



Champion Microelectronic Corp.

2021 Investors Conference

2021/12/29



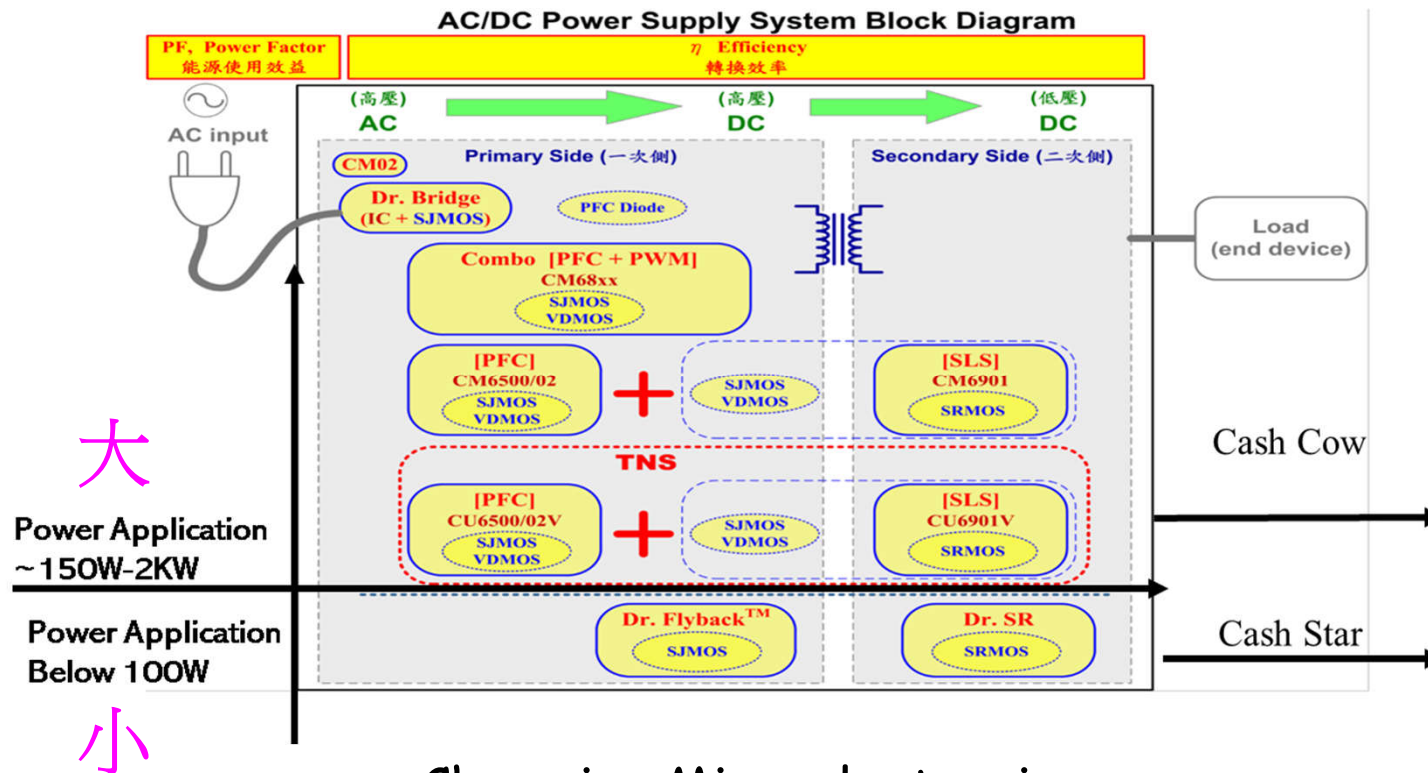
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Except as required by law, Champion Microelectronic does not undertake any obligation to update any forward-looking statements regardless of whether there is new information, future events or other results.



