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Introduction to Package CLIP



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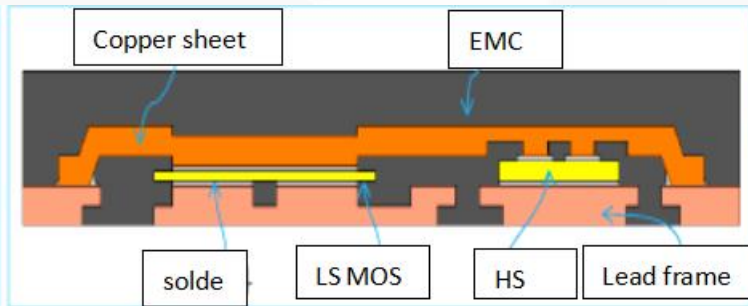
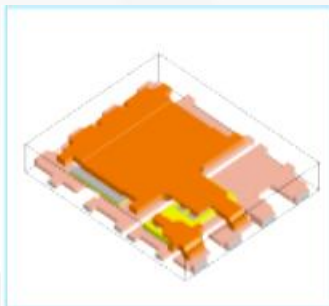
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1、Clip Package brief introduction

1.1 Copper Chip (Clip) Package Technology

Clip Bond, It is a package process that uses copper sheet welding instead of wire bonding to connect chips and pins. Clip bond, an electrical connection that can achieve lower resistance and inductance and improve thermal performance, has been applied to power device package.





1、Clip Package brief introduction

1.2 Two bonding methods:

1. All copper sheet bonding method

- Both the Gate pad and the Source pad are in the Clip mode. This bonding method has high cost and complex process, which can achieve better $R_{ds(on)}$ and better thermal effect.

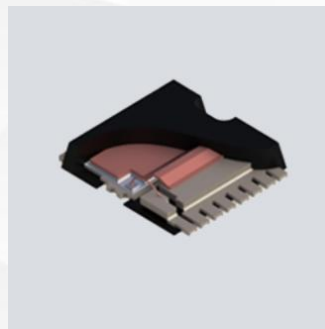
2、Copper sheet wire bonding method

- Source pad is in the Clip mode, and Gate is in the Wire mode. This bonding method is slightly cheaper than all-copper sheet, saving wafer area (applicable to the very small area of Gate), and making the process simpler than all-copper sheet.

