



TAM Thermal Analysis Module with HeatSink Design

Ichijouriki LS R&D Co., Ltd.

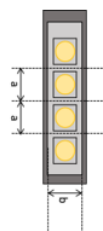
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Company Confidential

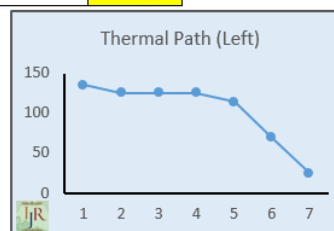
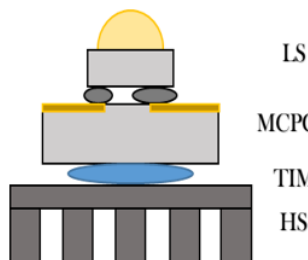
Content

- Basic Functions
 - Single computation (simplified)
 - Single computation (completed)
- Advanced Function
 - Double Panel Thermal Analysis
 - Import/Export Design data
 - Import/Export Material database
- Obtaining more functions

Thermal Analysis Module (TAM) Eq. Rth T_j

Env Temp	25 (C)	n	If (mA)	Vf (V)	1.182	135.3
Material	LightSource	1	2000	53.6593		
	Citizen-CLU048	k (W/mK)	Area (mm ²)	Thickness (mm)		
Solder Joint		0	392	0.07		
Solder Joint		0	392	0.07		
PCB		(a*b)				
TIM	Eporite-TIM3101	0	400	0.50		
		6	400	0.50		
		Thermal h	k	Fin n		
HS1	Extruded-Al-A6063	General-CoB-I	12 (W/m ² K)	170 (W/mK)	15	
HS2	General-SAC		0	58	0	
Driver	DRV-Test1		2 (W)		Block	



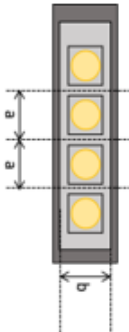
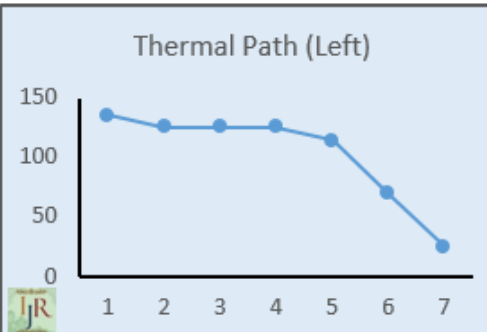



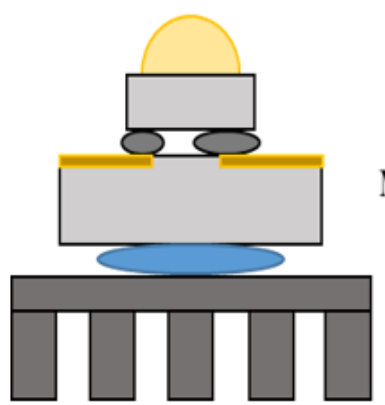
HideCOL

- TAM is a fast thermal analysis tool based on **Microsoft Office Excel VBA**. It is easy to use with good accuracy.

Thermal Analysis Module (TAM)

Env Temp	25 (C)			Eq. Rth	Tj
Material		n	If	1.182	135.3
LightSource	Citizen-CLU048		Vf		
			(mA)		
Solder Joint		1	2000		
Solder Joint		k	Area		
		(W/mK)	(mm ²)		
PCB		0	392		
TIM	Eporite-TIM3101	0	392		
			Thickness		
			(mm)		
			(a*b)		
		0	400		
		6	400		
		Thermal			
		h	k		Fin
		(W/m ² K)	(W/mK)		
HS1	Extruded-Al-A6063	General-CoB-l	12	170	15
HS2	General-SAC		0	58	0
Driver	DRV-Test1	2 (W)			Block



System requirement:

