



December, 2012

# Innovative **LED** Thermal Solutions



[www.coolttm.com](http://www.coolttm.com)  
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# Overview

Cooling InnovationTTM provides the epochal thermal solutionsfrom cooling methods to cooling modules



**Name of Company:** TTM Co., Ltd.

**CEO/President:** Eugene Choi

**Year Established:** November 2003

**Number of Employees:** 30

**Capital:** 1.5M USD

**Web:** [www.coolttm.com](http://www.coolttm.com)

## Contact Us

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Phone (408)519-5808



# History

Cooling InnovationTTM provides the epochal thermal solutions from cooling methods to cooling modules



## 2012

- Vendor Registration to Intel (USA)

## 2011

- TU1 (US Office ) Open in San Jose
- TK1 (Research Center) Open in Suwon, Korea

## 2010

- TD1 (Headquarter) Open in Daejeon, Korea
- Vendor Registration to Samsung (Korea)

## 2003 ~ 2009

- "Leader of Technology Startups" Awards
- "The Best Venture Enterprise" Awards
- "Venture Design Contest" Awards
- Designated "Inno-Biz Company"
- Designated "Material Special Company"
- Acquired "UL" Certificate
- Acquired "Clean Workplace" Certificate
- Acquired "Korea Technology (KT)" Certificate
- Acquired TS 16949
- Acquired ISO 9001/14001



## **MTRAN<sup>®</sup>** : Micro Channeled Ultra Thin Flat Heat Transmitter



- Conventional Aluminum Based, Phase Change Technology
- Superior Thermal Conductivity (over 5,000W/mK, 25X of Solid Aluminum)
- Ultra Thin (Minimum 1mm Thickness)
- Ultra Light (1/3~1/2 of Solid Aluminum)
- Large Surface Area (As Large as TV Panel Size)
- Easy Fabrication
- Unique in the Market
- Patent Protected (36 related Patent)



## NANOTIM<sup>®</sup> : Thermal Interface Materials



### ❖ NANOTIM TGS : Thermal Grease

- ❖ Intel Applied
- ❖ 2 W/mK, 4 W/mK, 7 W/mK
- ❖ RoHS Compliance, Halogen Free, and UL-94 V0



### ❖ NANOTIM PCM : Phase Change Material

- ❖ DRAM Module in Servers for Dell, HP and IBM Applied, LED Lightings Applied
- ❖ 2 W/mK, 4 W/mK, PAD Type & Paste Type
- ❖ RoHS Compliance, Halogen Free, and UL-94 V0



### ❖ NANOTIM SPS

- ❖ Various Applications Applied, Special focus on LED Lightings
- ❖ 1.5 W/mK, 3 W/mK, 4W/mK, 0.15mm Thickness and over available
- ❖ RoHS Compliance, Halogen Free, and UL-94 V0

## T-COATING® : Radiation Enhancement Coating

### Feature

- ❖ Special coating technology
- ❖ PEO(Plasma Electrolytic Oxidation)
- ❖ High durability of abrasion coating (corrosion, heat resistant)
- ❖ High withstand voltage coating
- ❖ Thermal Coating for HEAT SINK

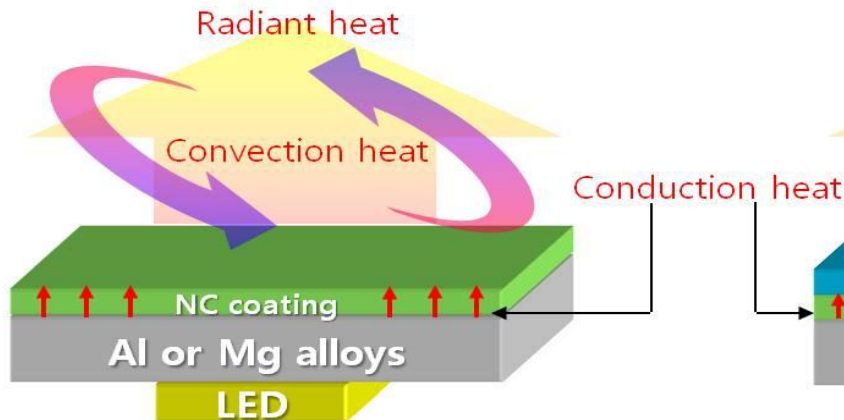
### NFC – Thermal coating technology

#### Active cooling by controlling the ceramic nanoparticles of surface

- 1) Metal NC coating : nanoparticle layer formed
- 2) Color NC paint : Synergy of Thermal performance by adjusting the element
- 3) RoHS Compliance

