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CERAMIC HEATSINK INTRODUCTION

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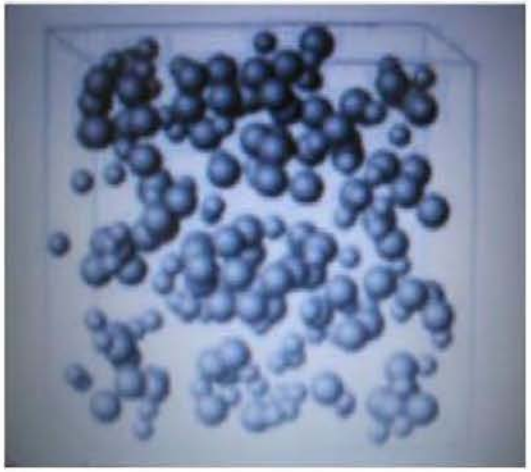
MPC Property-Natural Convection & Heat Radiation

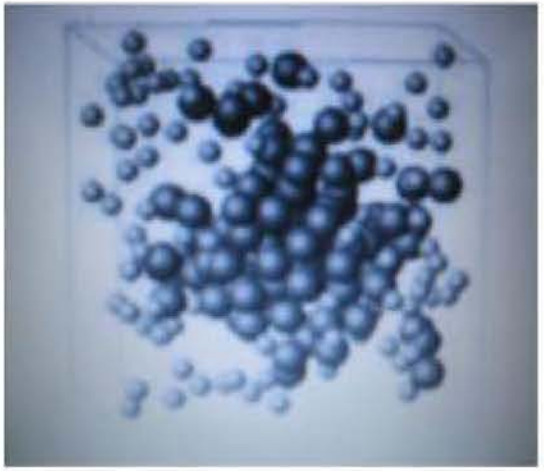
Using MPC as a heat sink, the MPC Structure provides very large surface area to contact air and has excellent property of Heat Dissipation and Heat Convection.

General Structure
Metal series



Regular arrangement

Micro-Pores Structure



Irregular arrangement

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MPC Property-Low Thermal Capacity

- We utilize the ceramic with the property of high thermal dissipation and the low thermal capacity for heat sinking.

Low Thermal Capacity:

In chart (1), it shows copper is the material with lowest thermal Capacity.

But in chart (2), we find the thermal capacity of copper is the highest than that of aluminum and MPC in term of unit volume. MPC is the lowest thermal capacity material in unit volume. MPC dissipates heat faster than metal Heat Sink without storing heat within itself.

	Density (g/cc)	Thermal conductivity (W/m-k)	Thermal capacity (J/g-℃)
Cu	8.96	385	0.385
Al	2.7	210	0.9
MPC	1.8	125	0.67

Chart(1)

	Volume (cm^3)	Weight (g)	Thermal capacity of Unit volume
Cu	1	8.96	3.45
Al	1	2.7	2.43
MPC	1	1.8	1.206

Chart(2)

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MPC Property- Heat Convection

- **Heat Convection:**

  The surface area of MPC is greater than the metal Heat Sink by about 30%. Hence, MPC has more surface area to contact air, the convection medium. MPC can dissipate more heat in a unit time. Test result as next page::

Test Equipment

Test Condition :

-Heater Type : Dummy Heater

-Heater Material: Copper

-Heater Size:30*30*8(mm)

-Convection Condition:

fanless, airless

-Conduction medium:

Thermal Grease (k=2)

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Heat Dissipation Ability Comparison Sheet

Material	Photo	Heat Sink Dimension	Heater Temp	Thermal Resistance	Thermal Resistance Variation	Power of Heater	Ambient Temp
Without Heat Sink		-	86.44 ℃	11.16℃/W	-	5.06 W	29.95 ℃
MPC		30*30*2.5mm	82.14 ℃	10.21℃/W	-11.9%	5.06 W	30.5 ℃
Copper		30*30*2 mm	86.38 ℃	11.09℃/W	-0.6%	5.06 W	30.26 ℃
Aluminum		30*30*2 mm	85.3 ℃	10.93℃/W	-2%	5.06 W	30 ℃

Result: We find that MPC has better Heat Dissipation ability than metal Heat Sink in a natural convection environment

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MPC Application Introduction

LED LCD TV

Digital Photo

Set Top Box

Mother Board

Broadband

Power Adaptor

Media Player

Solar System

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A pplication-LED & LCD TV GPU

Application : Samsung LED TV Series

Advantage : Low profile、Insulation

EMI Shelter、Heat Sinking

MPC Spec. : 40*40*5 Wave Type

30*30*5 Wave Type

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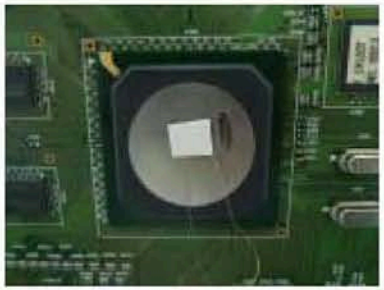
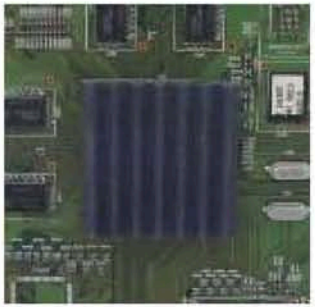
Test Report of LED TV

