



Chiefly

Intelligence Material Solutions

Heat Spreads Material





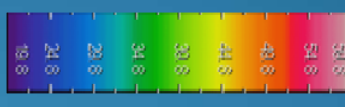
Introduction

TT-HHS is a super thin in-plane heat spreads material which effectively decrease the density of the heat in a tiny area. The heat would be dissipate about 30% quicker than the conventional solutions.

Features and the benefits:

- ① A variety of thickness available (0.05mm~0.15mm).
- ② Available for any shapes by die cut process.
- ③ High flexibility for easily apply in any devices.
- ④ Much lighter than the metal alternatives (30% lighter than Al and 80% than Cu).
- ④ Good capability for EMI shielding.
- ⑤ Reel-to-reel format for continuous die cut process.
- ⑥ Effectively eliminates the hot spot .

Heat Spreaders Comparison

Items	Al Film	Cu Film	TT-HHS	Graphite	Remarks
In-Plane Thermal Conductivity (W/m-k)	230	400	450	1200	
IR Imaging					
Insulation Strength	N/A	N/A	>1.5KV	N/A	
Tensile Strength	Poor	Good	Good	Poor	
EMI Shielding	Good	Good	Good	Good	
Thermal Radiation	<0.03	<0.03	0.96	0.82	
Heat Spreads rate (cm ² /s)	1.3	2.2	3.1	8.5	

Characteristics

Part Number		TT-HHS				Test Method
Color		Black				Visual
PSA		Acrylic	Acrylic	Acrylic	Acrylic + Graphite Gel	--
Thickness (mm)	Coating	0.015	0.015	0.015	0.055	ASTM D-3652
	Carrier	0.018	0.050	0.075	0.075	
	PSA	0.015	0.015	0.015	0.015	
	Total	0.050	0.080	0.110	0.150	
Carrier		Cu Film				--
RoHS Compliant		Yes				--
Insulation Strength	(KV/mm)	>1.5				ASTM D-149
Operation Temp.	(°C)	-40	150 (Max. for 15sec.)			--
			100 (Long Term)			
			130 (for < 30min)			--

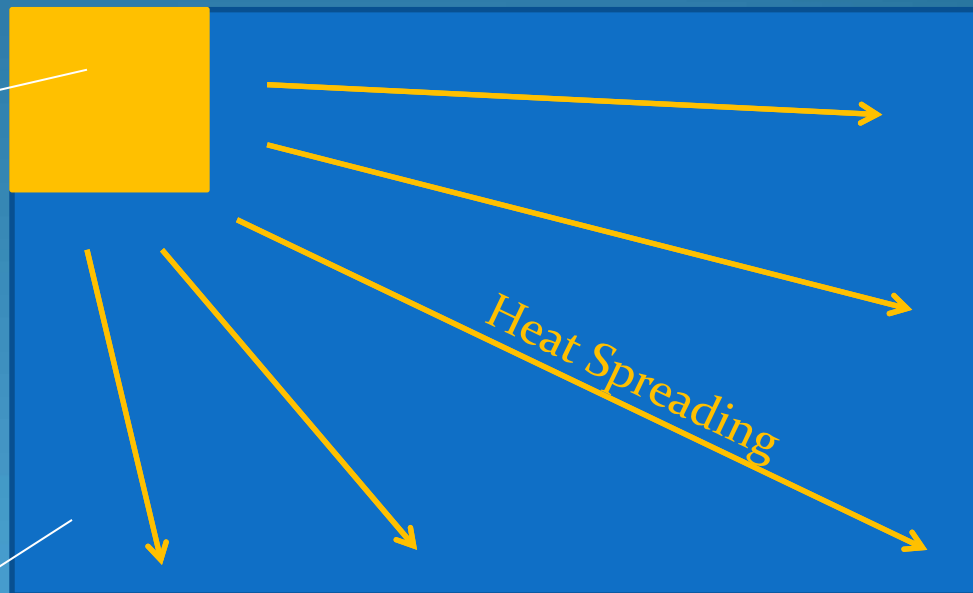
Thermal Test - 1

Compare “ T_c ” (Heat Source’s surface Temperature) of each material.

Heat Source:

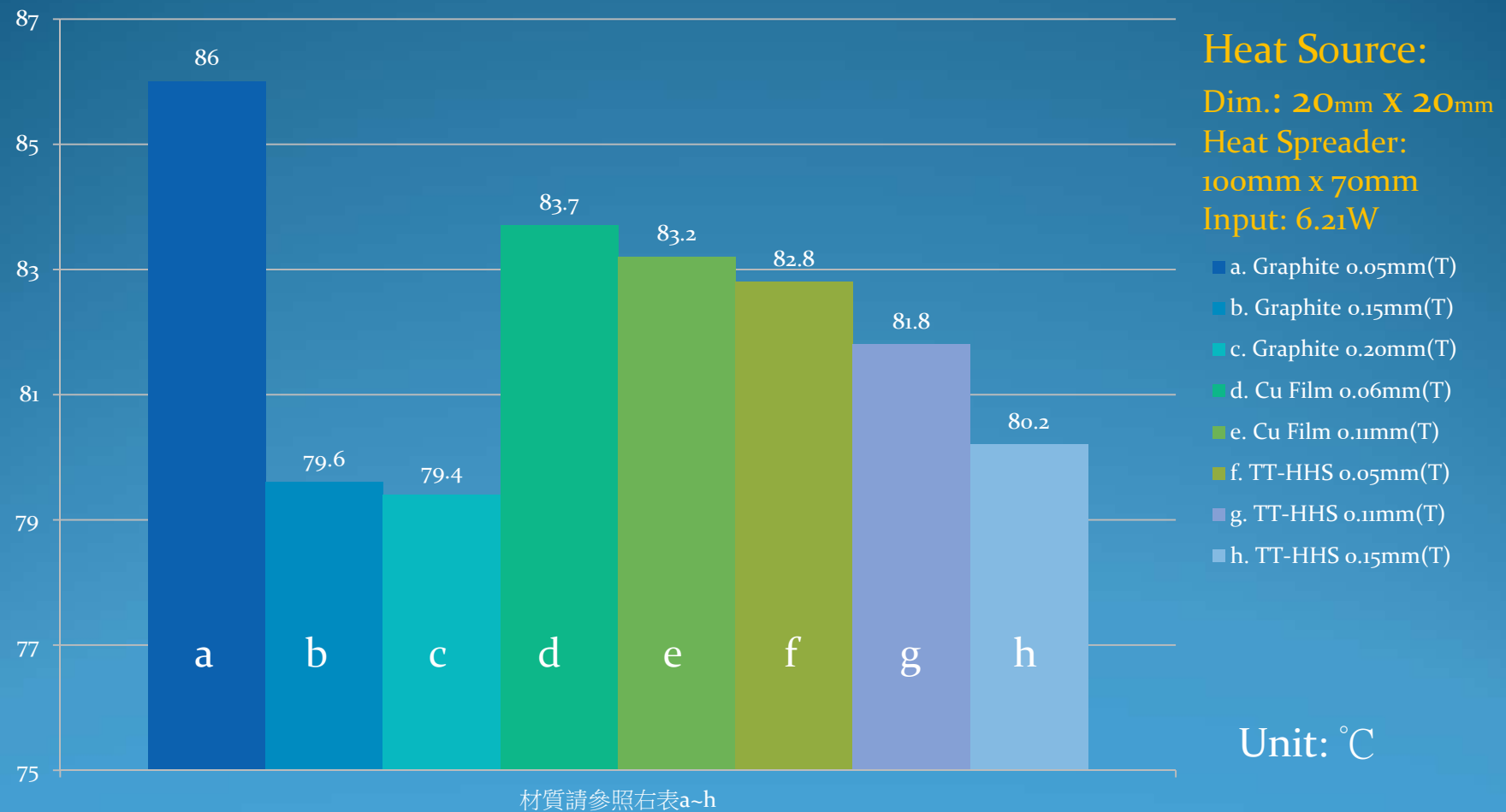
Dim.: 20mm X 20mm

Input: 6.21W



Heat Spreader (100mm x 70mm)

Thermal Test - 1



Thermal Test - 2

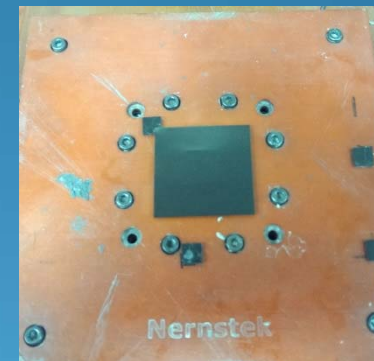
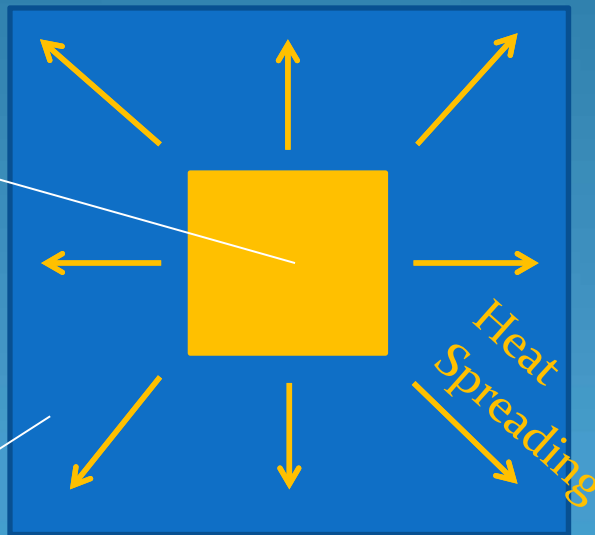
Focus on blank Cu film and TT-HHS (mobile phone industry)

Compare “T_c” (Heat Source’s surface Temperature) of each material.