Market status and Prospect



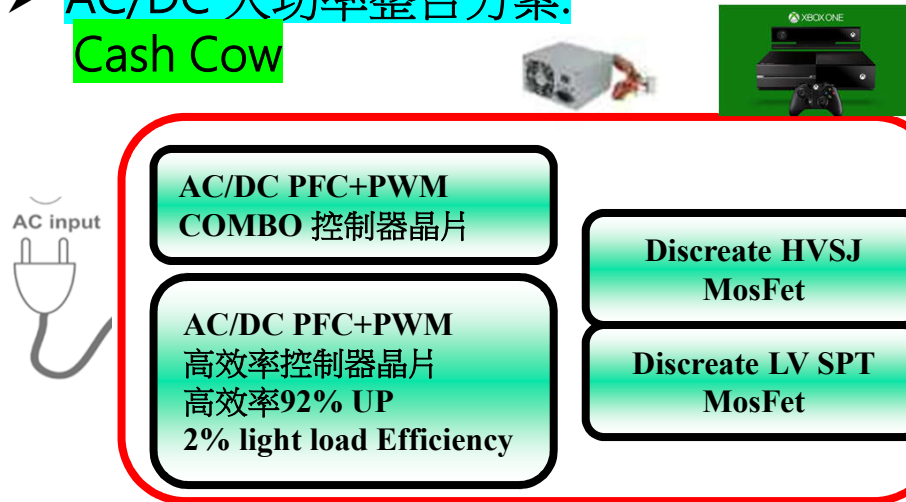
Champion Microelectronic

Green Tech Solutions

Technical advantages and Core values

AC/DC 全功率整合方案:

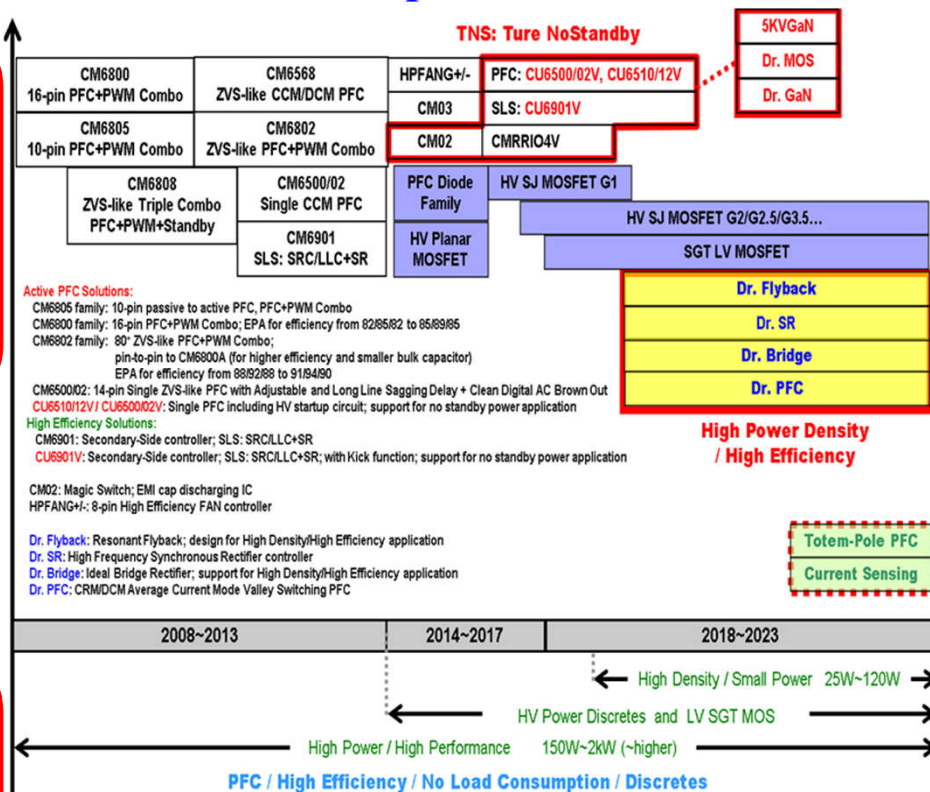
➤ AC/DC 大功率整合方案: Cash Cow



➤ AC/DC 小功率整合方案: Cash Star



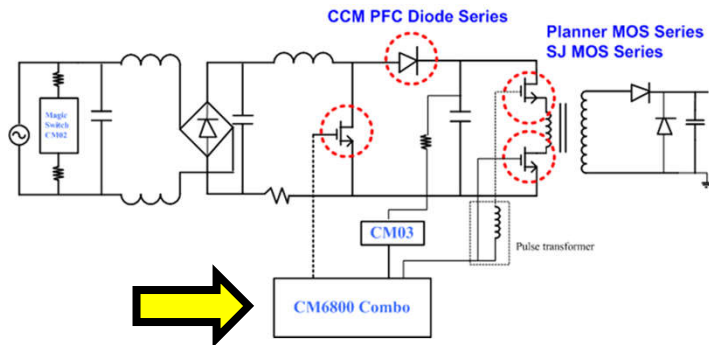
Products Roadmap:





AC/DC 大功率電源方案:Cash Cow---IC

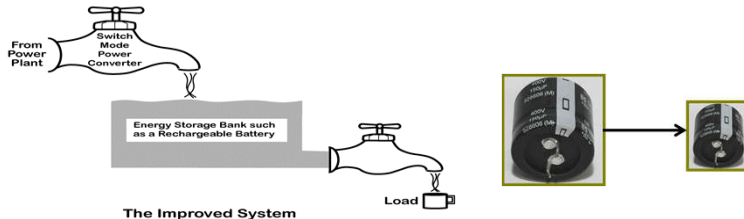
AC/DC PFC+PWM COMBO 控制器晶片



PFC AC to DC Section:

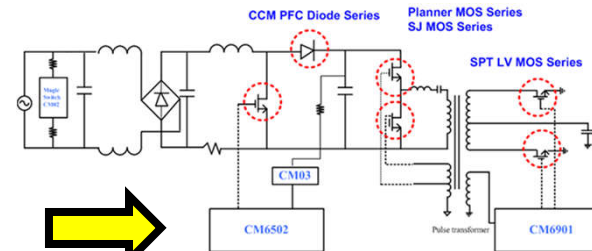
- Average Current Sense, Leading Edge Modulation PFC
- Leading Edge Modulation PFC and Trailing Edge PWM for Ripple Reduction in the Intermediate Stages' Capacitors (Simple Compensation and Easy to Use)

A big bucket is installed to improve this system. See below. Now the faucet is easily controlled. The big bucket can be a storage element, such as a battery or large capacitor (e.g., 300µF).



Dual Forward topology

AC/DC PFC+PWM 控制器晶片 高效率92% UP

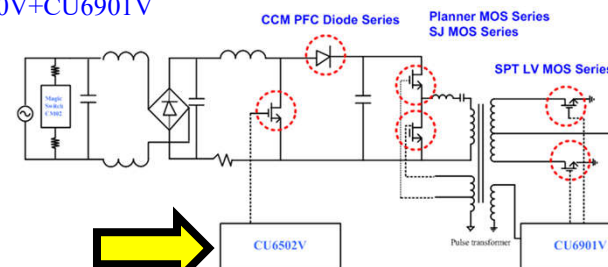


Efficiency The First of the Word

- Advantages:
 - Soft switching of the semiconductor component. The efficiency better than hard switch PWM mode.
 - Low EMI & low switching loss (soft switching)
 - Low component stress
 - Improved diode recovery loss
 - Reduce power supply size (higher frequency)

AC/DC PFC+PWM 控制器晶片 高效率92% UP
With 2% light load high Efficiency

True No Standby High Eff. 90+ with SRC/LLC +SR (S.L.S)
CU6500V+CU6901V



SRC/LLC+SR topology

AC/DC 大功率整合方案:Application Field

PC Computer



CM6800:Combo PFC+PWM EPA active
CM6805:Combo PFC+PWM EPA 80+
CM6502:CCM PFC controller
CM6901:HB/FB Resonant converter+ SR(S.L.S)
EPA 90/90++
CU6500V:CCM PFC
CU6901V:HB/FB Resonant converter +SR (S.L.S)
EPA 90/90++ Without standby power

Gaming Power



CU6500V:CCM PFC
CU6901V:HB/FB Resonant converter
+SR (S.L.S) EPA 90/90++ Without
standby power

Cloud Computing Server Power



CM6502:CCM PFC controller
CM6901:HB/FB Resonant converter+ SR(S.L.S)
EPA 90/90++
CU6500V:CCM PFC
CU6901V:HB/FB Resonant converter +SR (S.L.S)
EPA 90/90++
Without standby power