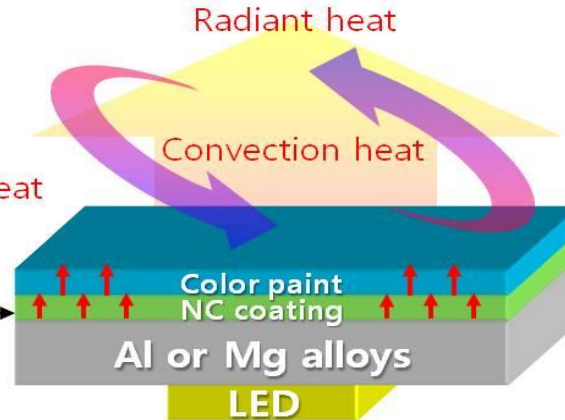


### NCC1 : Electro-Chemical Conversion



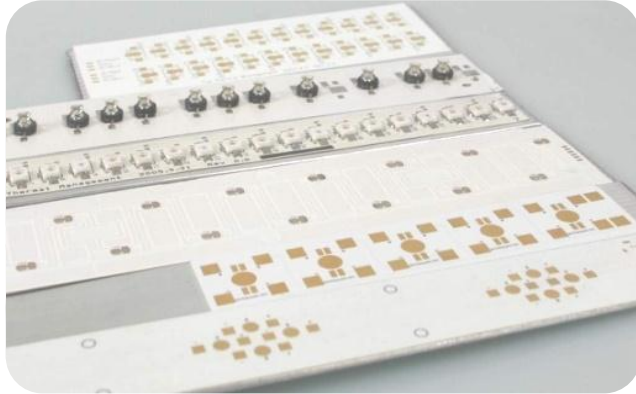
• Reduction temp  $\Delta T = -8 \sim -10^{\circ}\text{C}$

### NCC2 : NC coating + Color painting



• Reduction temp  $\Delta T = -6 \sim -8^{\circ}\text{C}$

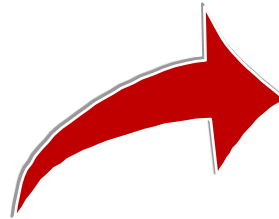
# ○ MTRAN as Substrate



MTRAN PCB-1



MTRAN PCB-2 (UniK)



MTRAN PCB-3

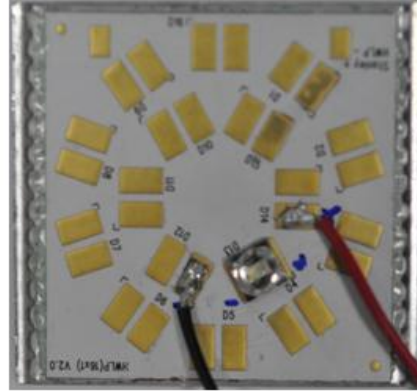
UniK	MPCB	Del-T
109.5	117.7	-8.2
93.8	103.6	-9.8
81.9	86.3	-4.4



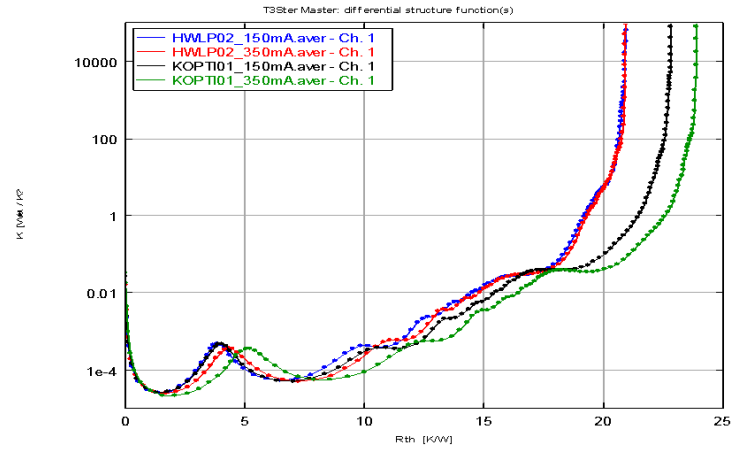
# MTRAN as Substrate



**샘플명 : KOPTi01**  
**측정 조건**  
 -구동 전류 : 150mA, 350mA  
 -센서 전류 : 10mA  
 -구동 전력 : 0.44W , 1.11W  
 -구동 전압 : 3.12V , 3.25V  
 -샘플상태 : 양호  
 - $T_A$  : 25°C  
 -TIM : COH-4000LVC  
 -TCO :  $-2.733333e-03$  V/K