- Windows 10
- More than Microsoft Office Excel 2013 (with Macro)

Basic Functions

Start up menu: Language selection



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Thermal Analysis Module (with HeatSink Design)

熱學分析模組 (帶散熱器設計)

热分析模組 (带散热器设计)

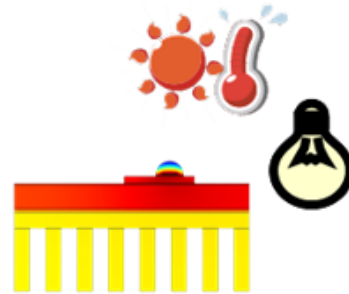
Import DB

Export DB

Language selection

Language/選擇語言/选择语言

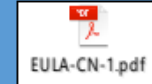
Traditional Chinese



Database / 現有資料庫	Number of data / 資料個數
LightSource 光源	5
Metal 金屬	5
PCB 電路板	5
TIM 熱介面材料	4
Driver 驅動	2
HeatSink 散熱器	7

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使用前請閱讀最終用戶協議
使用前请阅读最终用户协议

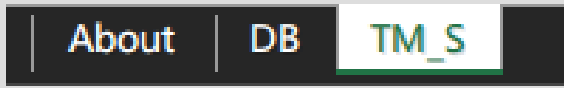


Leave this sheet and/or enable other functions means the EULA is agreed by the user.

進入其他頁面或是啟動其他功能即表示使用者同意該協議

进入其他页面或是启动其他功能即表示使用者同意该协议

Single computation (simplified)



- Select "TIM_S" to enter such module
- Light Blue: titles
- Light orange: dropdown menu
- Light green: input cells

Thermal Analysis Module (TAM)

Env Temp	25 (C)
Material	
LightSource	Citizen-CLU048
Solder Joint	
Solder Joint	
PCB	
TIM	Eporite-TIM3101

Material	Geometry	h	k	Fin
		(W/m2K)	(W/mK)	n
HS1	Extruded-Al-A6063	12	170	15
HS2	General-SAC	0	58	0
Driver	DRV-Test1	2 (W)		Block