Heat Source:

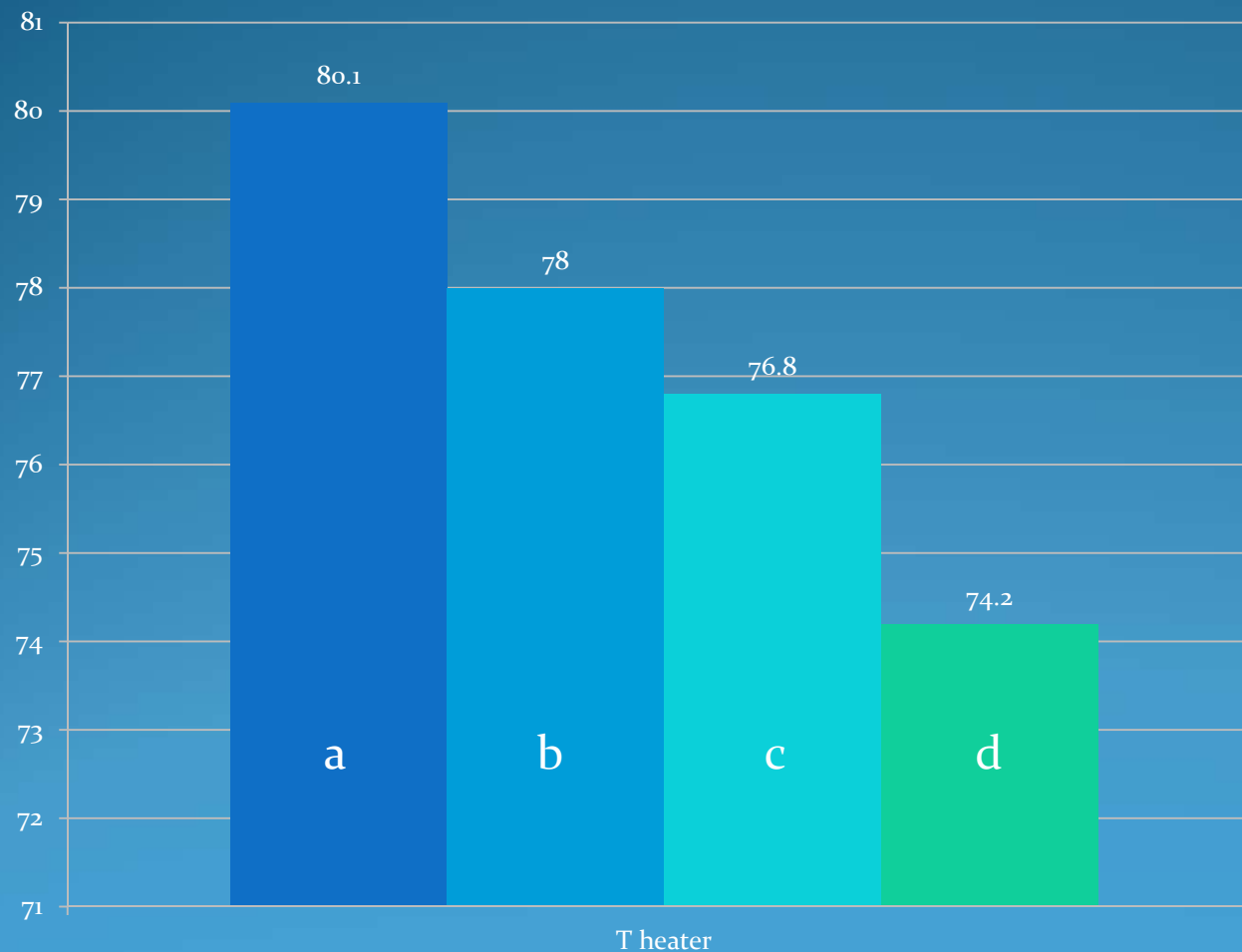
Dim.: 20mm X 20mm

Input: 5W



Heat Spreader (40mm x 40mm)

Thermal Test - 2



Heat Source:

Dim.: 20mm X 20mm

Heat Spreader:

40mm x 40mm

Input: 5W

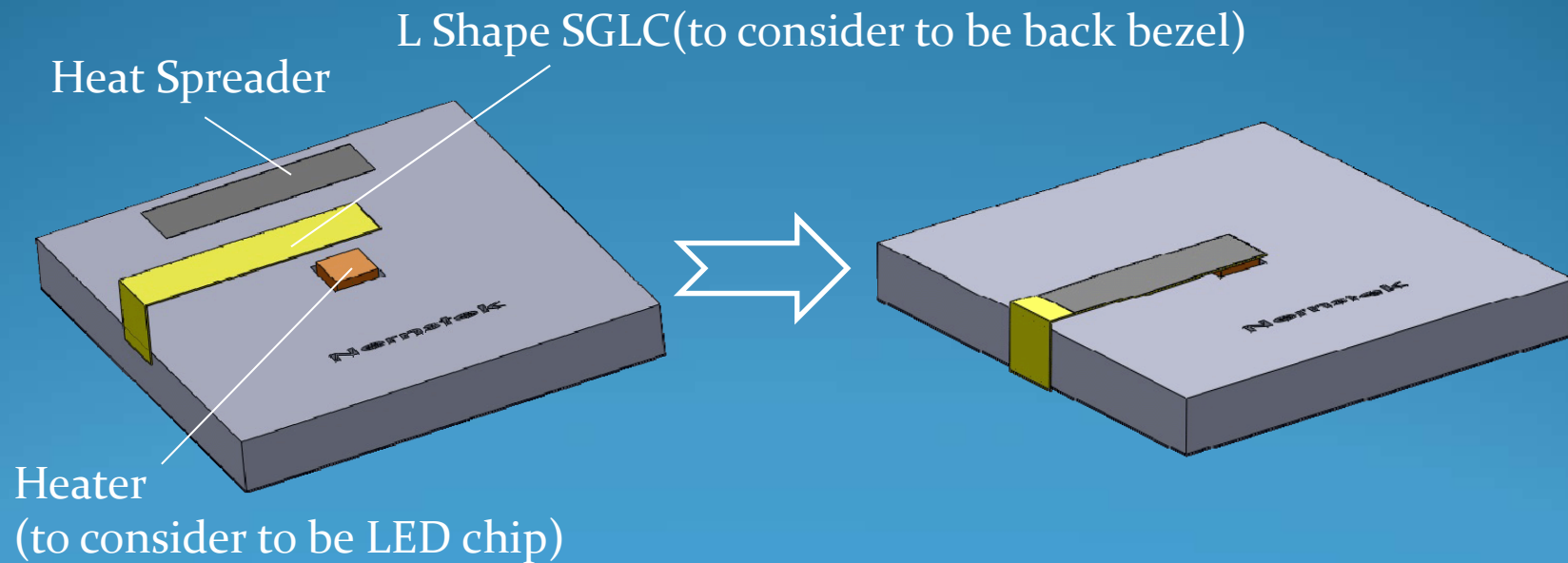
- a. Cu film covered by PET t=0.08
- b. TT-HHS t=0.05
- c. Cu film covered by PET t=0.11
- d. TT-HHS t=0.11