**샘플명 : HWLP\_02**  
**측정 조건**  
 -구동 전류 : 150mA, 350mA  
 -센서 전류 : 10mA  
 -구동 전력 : 0.44W , 1.12W  
 -구동 전압 : 3.10V , 3.27V  
 -샘플상태 : 양호  
 - $T_A$  : 25°C  
 -TIM : COH-4000LVC  
 -TCO :  $-3.200000e-03$  V/K

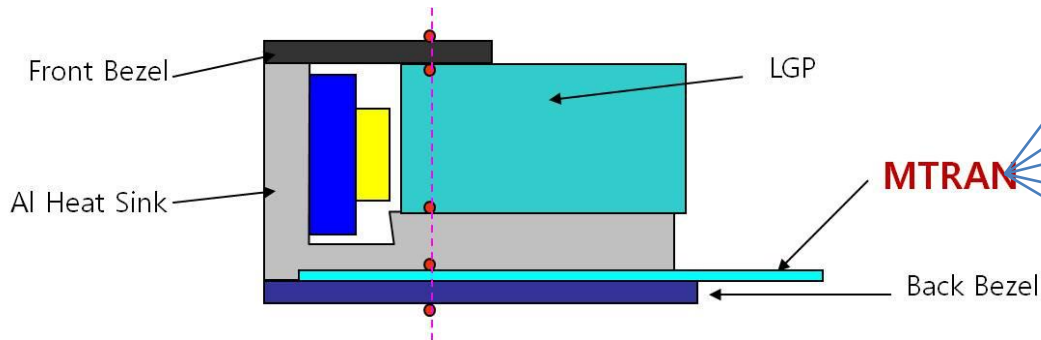


	150mA	350mA
<b>Ceramic Substrate Module</b>	<b>22.8K/W</b>	<b>23.8K/W</b>
<b>MTRAN Substrate Module</b>	<b>20.9K/W</b>	<b>20.9K/W</b>

# MTRAN for LED BLU

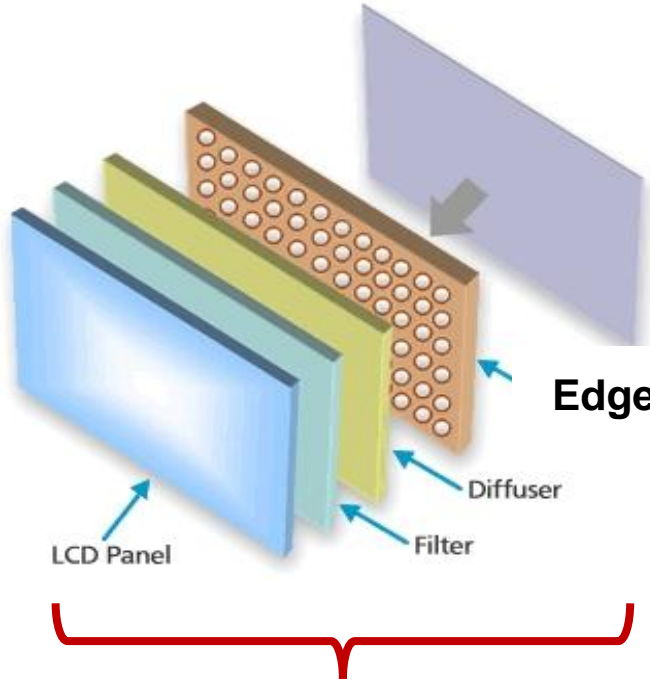
## MTRAN® @ 65" LED Backlit LCD TV

compare	No MTRAN		MTRAN
<b>Back Bezel</b>	<b>54.0</b>	→	<b>46.2</b>
<b>Al Heat Sink</b>	<b>62.1</b>		<b>50.9</b>
<b>LGP</b>	<b>65.2</b>		<b>58.6</b>
<b>Front Bezel</b>	<b>62.3</b>	→	<b>51.6</b>