Gaming PC/網絡工作直播/影音處理系統電源



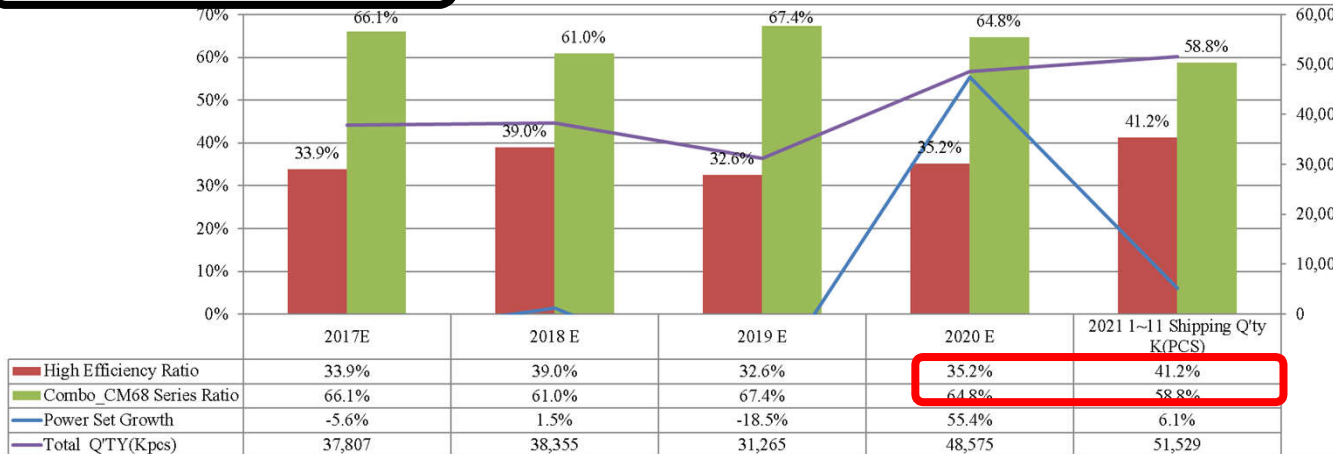
RM1000X 2021

CORSAIR 海盜船 RM1000X 80Plus金牌
1000W電源供應器 2021款 CP-9020201-TW
NT\$6,090

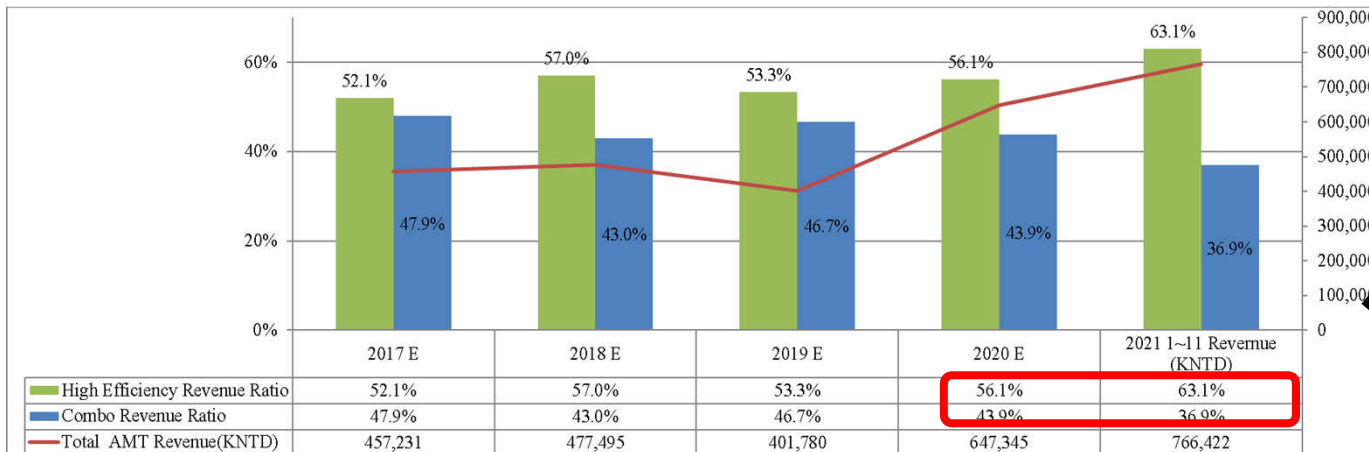


AC/DC 大功率電源方案:Status(IC)

Power Set 數量與分佈 (Quantity and Distribution)



營收狀況(Revenue status)