All copper sheet bonding method



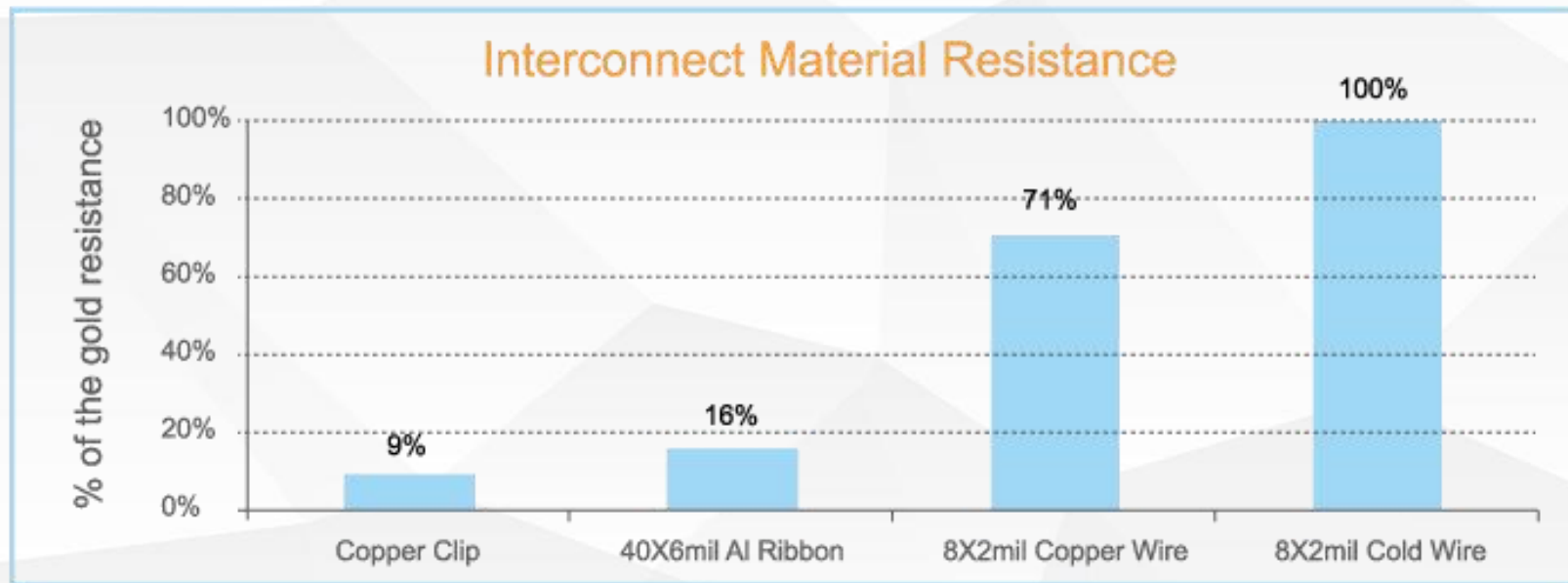
Copper sheet wire bonding method





2、Clip Package features

2.1 Use copper blocks to connect the source and leadframe of MOSFETs to achieve better $R_{ds(on)}$ and better thermal dissipation

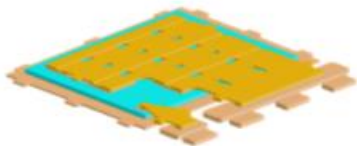




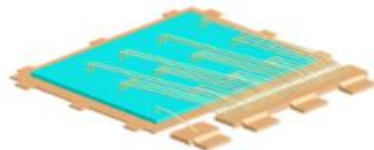
2、Clip Package features

2.2 For Electrical performance, Clip package has lower internal resistance and stronger current capacity than wire bond.

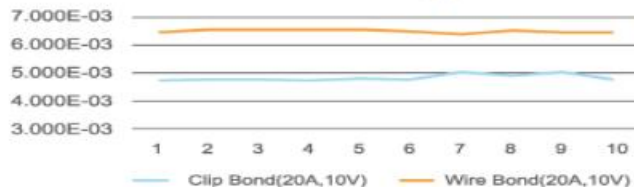
Clip Bonding



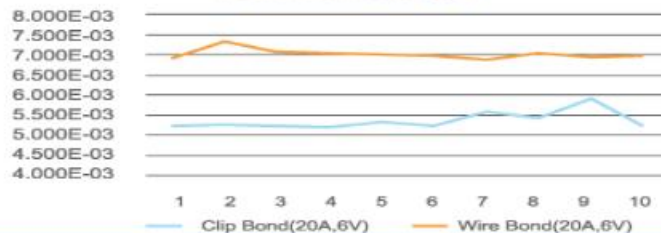
Wire Bonding



RDSon Distribution(Ω)



RDSon Distribution(Ω)



Conclusion: Applied to DFN8X8, cooper clip reduces internal resistance by 30% compared to wire bond, and increases current by 6 times.

Bonding Type	Wire Qty. (EA)	Sectional Area (mm ²)	Max Current (A)
Cu Wire	29	0.058	60
Clip	1	0.358	350

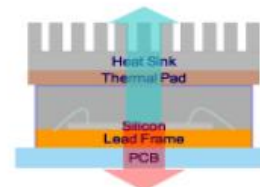
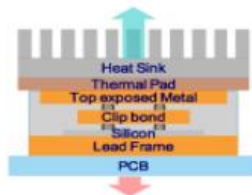
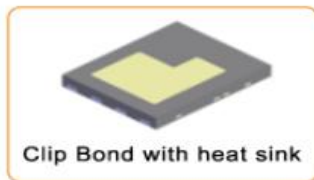
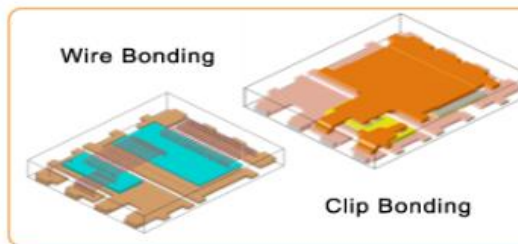


