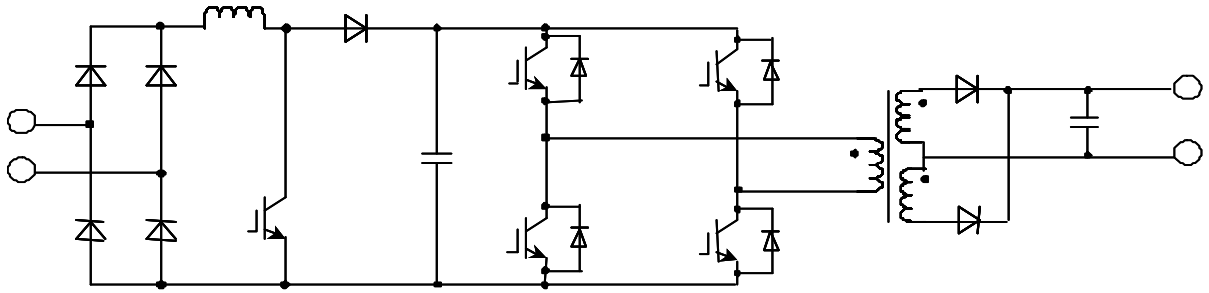
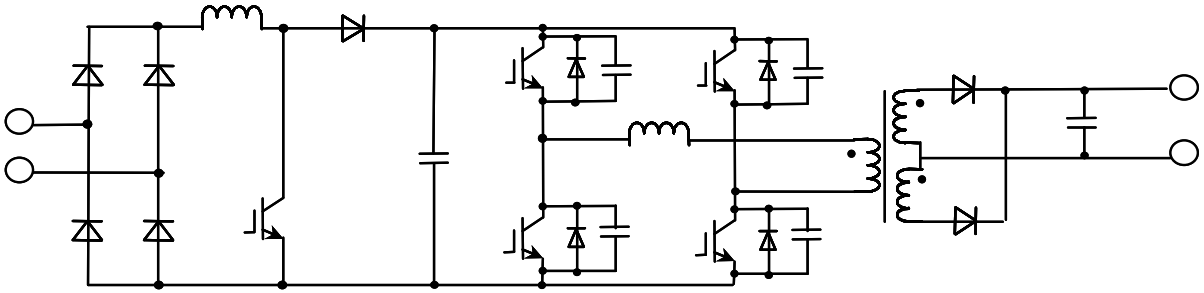
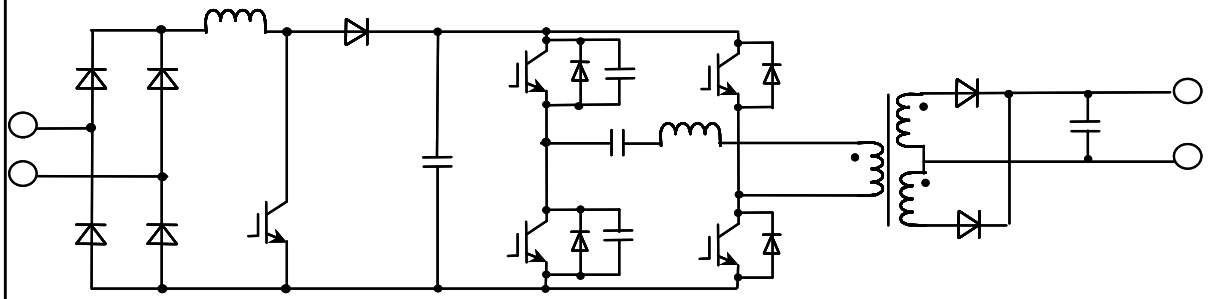
Fuji IGBT Modules for Welding machine