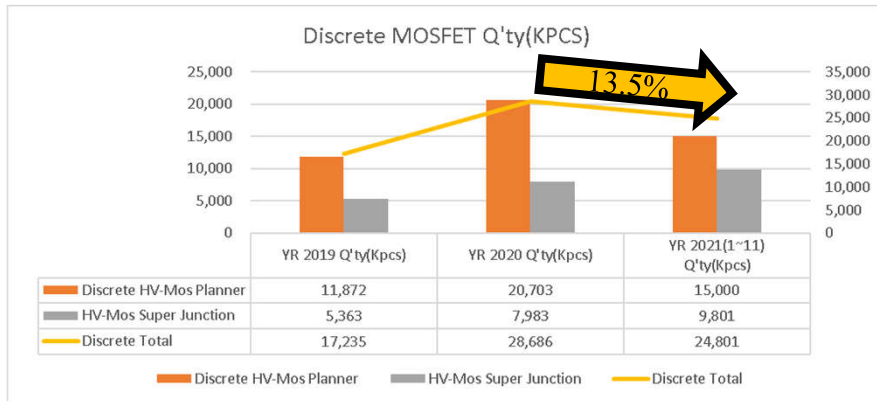
穩建
成長
(growth)
~10%

- High Efficiency IC ASP~2.5 COMBO IC
- High Efficiency Power supply share ratio 上升
- 2022 Ratio 50% V.S 50% Powe Set 數量Keep~Revenue Gtrowth ~10%

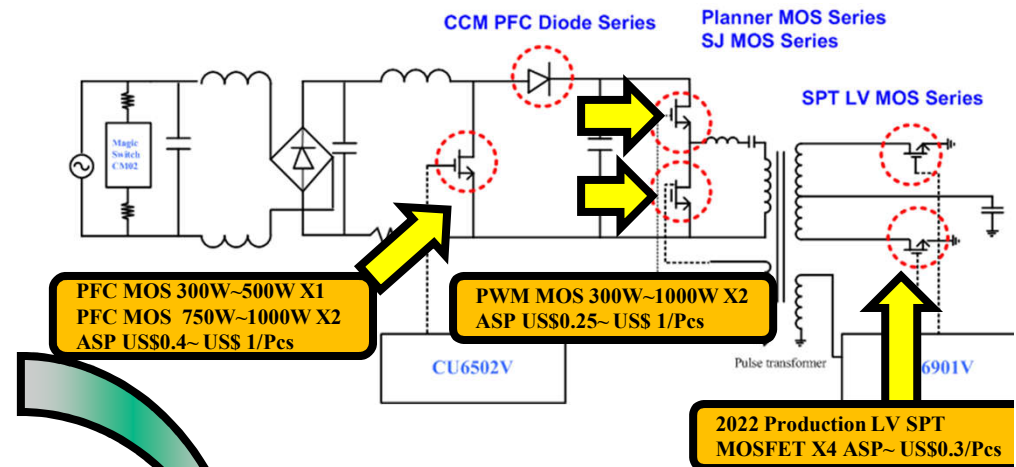
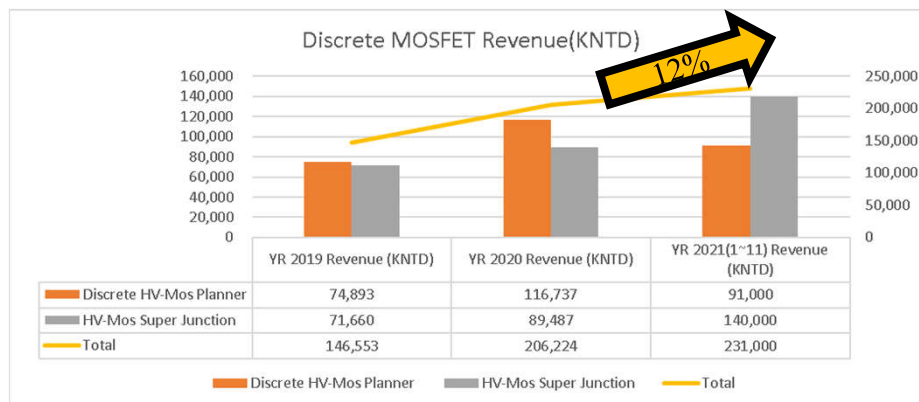


AC/DC 大功率電源方案:Status(Discrete)

Discrete 數量(Quantity)