Unit: °C

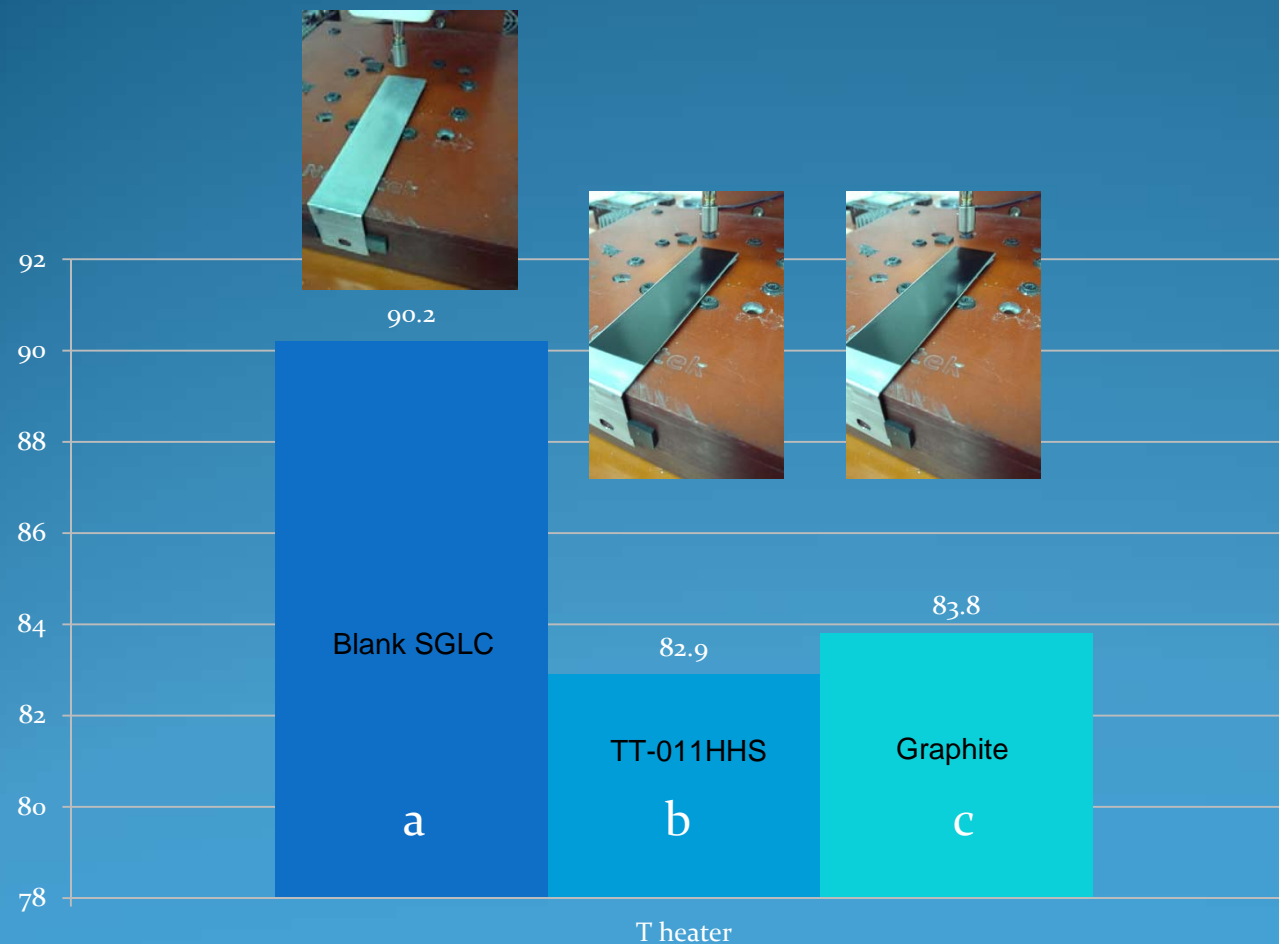
Thermal Test - 3

Heat dissipation test on SGLC (panel industry)