Device Application Technology Dept.
Semiconductor Sales Div.
Global Sales Group

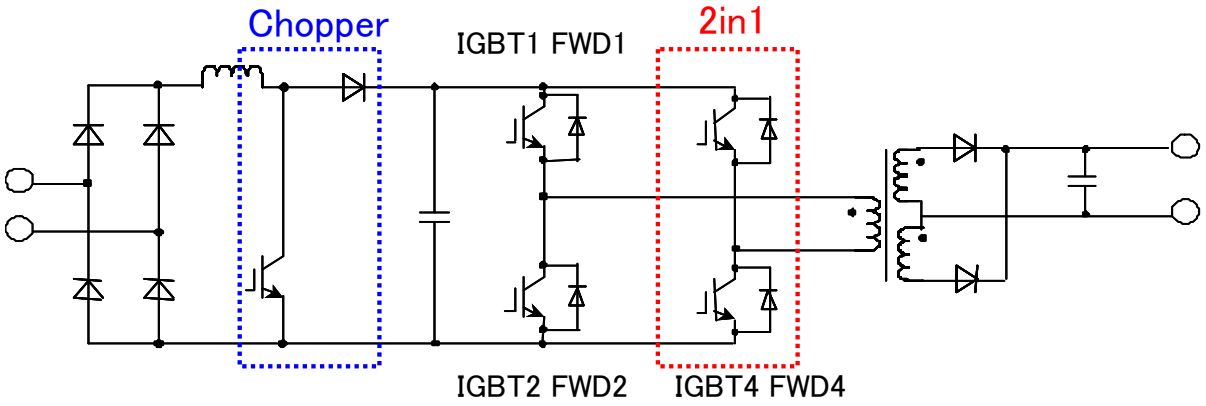
Topology in Welding machine

Fuji Electric
Innovating Energy Technology

	Topology (example)	Feature
Hard switching type		・Duty control method ・IGBT: small turn on and large turn off loss ・FWD: small reverse recovery loss
Soft switching type (ZVS)		・IGBT: zero voltage switching at turn on, and hard switching at turn off. ・FWD: small reverse recovery loss
Soft switching Type (ZVZCS)		・IGBT: zero voltage zero current switching at turn on, and hard switching at turn off. ・FWD: small reverse recovery loss

Topology in Welding machine

■Topology (Hard switching type)



・Chopper Module:

1MBI200HH-120L-50
1MBI300HH-120L-50
1MBI400HH-120L-50

・H bridge (2in1)

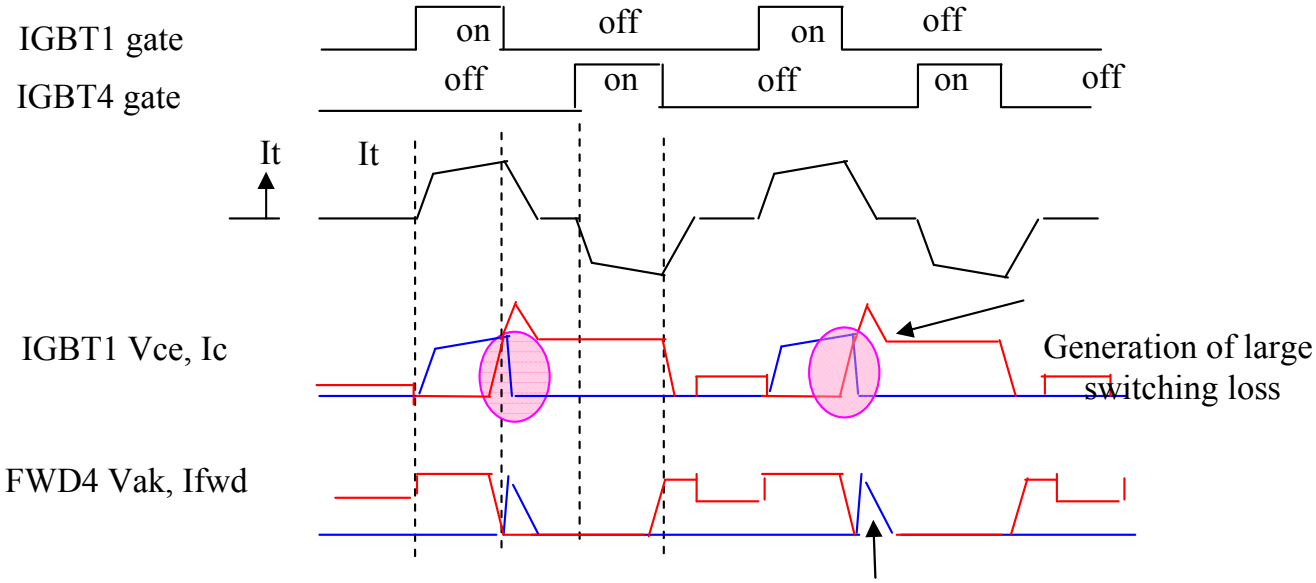
2MBI100HB-120-50
2MBI200HH-120-50
2MBI300HH-120-50