Eq. R_{th}

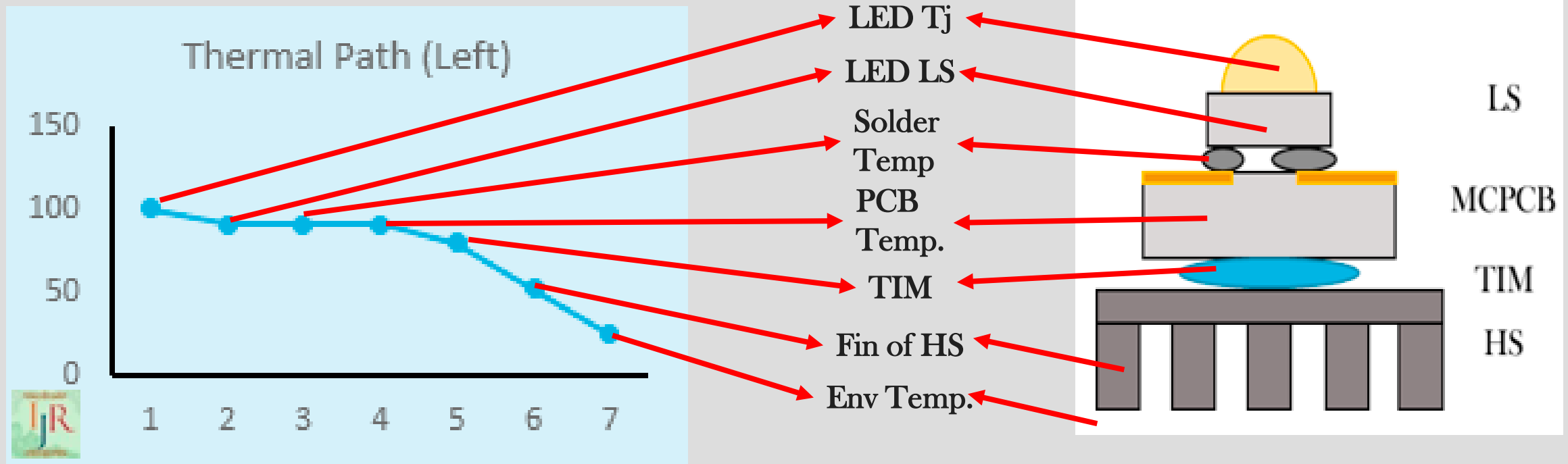
1.182	135.3
-------	-------

Temperature gradient

Number of Fin

Single computation (simplified)

- Definition of Temperature gradient



Single computation (simplified)

- Select the proper material by dropdown menu

請參閱Youtube 影片：
https://youtu.be/8AkzKCpW_XM

看不到Youbube的朋友請下載
本公司影片：
http://www.ichijouriki.com/Software/Product/TAM/TAM_CN_intro.zip

Thermal Analysis Module (TAM)

Env Temp: 25 (C)

Material: Citizen-CLU048

LightSource: Citizen-CLU048

Sold: Citizen-CLU048

PCB: Eporite-TIM3101

HS1: Extruded-Al-A6063

HS2: General-SAC

Driver: DRV-Test1

n	If (mA)	Vf (V)
1	2000	53.6593

k (W/mK)	Area (mm ²)	Thickness (mm)
0	392	0.07
0	392	0.07

(a*b)	Thermal h (W/m ² K)	Fin k (W/mK)	n
0	400	0.50	0
6	400	0.50	0

Eq. Rth: 1.182

Tj: 135.3

Thermal Path (Left)

LS

MCPCB

TIM

HS

HideCOL

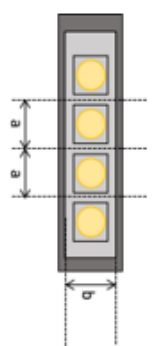
About DB TM_S

Single computation (simplified)

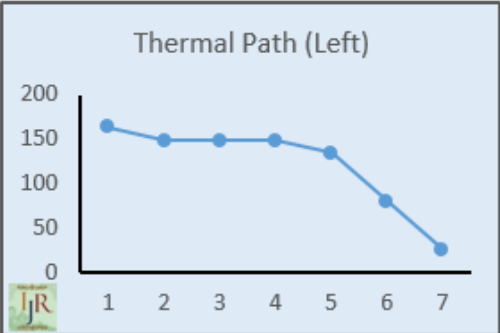
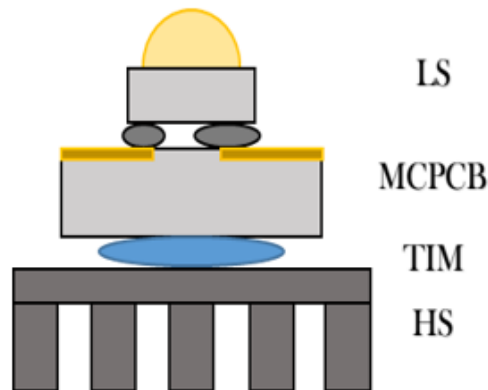
- Modify the parameter by directly input
 - After the modification of If, the program will predict Vf by fitting equation
 - User can modify the Vf by directly input

Thermal Analysis Module (TAM)

Env Temp	25 (C)
Material	
LightSource	Citizen-CLU056
Solder Joint	
Solder Joint	
PCB	
TIM	Eporite-TIM3101



n	If	Vf	Eq. Rth	Tj	
	(mA)	(V)	1.232	163.0	
1	2500	52.7164			
k	Area	Thickness			
(W/mK)	(mm ²)	(mm)			
0	722	0.07			
0	722	0.07			
	(a*b)				
0	400	0.50			
6	400	0.50			
Thermal		Fin			
h	k	n			
(W/m ² K)	(W/mK)				
HS1	Extruded-Al-A6063	General-CoB-I	12	170	15
HS2	General-SAC		0	58	0
Driver	DRV-Test1		2 (W)		Block

HideCOL

Some tricks...