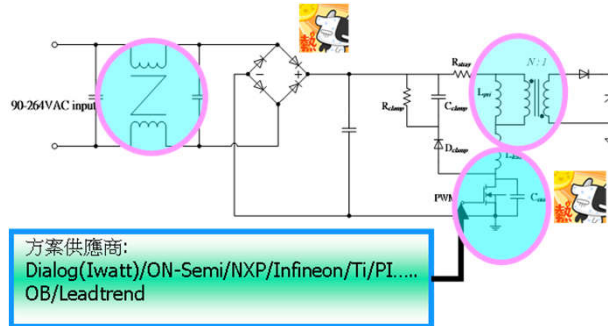
Discrete Revenue



- High Efficiency 電源 HV SJ MOSFET使用數量增加
- 功率元件市場Out of Stock
- SJ MOSFET(600V) 策略採取大電流數/高單價
- 2021 Q2 Design Win 美系Gaming Power 供應鏈
- 2021 Q4 Design Win 韓系TV供應鏈
- 2021 Q3 Design Win Clone Gaming High Efficiency Power 550W~1000W供應鏈
- SPT LV Design in Increase Revenue and Market Share

快速
成長
(growth)
20%

傳統電源控制架構(QR-Flyback):



電源小型化

➤ 高頻化

➤ 變壓器變小

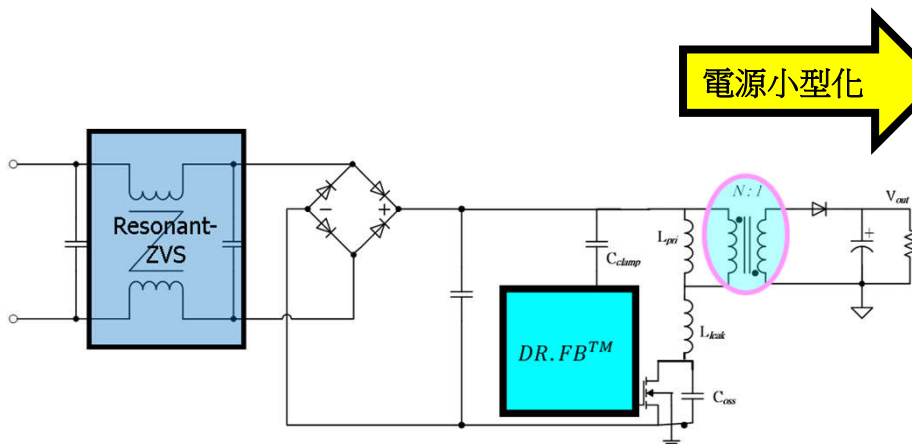
◆ 功率元件Switching loss 增加(熱)

被迫採用GAN

EMI 難度增加

增加EMI Size/效率變差/Power Size 變大

新控制機制電源方案架構:
共振式ZVS切換技術



電源小型化

➤ 高頻化

➤ 變壓器變小

◆ 功率元件Switching loss~0

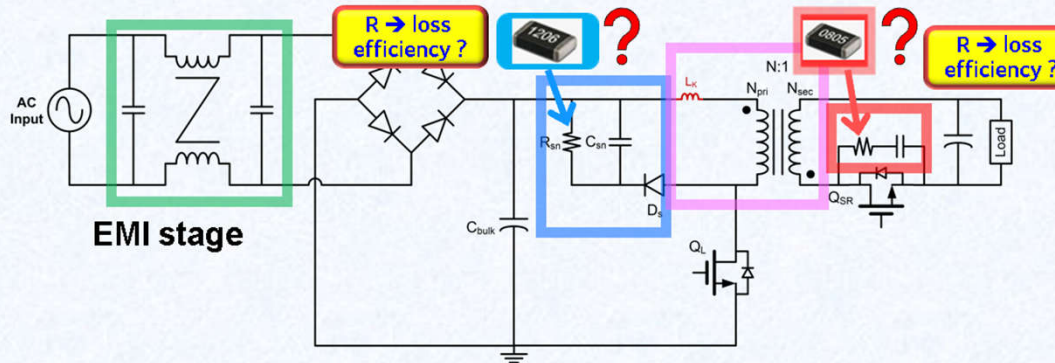
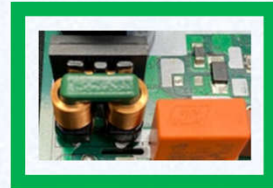
採用SJ MOSFET