■Feature:

・Duty control method

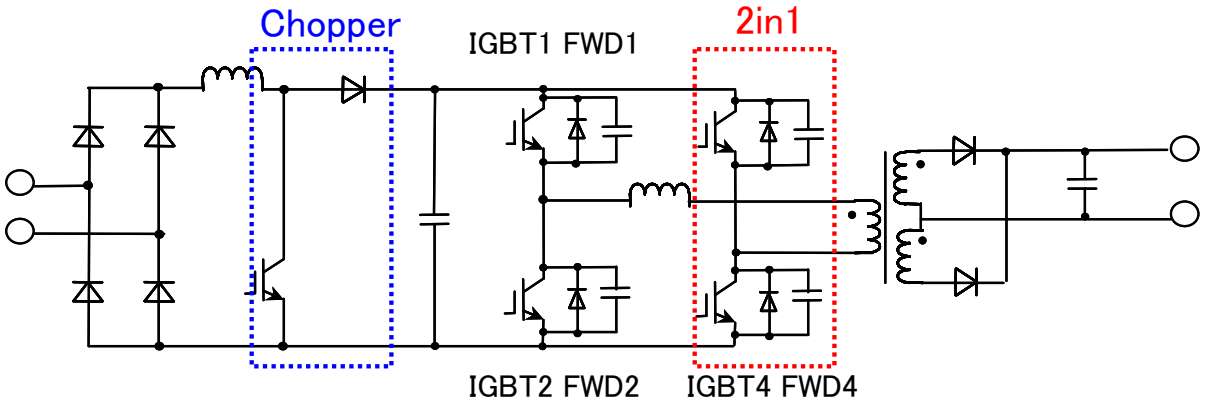
・IGBT: small turn on and large turn off loss (high speed IGBT is necessary.)

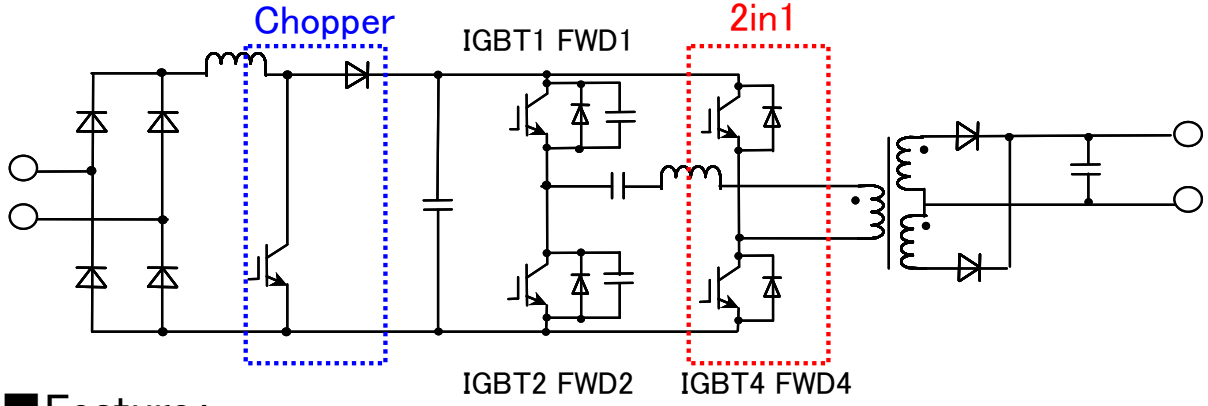
・FWD: small reverse recovery loss (high speed diode in 2in1 module is not necessary.)