Thermal Analysis Module (TAM)

Env Temp (C)

Material

LightSource Citizen-CLU056

1

Solder Joint

Solder Joint

PCB

TIM Eporite-TIM3101

Material Geometry

HS1 Extruded-Al-A6063 General-CoB-I

HS2 General-SAC

Driver DRV-Test1 2 (W) 3

n	If (mA)	Vf (V)
1	2500	52.7164

k (W/mK)	Area (mm ²)	Thickness (mm)
0	722	0.07
0	722	0.07

(a*b) 2

Thermal h (W/m ² K)	Fin k (W/mK)	n
0	400	0.50
6	400	0.50

Eq. Rth 1.232 Tj 163.0

4

Thermal Path (Left)

LS

MCPCB

TIM

HS

HideCOL

1. Press <Delete> Key in the dropdown menu to remove the items that you don't want to put in the thermal calculation. Or, just simply put the k value to 0.
2. The definition of the effective area is illustrated in the figure. For a strip lighting with 10cm in length and 1cm in width, one could choose 1x1. For COB lightsource, one could use 1.1 * COB area.
3. In the heaksink calculation, the program will ignore the computation if h or k is 0.
4. When the cell changed, the program will automatically compute the Tj and temperature gradient diagram.

Advanced Functions

Export/Import of the design parameters

Press the "Import":

- Take Single computation as example:

Import **Export**

Thermal Analysis Module (TAM)

Import: Env Temp 25 (C)

Export: LightSource Citizen-CLU056

Solder Joint

PCB

TIM Eporite-TIM3101

Material	Geometry	(W/m2K)	(W/mK)	n	
HS1	Extruded-Al-A6063	General-CoB-I	12	170	15
HS2	General-SAC		0	58	0
Driver	DRV-Test1		2 (W)		Block

Eq. Rth TJ 1.232 163.0

Thermal Path (Left)

LS
MCPCB
TIM
HS

HideCOL

Open File

4000_ProductDev + ZThermal + dev

CLU048_Ref_Design_20060701.tmb

Thermal Analysis Module (TAM)

Import: Env Temp 25 (C)

Export: LightSource Citizen-CLU056

Solder Joint

PCB

TIM Eporite-TIM3101

Material	Geometry	(W/m2K)	(W/mK)	n	
HS1	Extruded-Al-A6063	General-CoB-I	12	170	15
HS2	General-SAC		0	58	0
Driver	DRV-Test1		2 (W)		Block

Identify import file (*.tmb)

Press "Export":

Thermal Analysis Module (TAM)

Import: Env Temp 25 (C)

Export: LightSource Citizen-CLU056

Solder Joint

PCB

TIM Eporite-TIM3101

Material	Geometry	(W/m2K)	(W/mK)	n	
HS1	Extruded-Al-A6063	General-CoB-I	12	170	15
HS2	General-SAC		0	58	0
Driver	DRV-Test1		2 (W)		Block

Export File Name

Input the file name


名称	修改日期	类型	大小
-STAM-v68_raw.xlsxm	30/6/2016 8:42	Microsoft Excel ...	1 KB
code	28/6/2016 22:43	文件	1 KB
GeneralDB_20160629.xlsxm	29/6/2016 21:08	Microsoft Excel ...	462 KB
TAM-v68_raw.xlsxm	30/6/2016 8:52	Microsoft Excel ...	2,097 KB
test.tmb	29/6/2016 22:27	TMB 文件	1 KB
xTT.xlsxm	27/6/2016 19:32	Microsoft Excel ...	42 KB
CLU048_Ref_Design_20060701.tmb	30/6/2016 8:54	TMB 文件	1 KB