EMI 容易

EMI 方案簡單/效率變好/Power Size 自然變小

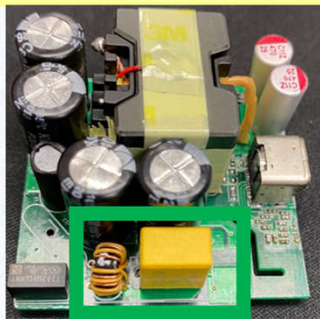
高功率密度/高效率電源控制新架構

Traditional QR Flyback



The advantages of **Dr. Flyback (Resonant Flyback)** :

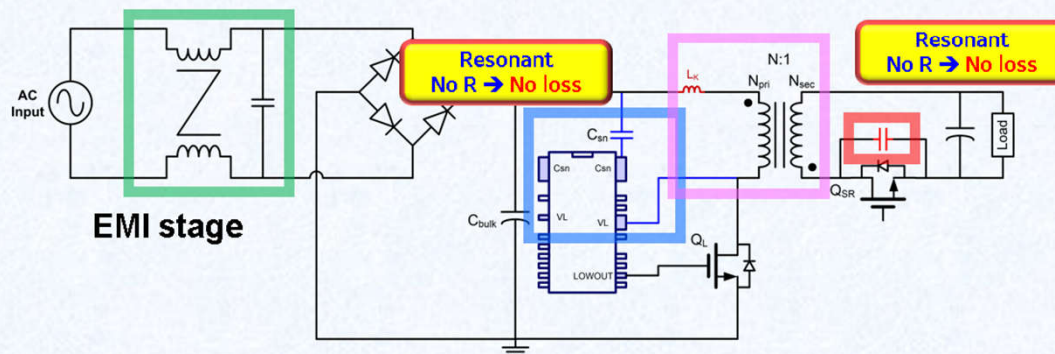
- Simple EMI Design
- High Efficiency (1% up better than QR) ↑
- Smaller Transformer Size
- Innovative Resonant Control / Jitter
- Lossless Snubber (L_K energy transfer)
- High Frequency



65W USB Type-C PD Adapter

Power Density (power board only): **1.5W/cc**

Power Density (with housing case): **~1W/cc**




Dr. Flyback®

AC/DC 小功率電源方案:

Word Number One:

- ◆ High Power Density
- ◆ High Efficiency
- ◆ Less part count
- ◆ Ultra low Standby Consumption

AC/DC 小功率電源指標:

➤ 功率密度(Power Density)



規格		
輸入電源	AC100-240 50/60Hz	
輸出電壓	Type-C	DC 5.0/3A 9V/3A 12V/2A
最大輸出	24W	
產品尺寸	30*30*35mm	

24W/3cm/3cm/3.5cm~0.76W/CC



規格 Dr.Flyback 65W		
輸入電源	AC100-240 50/60Hz	
輸出電壓	Type-C PD	DC 5.0/3A 9V/3A 15V/3A 20V/3.25A
輸出電壓	PPS	3.3V~21V/3.25A
最大輸出	65W	
產品尺寸	43*39*26.7mm	

65W/4.3cm/3.9cm/2.67cm~1.45W/CC

Power Density Compare with Other Company

CMC PDPPS-65W
Dr. Flyback®

Foldable(0)
Changeable(0)
Power density 1.42W/CC
PD : 5V/3A
9V/3A
12V/3A
15V/3A
20V/3.25A
PPS:3.3V~21V3A

Power Density: 1.14W/cc (with different plug)

Power Density: 1.42 W/cc



One design for any Country

ANKER 65W (A2663)

Foldable
Changeable(X)
Power density 0.98W/CC

PD :
5V/3A
9V/3A
15V/3A
20V/3.25A



三星65W充电器

Foldable (X)
Changeable(X)
Power density 0.97W/CC

PD : 5V/3A
9V/3A
12V/3A
15V/3A
20V/3.25A
PPS:5V~21V3.25A



S22



Xiaomi 65W (AD65G)

Foldable(X)
Changeable(X)
Power density 1.2W/CC

PD :
5V/3A
9V/3A
15V/3A
20V/3.25A



Power Density Compare with Other Company



Power Density: 1.14W/cc

(with different plug)