# ○ (O)LED TV & Panel Type (O)LED Lighting

## Large Surface MTRAN

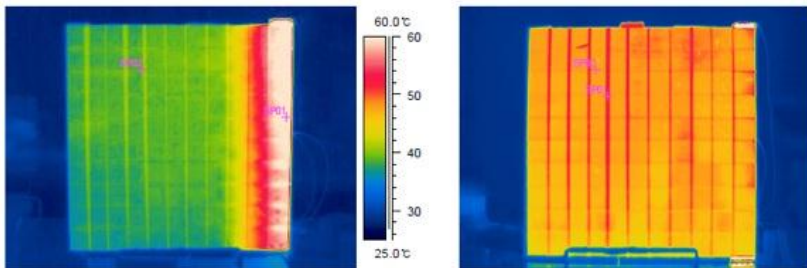


**(O)LED Panel Cooling with B/Chassis(MTRAN) for Heat Spreading**

Edge LED or Direct LED BLU



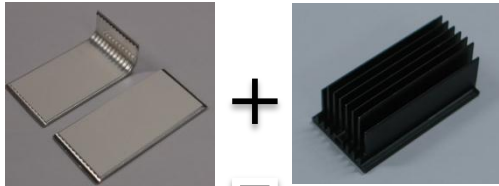
or OLED PANEL



# LED Special Lighting

## LED Headlamp

- 0% Field Defect Rate Since 2009



MTRAN

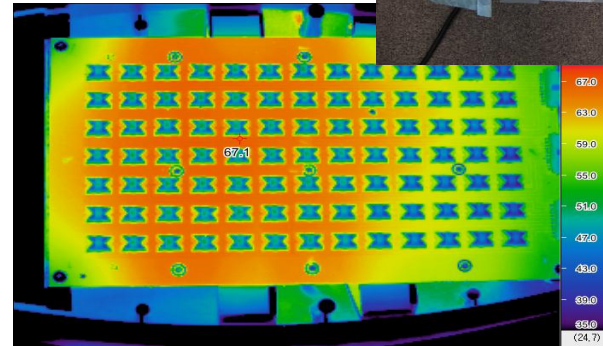
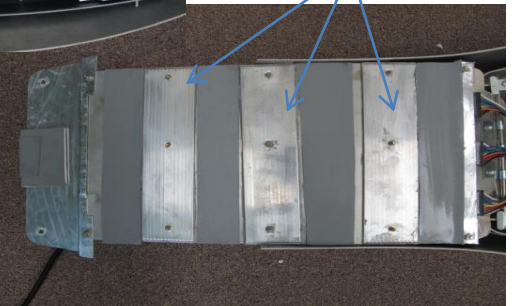


## 150W LED Streetlight

- $T_{max} = 67.1^{\circ}\text{C}$



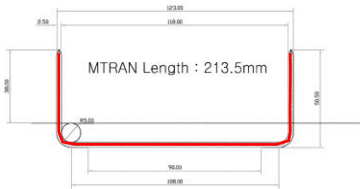
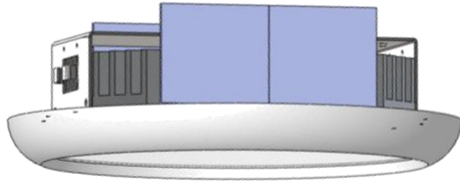
MTRAN



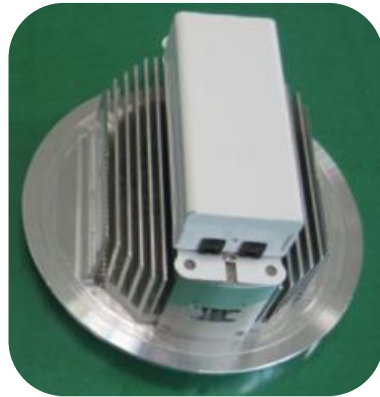


# LED Special Lighting

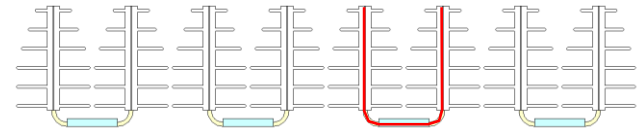
## 40W LED Down light



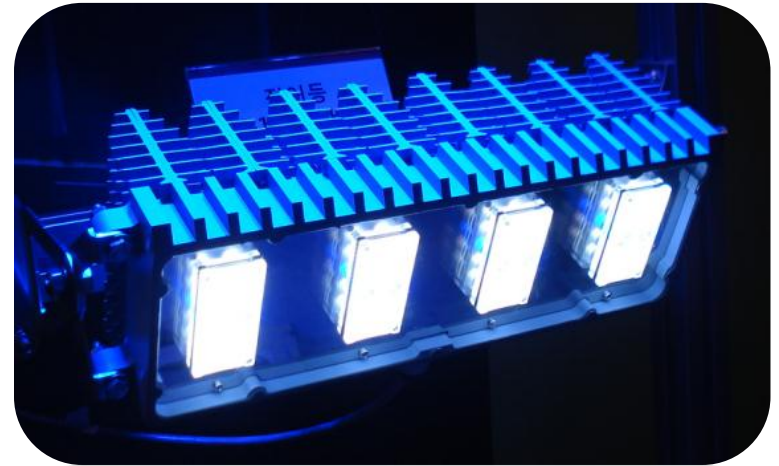
### MTRAN



## 120W LED Lighting



### MTRAN 4pcs



# Thank you

Cooling InnovationTTM provides the epochal thermal solutions from cooling methods to cooling modules

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The Epochal Thermal Solution Provider