Data file (.tmb) appears under the same directory

(File explorer view)

Import/Export of the material database

- In "DB" Sheet:



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Thermal Analysis Module (with HeatSink Design)
 熱學分析模組 (帶散熱器設計)
 热分析模组 (带散热器设计)

Import DB


Export DB

Import

Export

Language/選擇語言/选择语言

Traditional Chinese



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EULA-EN-1.pdf

EULA-CN-1.pdf

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 进入其他页面或是启动其他功能即表示使用者同意该协议

Database / 現有資料庫	Number of data / 資料個數
LightSource 光源	5
Metal 金屬	5
PCB 電路板	5
TIM 熱介面材料	4
Driver 驅動	2
HeatSink 散熱器	7

The operation is the same as "data parameter" import/export, but with difference:

1. It deal with .xlsm file
2. The import/export of database will not influence the design parameters

Obtain more functions

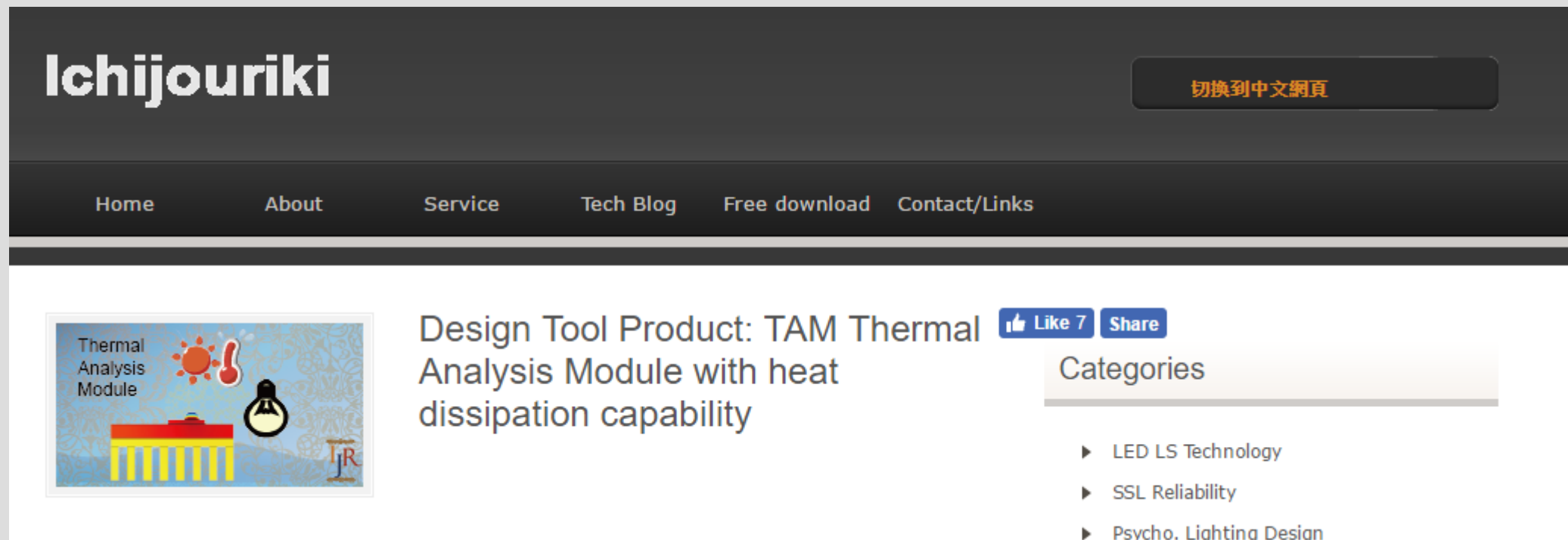
Function Lists

- Please select the version that fit your need most

Function	Rights	English/繁中/简中	Free use	Single computation (simplified)	Single computation (completed)	Double column computation (simplified)	Double column computation (completed)	Export/Import Thermal model	Export/Import Design Database	Building Design Database
-1	Free	●	●	●						
0	Beginner	●		●	●					
1	Advanced	●		●	●	●	●	●		
2	Engineer	●		●	●	●	●	●	●	
3	Enterprise	●		●	●	●	●	●	●	●