Test sample	Without Heat Sink			40*40*5 Wave Type		
PHOTO:						
No	IC Temp(℃)	Room Temp(℃)	△T=IC-Room	IC Temp(℃)	Room Temp(℃)	△T=IC-Room
1	85.2	24.5	60.7	80.3	25.1	55.2
2	84.5	24.3	60.2	80.6	25.1	55.5
3	83.7	23.2	60.5	80.3	25.1	55.2
4	83.6	23.3	60.3	79.8	25	54.8
5	83.9	23.2	60.7	79.7	24.6	55.1
average	84.18	23.7	60.48	80.14	24.98	55.16

Remark : The ambient temperature inside LED TV is around 52 ℃

Test Result : MPC can reduce 5.3℃=(60.48 -55.16)

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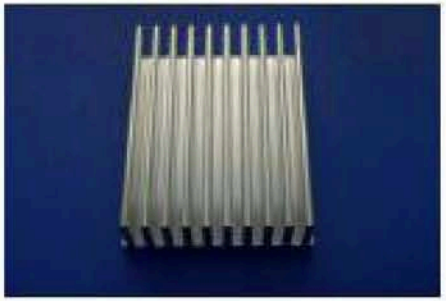
Ceramic Heat Sink V.S Aluminum Heat Sink
IC : Power IC
IC Size : 20*15(mm)
Test Date : 2010/4/21

Test sample	Without Heat Sink				Aluminum_Fin Type_30*30*8.6(mm)				MPC_Wave Type 30*30*5(mm)			
PHOTO: IC WITH Heat Sink												
	Power(W)	IC Temp(℃)	Room Temp(℃)	ΔT	Power(W)	IC Temp(℃)	Room Temp(℃)	ΔT	Power(W)	IC Temp(℃)	Room Temp(℃)	ΔT
	2W	109	22.6	86.4	2W	77	23	54	2W	77.7	23	54.7
Test sample	Without Heat Sink				Aluminum_Flat Type_30*30*2.5(mm)				MPC_Flat Type 30*30*2.5(mm)			
PHOTO: IC WITH Heat Sink												
	Power	IC Temp(℃)	Room Temp(℃)	ΔT	Power	IC Temp(℃)	Room Temp(℃)	ΔT@25℃	Power	IC Temp(℃)	Room Temp(℃)	ΔT
	2W	109	22.6	86.4	2W	83	23	60	2W	80.6	23.0	57.6

Test Result

Test Sample	ΔT	Reduce Temp(℃)
without H/S	86.4	
Al Fin Type 30*30*8.6(mm)	54	32.4
MPC_Wave Type 30*30*5(mm)	54.7	31.7
Aluminum_Flat Type_30*30*2.5(mm)	60	26.4
MPC_Flat Type 30*30*2.5(mm)	57.6	28.8

Application - VGA Card

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Ceramic H/S -090610

Test sample	W/O H/S(IC Temp.)			30*30*2.5 Flat (ABC)			40*40*2.5 Flat (ABC)			△T=IC-Ambient	△T=IC-Ambient	△T=IC-Ambient
PHOTO: IC WITH Heat Sink												
No	IC	Ambient Temp		IC	Ambient Temp		IC	Ambient Temp		△T=IC-Ambient Without HeatSink	△T=IC-Ambient 30*30*2.5	△T=IC-Ambient 40*40*2.5
1	87.8	29.4		73.9	28.8		72.1	29.3		58.4	45.1	42.8
2	87.6	29.2		74.8	29.4		71.3	29.6		58.4	45.4	41.7
3	87.1	29.6		73.9	29.5		72.1	29.6		57.5	44.4	42.5
4	86.9	29.5		73.6	29.4		71.1	29.1		57.4	44.2	42.0
5	87.4	29.6		73	29.3		71.8	29.2		57.8	43.7	42.6
average	87.36	23.9		73.84	29.28		71.68	29.36		57.9	44.6	42.32

Test Condition:

1.Test Heater : VGA Card Series : NVIDIA G- FORCE2 400

2. Thermal meter-Company :Fuji Electric ; Name: FCR MicroJet ; Type : PHC6603-AAOYC

Result :		
Without Ceramic Heat Sink	Add 30*30*2.5 Ceramic Heat sink	Add 40*40*2.5 Ceramic Heat sink
△T=57.9℃	△T=44.6℃	△T=42.32℃
—	It can reduce 13.4℃	It can reduce 15.58℃

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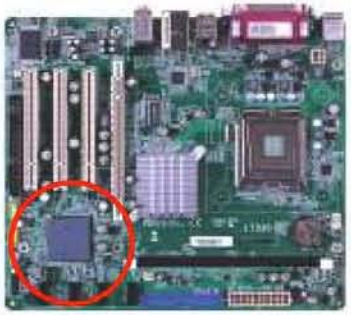
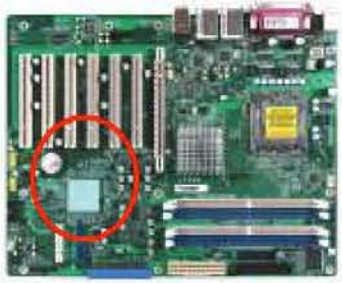
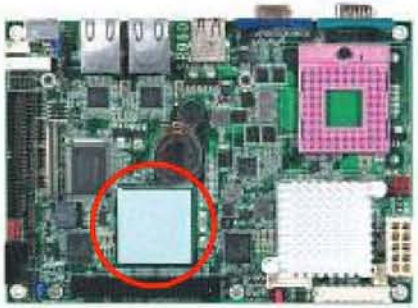
A pplication-Mother Board Chip Set



Application :Mother Board Chip Set

Advantage : Low profile、Insulation

EMI Shelter、Heat Sinking

MPC Spec. : Flat Type 30*30*2.5(mm)