2、Clip Package features

2.3 For thermal performance. Clip packaging dissipates heat through clips to achieve better thermal effects.

Summary	Wire	Clip	Temp D	Reduce %
HS MOSFET Temp	81.5	70	11.5	14%
LS MOSFET Temp	65.5	58.6	6.9	10.5%
Package Temp	81.6	70.2	11.2	14%

Loading :@19A; HS: 6.8W/mm³ ; LS: 1.7W/mm³



DFN5X6 Due FET	Temperature(℃)
Clip @ 30A	138
Wire with heat sink @ 30A	107
Clip with heat sink@ 30A	86

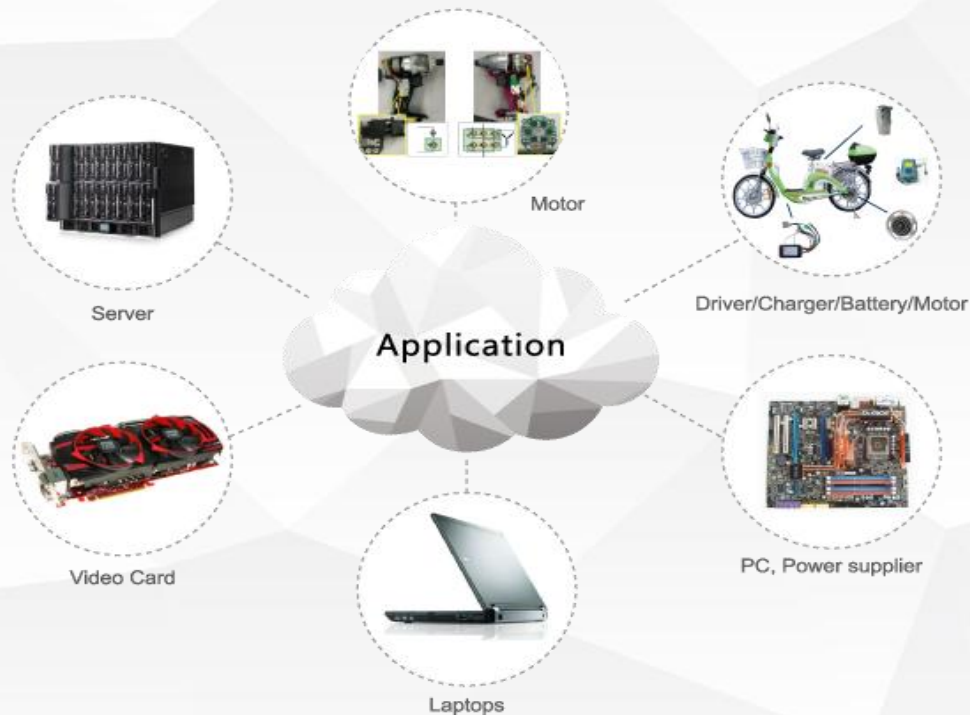
25%

Conclusion: The Cu-clip dissipates heat through the upper heat sink, achieving better thermal effect.



3、Clip Package MOSFET Application

Clip Bond Application



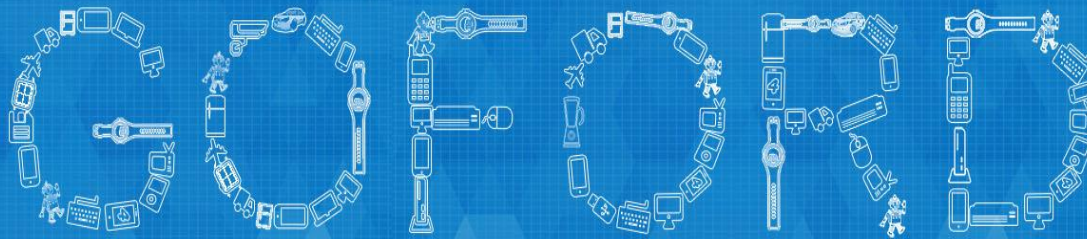


4、Clip Product

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GT011N03D5E

1. Clip bond package with extreme low $r_{ds(on)}$ and big current:
 V_{DS} :30V, $R_{DS(on)}$ (typ)(@4.5V): 1.24m Ω , I_D : 209A
2. Strong ESD capability: over 5K
3. Widely used in BMS, motor control and large power supply.



THANKS