Price and payment

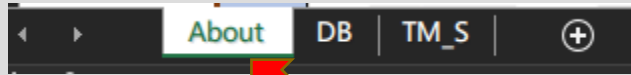
- Please visit the following website for more information :
 - http://www.ichijouriki.com/SoftwareProduct/TAM_en.html



The screenshot shows the Ichijouriki website interface. At the top left is the logo "Ichijouriki". To its right is a button labeled "切换到中文網頁". Below the logo is a navigation menu with links: "Home", "About", "Service", "Tech Blog", "Free download", and "Contact/Links". The main content area features a product listing for "Design Tool Product: TAM Thermal Analysis Module with heat dissipation capability". To the left of the text is a thumbnail image showing a circuit board with a heat sink and a light bulb, with the text "Thermal Analysis Module" and the Ichijouriki logo. To the right of the text are social media interaction buttons: "Like 7" and "Share". Below these is a "Categories" section with a list of items: "LED LS Technology", "SSL Reliability", and "Psycho. Lighting Design".

Activate the functions after payment

- Please enter "About" Sheet

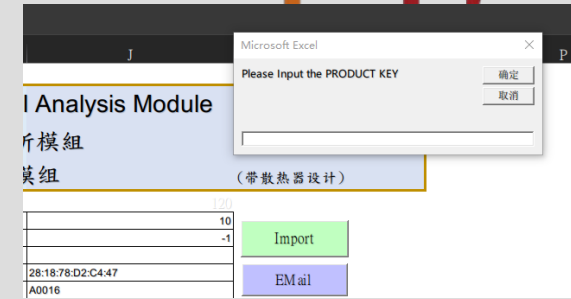


We will send you (via Email) the "purchasing #" after we confirm your payment

If you have Outlook, please directly press "Email" Button to send us the key request. If not, please send us email including Software Name and Version (TAM VER10), and the information in side the red square to sales@ichijouriki.com. We will send you the activation key within 24 hours.

The activation key have 4 characters in 1 set, totally 24 characters, with the format: XXXX-XXXX-XXXX-XXXX-XXXX-XXXX. Please don't remove the "-" and leave no space. We do suggest directly copy-and-paste instead of key-in.

After the activation key is received, please use the "Import" function to activate the software.



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1.Fill in the purchasing #

Thermal Analysis Module (with HeatSink Design)
 熱學分析模組 (帶熱沉)
 热分析模組 (帶熱沉)

PROGCODE	100
VER	10
FUNC	-1
CODE	
MAC	[REDACTED]
Purchasing #	A0016
Computer+User	[REDACTED]