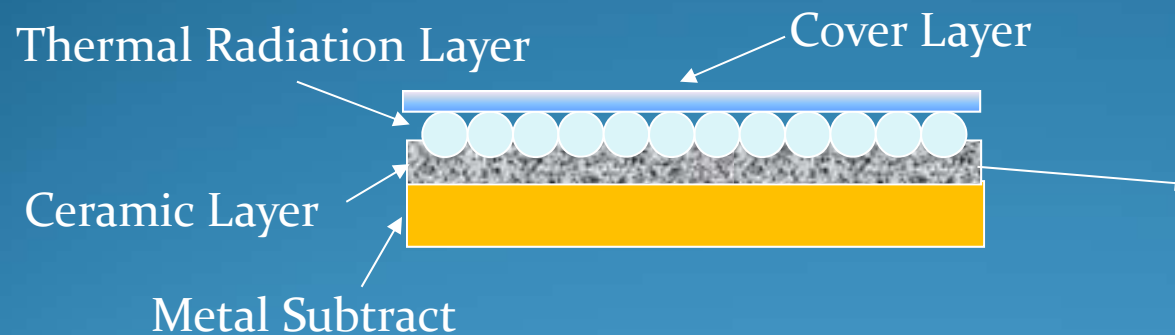
Compare “T_c” for different Heat Spreader.