Topology in Welding machine

■Topology (Soft switching type)





■Feature:

・IGBT: zero voltage switching at turn on, and hard switching at turn off. (high speed IGBT is necessary.)

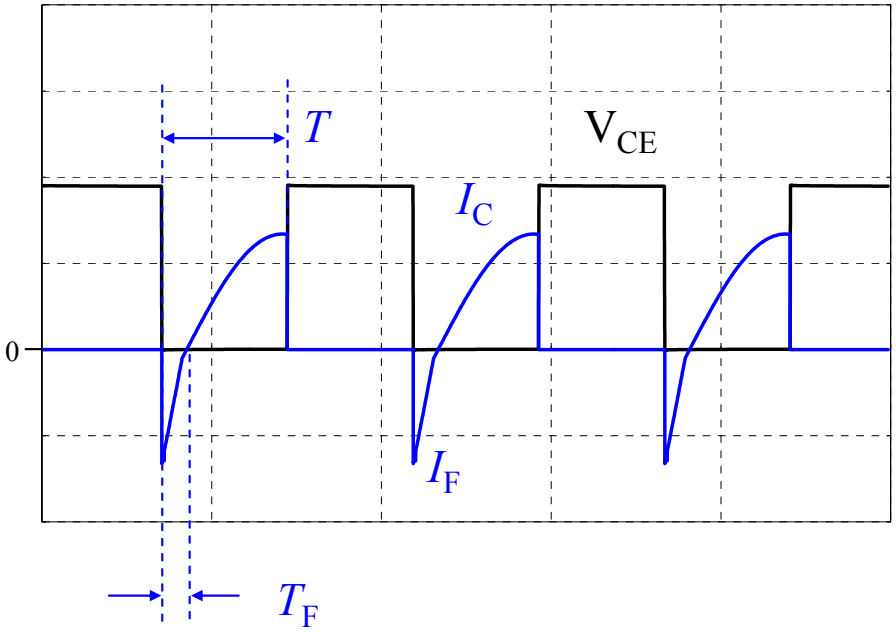
・FWD: small reverse recovery loss (high speed diode in 2in1 module is not necessary.)

・Chopper Module:

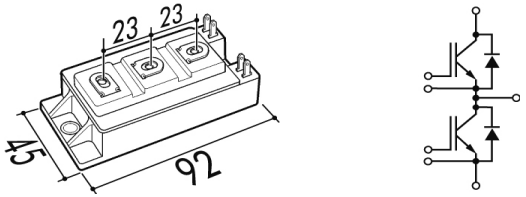
1MBI200HH-120L-50
1MBI300HH-120L-50
1MBI400HH-120L-50

・H bridge (2in1)

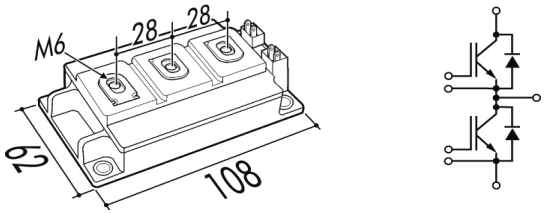
2MBI100HB-120-50
2MBI200HH-120-50
2MBI300HH-120-50



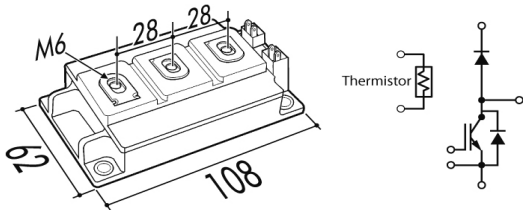
Welding output	IGBT P/N (2in1 module)	IGBT P/N (chopper module)
125A	2MBI100HB-120-50	1MBI200HH-120L-50
160A	2MBI100HB-120-50	1MBI200HH-120L-50
250A	2MBI100HB-120-50	1MBI200HH-120L-50
315A	2MBI100HB-120-50	1MBI200HH-120L-50
400A	2MBI150HH-120-50	1MBI200HH-120L-50
500A	2MBI150HH-120-50	1MBI200HH-120L-50
630A	2MBI200HH-120-50	1MBI200HH-120L-50