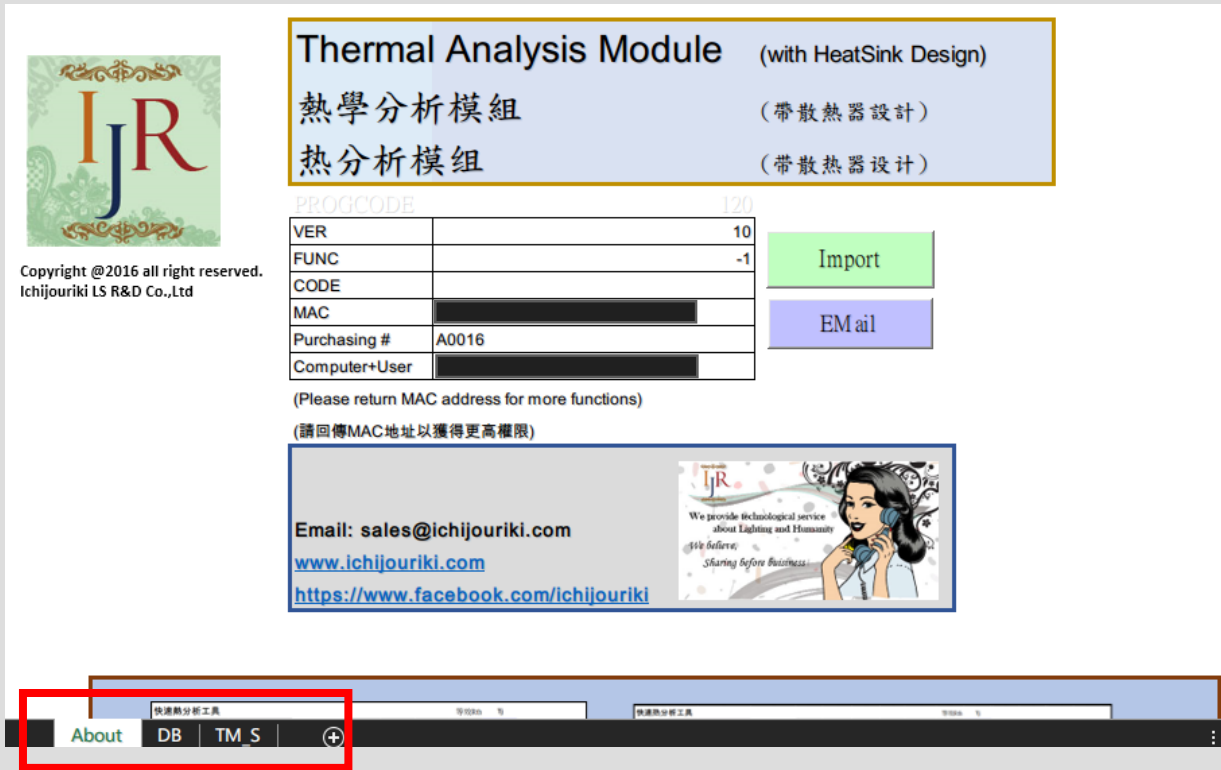
(Please return MAC address for more functions)
(請回傳MAC地址以獲得更高權限)

Buttons: Import, EM ail

2. Import the activation key

Email: sales@ichijouriki.com
www.ichijouriki.com
<https://www.facebook.com/ichijouriki>

Comparison of different function



Thermal Analysis Module (with HeatSink Design)
 熱學分析模組 (帶散熱器設計)
 热分析模組 (帶散熱器设计)