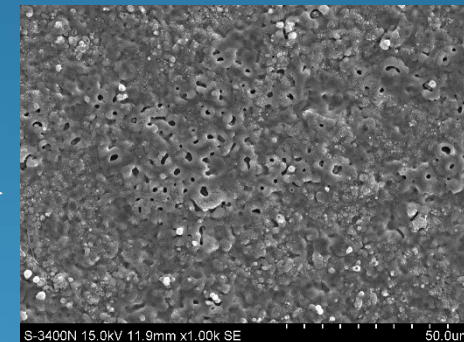
Thermal Test - 3



Structure

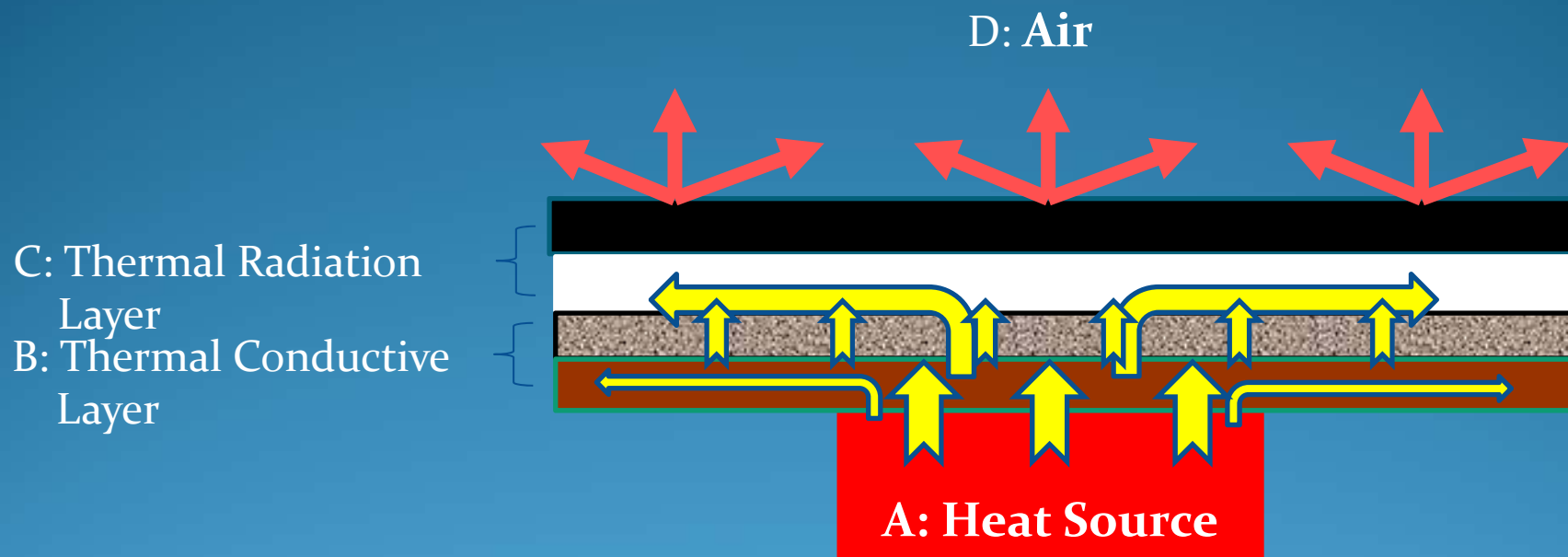


Ultra-High Surface



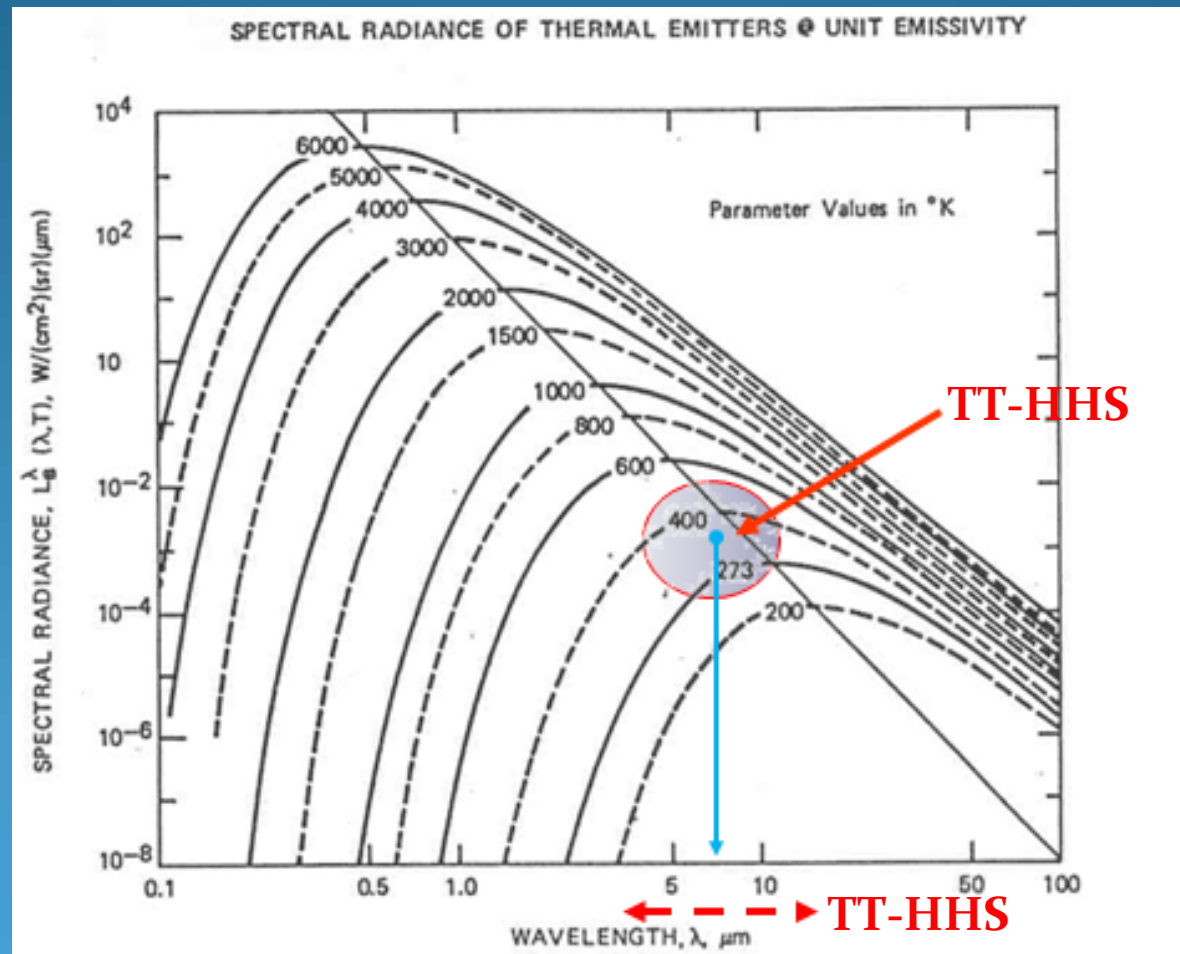
TT-HHS which covered the ceramic layer, thermal radiation copolymer layer and a protective cover layer on the copper film from bottom to top. Those layers enhanced the thermal radiation performance and well protected the surface.

How it works



A: Heat Source(Chip/LED/VRM...etc).
B: Thermal diffusion layer.
C: Thermal radiation layer.

Temp. and Wavelength

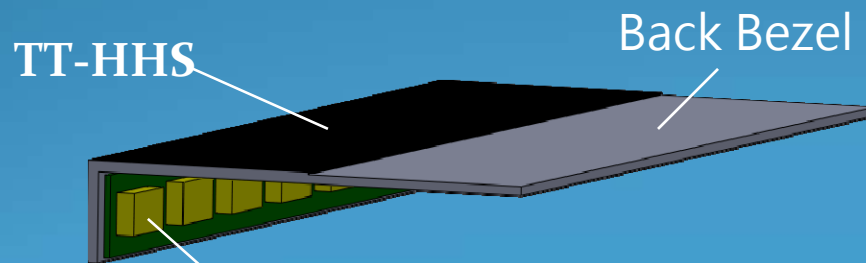
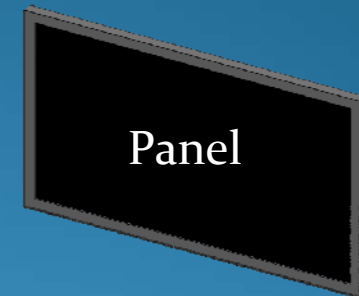


Applications I

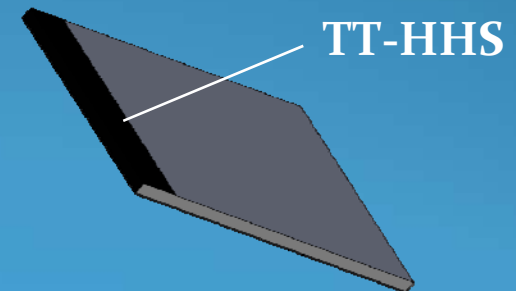


Monitor:

Desktop monitor
Notebooks
Tablets
Vehicle ...etc

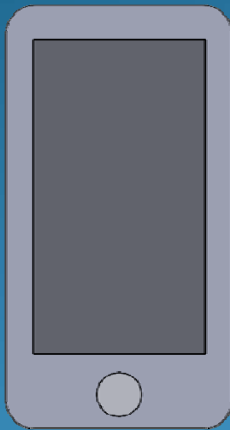


LED temp. decreased



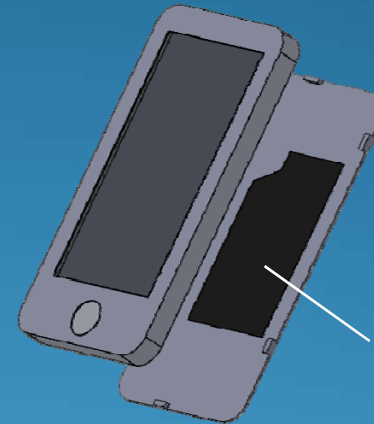
TT-HHS spreads the heat from the
Back Light Module to back bezel

Application II



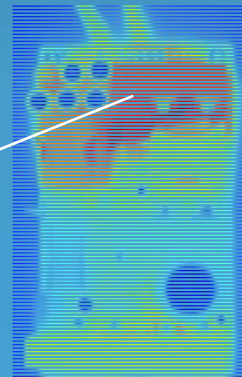
Hand held devices

Mobile Phone
Tablets
E-books...etc



Attach TT-HHS
on the back
bezel

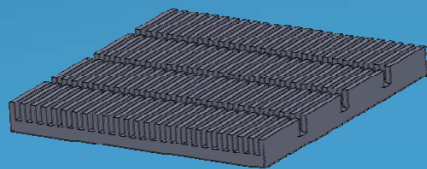
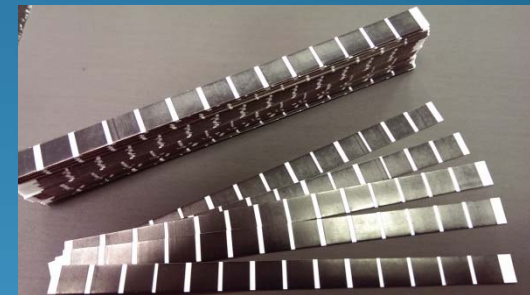
Eliminates the hot spots and
reduce the touch
temperature effectively.



Application III

Compare to the conventional heat sinks:

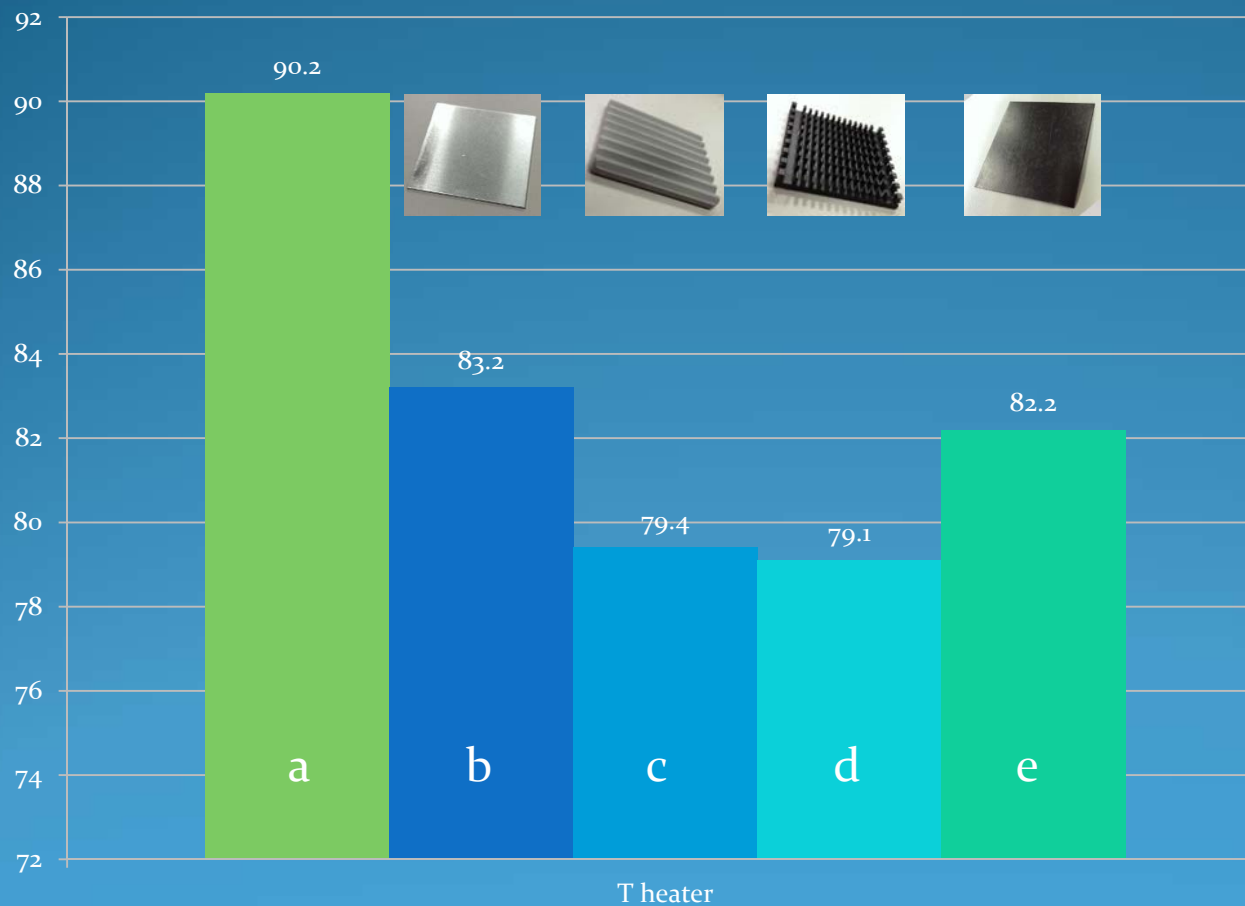
1. Cost Reduction.
2. Lighter, Thinner, could be fastened by only a tape.
3. Save weight for end user's products.
4. Mitigation EMI issues.