・2MBI100HB-120-50



・2MBI150HH-120-50
2MBI200HH-120-50



・1MBI200HH-120L-50
1MBI300HH-120L-50
1MBI400HH-120L-50

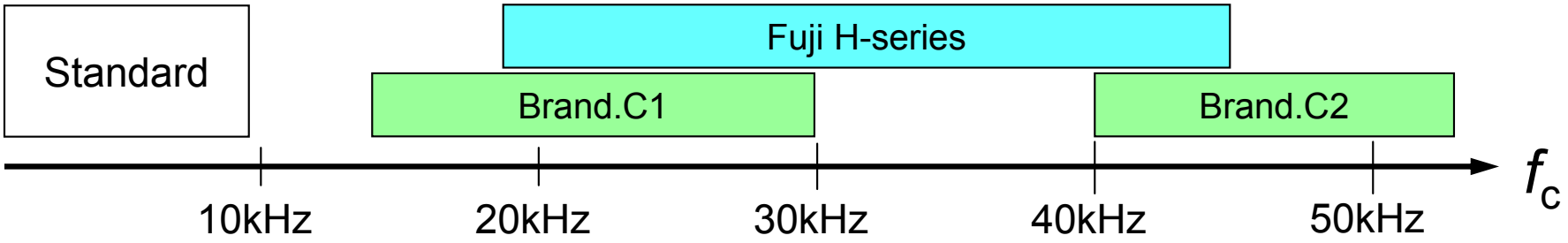
● *High performance for high carrier frequency application*

◆Optimized design for fc = 20 ~ 50kHz

Lower switching loss, lower surge voltage

◆Low thermal impedance package

New Si_3N_4-DCB substrate, RoHS package



Carrier frequency: fc

● *2in1 module and Chopper module lineup*

◆ 2in1 module: 1200V / 100A ~ 200A

◆ Chopper module: 1200V / 200A ~ 400A with NTC

1/2 half-bridge - 2in1 module

※only for soft turn on

High-speed IGBT + Standard, small FWD

2MBI100HB-120-50 (1200V/100A Pkg: M233)

2MBI150HH-120-50 (1200V/150A Pkg: M249)

2MBI200HH-120-50 (1200V/200A Pkg: M249)

PFC – Chopper module + NTC

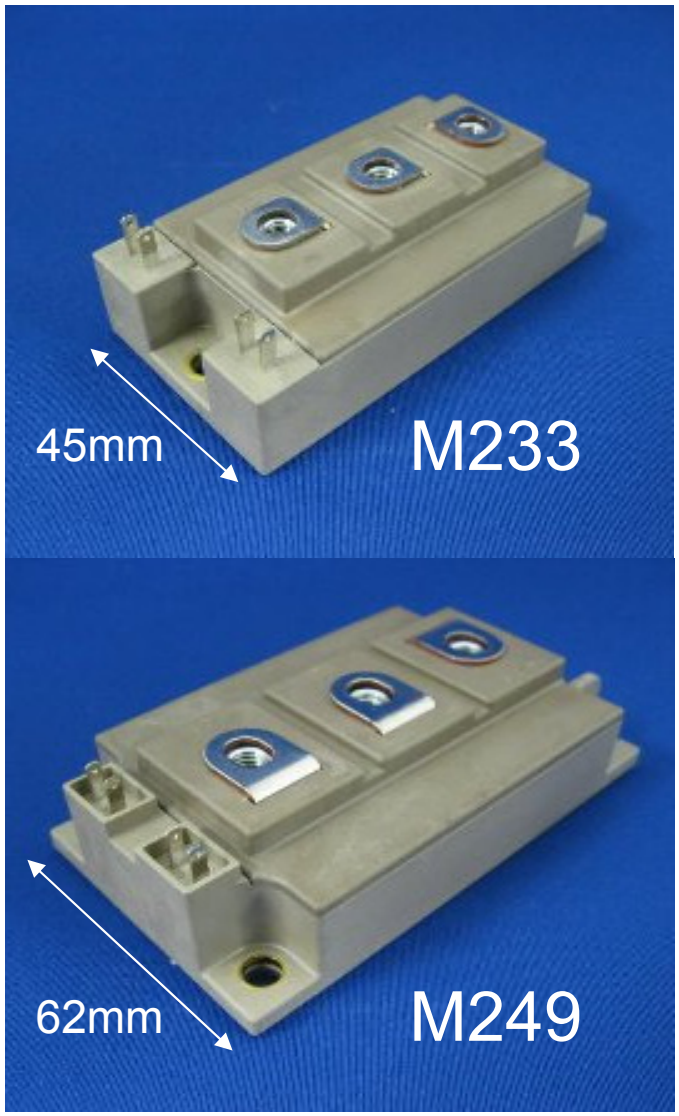
High-speed IGBT + High speed diode + NTC