PROGCODE	120
VER	10
FUNC	-1
CODE	
MAC	
Purchasing #	A0016
Computer+User	

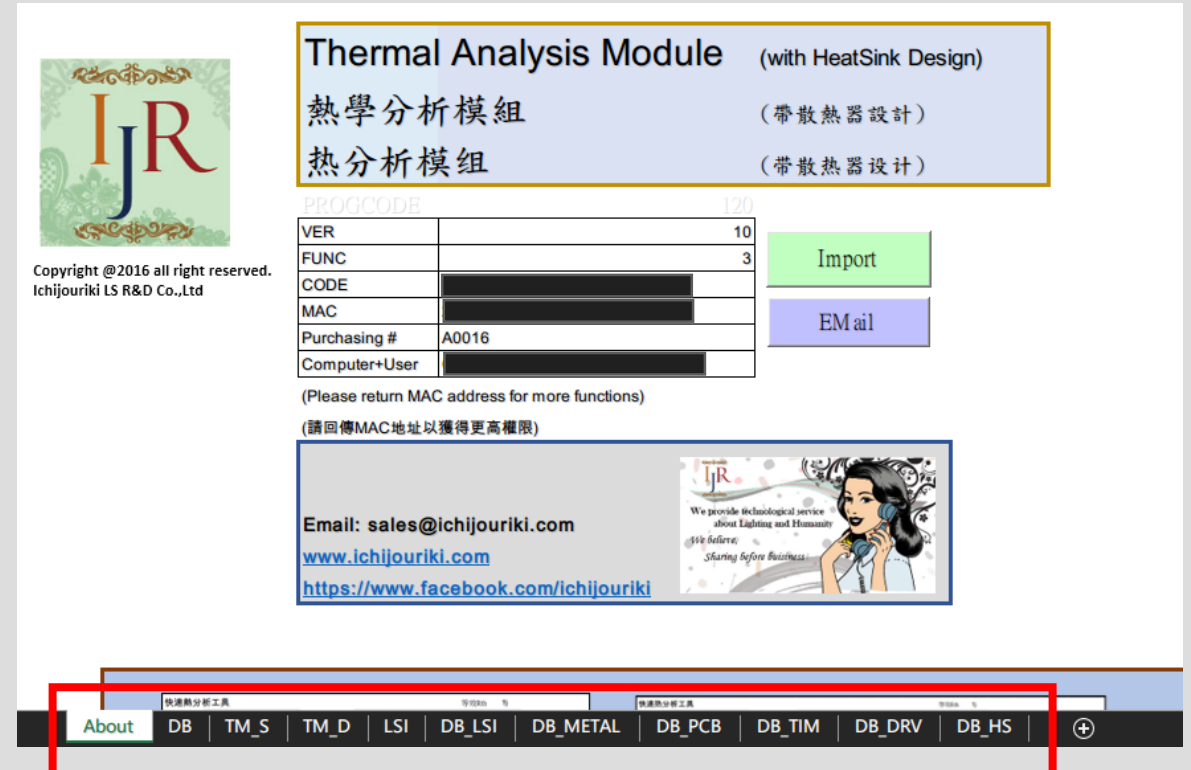
Buttons: Import, EMail

(Please return MAC address for more functions)
 (請回傳MAC地址以獲得更高權限)

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Navigation bar: About | DB | TM_S | +

“About” sheet of Free version



Thermal Analysis Module (with HeatSink Design)
 熱學分析模組 (帶散熱器設計)
 热分析模組 (帶散熱器设计)

PROGCODE	120
VER	10
FUNC	3
CODE	
MAC	
Purchasing #	A0016
Computer+User	

Buttons: Import, EMail

(Please return MAC address for more functions)
 (請回傳MAC地址以獲得更高權限)

Email: sales@ichijouriki.com
www.ichijouriki.com
<https://www.facebook.com/ichijouriki>

Navigation bar: About | DB | TM_S | TM_D | LSI | DB_LSI | DB_METAL | DB_PCB | DB_TIM | DB_DRV | DB_HS | +

“About” Sheet at Enterprise version

* Capability of full material database editing will be enabled in the enterprise version

Some tricks...

- To preserve the first activation, please keep the original copy in a backup directory.
- In the daily work, please use the backup copy. Because this software only limited to by used in the same computer, without the number is copies.

The image shows a sequence of three screenshots illustrating a software activation trick. The top screenshot shows the 'Thermal Analysis Module' (with HeatSink Design) in an 'Inactivated version' state. The middle screenshot shows the same software in an 'Activated!' state. The bottom screenshot is a file explorer view showing a directory structure: 科技有限公司 > 4000_ProductDev > 2Thermal > Promotion > demo. A file named 'backup' is highlighted with a red box, indicating it is the backup copy used for activation.

Inactivated version

Activated !

Backup!

名称	修改日期	类型	大小
~\$TAM-v68_raw.xlsm	30/6/2016 10:37	Microsoft Excel ...	1 KB
TAM-v68_raw.xlsm	30/6/2016 10:40	Microsoft Excel ...	2,090 KB
<input checked="" type="checkbox"/> backup	30/6/2016 10:40	文件夹	