Conventional Heat Sink



Application III (Comparison)



Heat Source:

Dim.: 20mm X 20mm

Input: 5W

- a. No heat sink
- b. AL Plate (Blank) t=2.0
- c. Ceramic t=5.0
- d. AL Extrusion t=5.0
- e. TT-011HHS t=0.11

Application IV

Solutions for tiny chips(I):

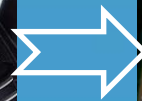
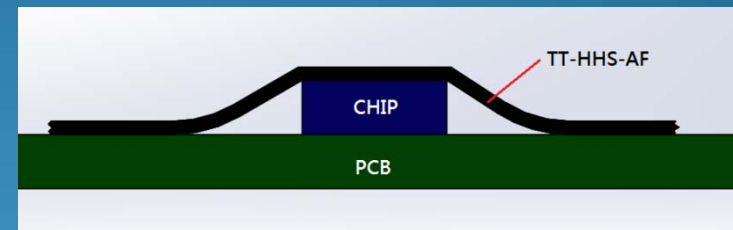
1. Only single TT-HHS for many chips.
2. Lighter, Thinner, could be fastened by self adhesion.
3. Save weight for end user's products.



Application IV

Solutions for tiny chips(II):

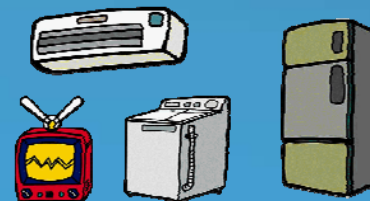
1. Only single TT-HHS-**AF** for many tiny chips.
1. Perfect covering for every tiny chips by its self adhesion and extraordinary softness.
3. Save weight for end user's products.



Characteristics

Part Number		TT-HHS-AF		Test Method
Color		Black		Visual
PSA		Acrylic Base		--
Thickness (mm)	Coating	0.06		ASTM D-3652
	Carrier	0.08		
	PSA	0.05		
	Total	0.19		
Carrier		AL Film		--
RoHS Compliant		Yes		--
Insulation Strength	(KV/mm)	>2.5		ASTM D-149
Operation Temp.	(°C)	-40	150 (Max. for 15sec.)	--
			100 (Long Term)	
			130 (for < 30min)	--

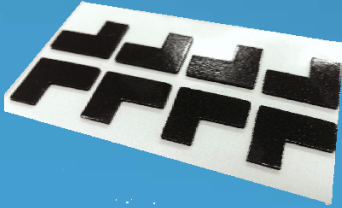
Applications for TT-HSP



Comparison

Items	TT-HHS	AL Extrusion
Performance	Medium	Medium
Weight	Extremely Light	Heavy
Volume	Small	Large
Price	Low	Medium
Fastener	By tape	By fastener

Availability

	Roll	Sheet	Customize
TT-HHS	V	V	V
Picture			
			

Quality Policy

By focusing on customer satisfaction, we strive to design our products to meet the needs of our customers, control our processes using appropriate techniques, manufacture our products to be defect free, involve all employees in continuous improvement, deliver our products in a timely manner, and support them with quality customer service



SPEC SOCIETY OF PROFESSIONAL ENGINEERS CERTIFICATION

CERTIFICATE OF REGISTRATION

Certificate No: **QMS - 5039**

Company Name: **Nernstek Asia Ltd.,**
No.26, Fengshan St., Xinzhuang Dist., New Taipei City 242,
Taiwan(R.O.C)

Scope of registration : **The Manufacture of adhesive tape**
(Exclusion: 7.3)

Standard : **ISO 9001:2008**

SPEC Certification Co., Ltd. hereby certifies that the Quality Management System of the above organization has been assessed and found to meet the requirements of the standard and scope of registration detailed above

Certificate From : 2011-04-01 Certificate Expiry : 2014-03-31
(Registration on 2011-04-01)

2011-04-01
Signed for and on behalf of SPEC
[Signature]
By authority of the Chief Executive

KAB KAS-QC-18
The Accreditation Mark indicates accreditation by KAB in respect of those activities covered by the accreditation certificate number KAS-QC-18
SPEC is accredited by Montefiore (IAS) of the International Accreditation Forum Multilateral Recognition Arrangement for Quality Management Systems

IAF INTERNATIONAL ACCREDITATION FORUM

SPEC Co., Ltd. 4407 New Britain Street 17th, 107 01, Dashi-dong, Gung-gu, Seoul, 150-796, Korea



Thank You!

Chiefly is an industry leader of today and prepared for
the possibilities of tomorrow.