1MBI200HH-120L-50 (1200V/200A Pkg: M249)

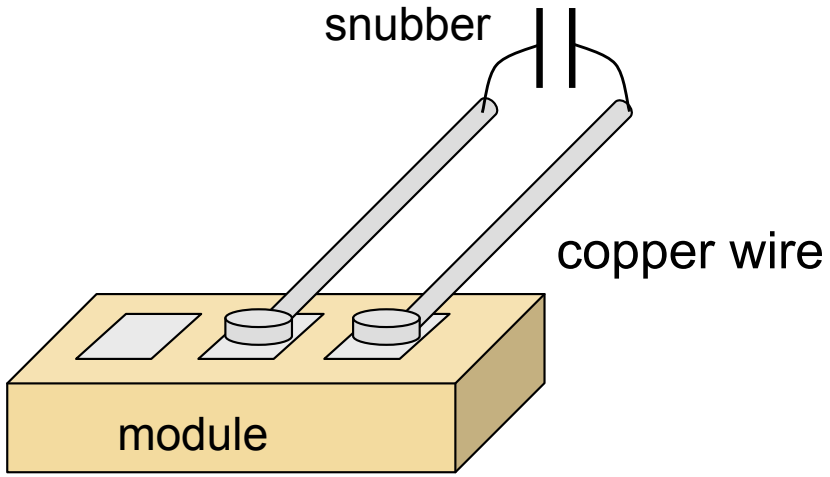
1MBI300HH-120L-50 (1200V/300A Pkg: M249)

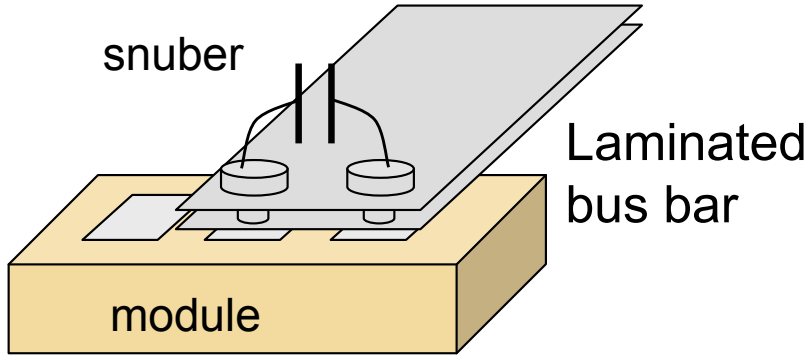
1MBI400HH-120L-50 (1200V/400A Pkg: M249)

RoHS, SiN-DBC



Small stray inductance is necessary to reduce surge voltage.
Laminated bus bar or snubber capacitor are effective.



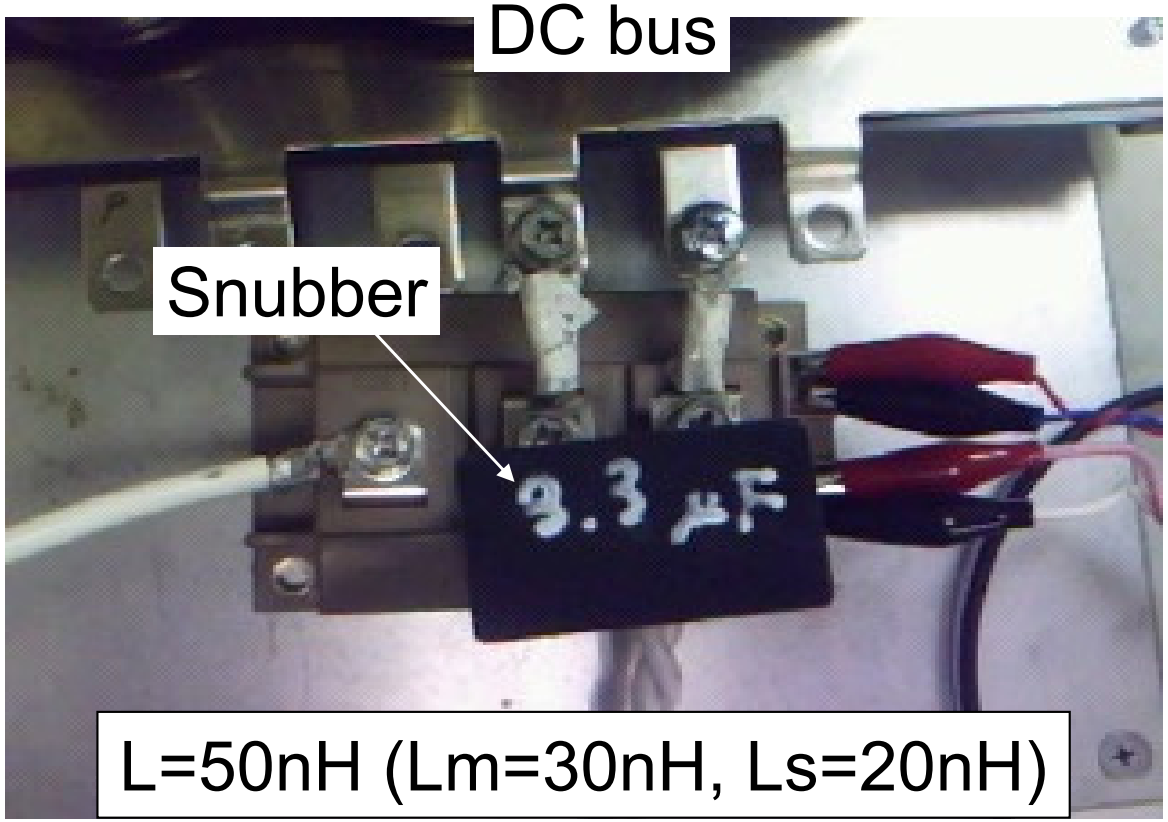


Large inductance
→ Large surge voltage

Small inductance
→ Small surge voltage

Recommended line inductance: Ls< 20nH

Inductance of cupper wire: 1cm = 1nH



To realize Ls = 20nH, connect module and dc bus by short wire and attach snubber capacitor on the module.

CONCEPT
A Power Integrations Company

IC rating	IGBT P/N (example)	Driver type（example）
100A	2MBI100HB-120-50	2SP0115T2Ax
150A	2MBI150HH-120-50	2SP0115T2Ax
200A	2MBI200HH-120-50	2SP0115T2Ax
200A	1MBI200HH-120-50	2SP0115T2Ax
300A	1MBI300HH-120-50	2SP0115T2Ax
400A	1MBI400HH-120-50	2SP0115T2Ax

イサハヤ電子株式会社

IC rating	IGBT P/N (example)	Driver type（example）
100A	2MBI100HB-120-50	VLA546**
150A	2MBI150HH-120-50	VLA546**
200A	2MBI200HH-120-50	VLA546**
200A	1MBI200HH-120-50	VLA546**
300A	1MBI300HH-120-50	VLA546**
400A	1MBI400HH-120-50	VLA500K