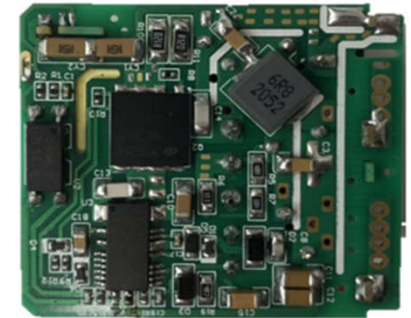
Power Density: 1.42 W/cc



Top View



Bottom View

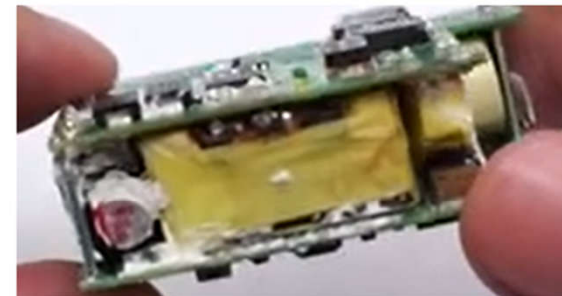


Solution:
Dr.flyback
Low side Mos



L:51mm
W:42mm
H:26mm

Power Density:1.13W/CC



Solution:

初级控制器: TI德州仪器UCC28780

驱动器: TI德州仪器UCC27712

初级功率器件: 英飞凌CoolMOS IPL60R185C7 2PCS

市場競爭者現有方案比較

Comparison of existing schemes of market competitors

控制架構決定未來市場

功率密度世界第一

Technical Analysis of

QR vs ACF vs Dr. Flyback®



For ZVS, additional HighSide IC and Switch must be added.



ZVS (Active Clamp Flyback)



ZVS (Dr. Flyback®)

ANKER 65W (A2663) Gan Mos+IC Gan Mos+IC	Xiaomi 65W (AD65G) TI-ACF NA6115+NA6117	IC IC Gan Driver Gan Mos*2	CMC PDPPS-65W Dr. Flyback® CMS6520AEND88	IC SJ MOSFET
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0.98W/cc

must use GaN



1.20W/cc

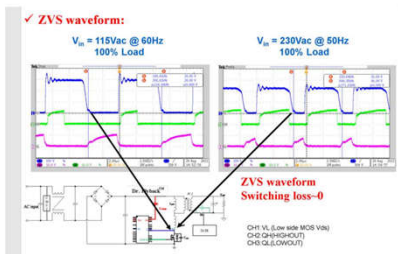
must use GaN
(The plug cannot be folded)



1.14W/cc (including foldable plug)
1.42W/cc (no use of foldable plug)
just use SJMOS (no need GaN)
"Cost Saving"

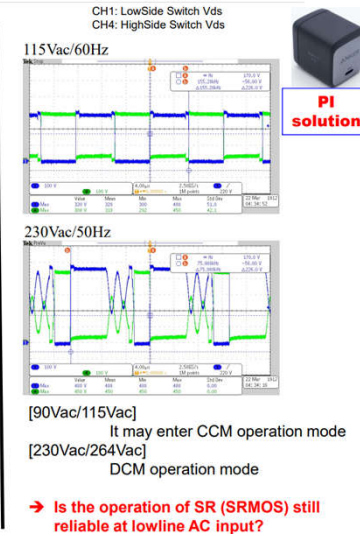


Dr. Flyback® solution



[90Vac/115Vac]
CRM / DCM operation mode
[230Vac/264Vac]
CRM / DCM operation mode

→ Make SR (SRMOS) operation more reliable under universal input range



[90Vac/115Vac]
It may enter CCM operation mode
[230Vac/264Vac]
DCM operation mode

→ Is the operation of SR (SRMOS) still reliable at lowline AC input?

ANKER 65W (A2663)
PowiGaN (INN4075C)
+
ClampZero

0.98W/cc

Many components, complicated manufacturing, and high cost

HighSide IC+Switch

Main Controller (with GaN)

Xiaomi 65W (AD65G)
TI-ACF
+
NA6115+NA6117

1.20W/cc

4 layer PCB

Too many components, complicated manufacturing, and high cost

Main Controller is on the back

HighSide Gate Driver

GaN

GaN

CMC PDPPS-65W
Dr. Flyback®
+
CMS6520AEND88

1.42W/cc

2 layer PCB

Simple design, easy to manufacture

Dr. Flyback

SJMOS

手機充電器等級待機功耗

No Load	115Vac	230Vac
CMC PDPPS-65W (Dr. Flyback®)	27mW	29mW
ANKER 65W (A2663) (PI: PowiGaN INN4075C + ClampZero)	25mW	44mW
Xiaomi 65W (AD65G) (TI: ACF + GaN-NA6117 + GaN-NA6115)	30mW	46mW

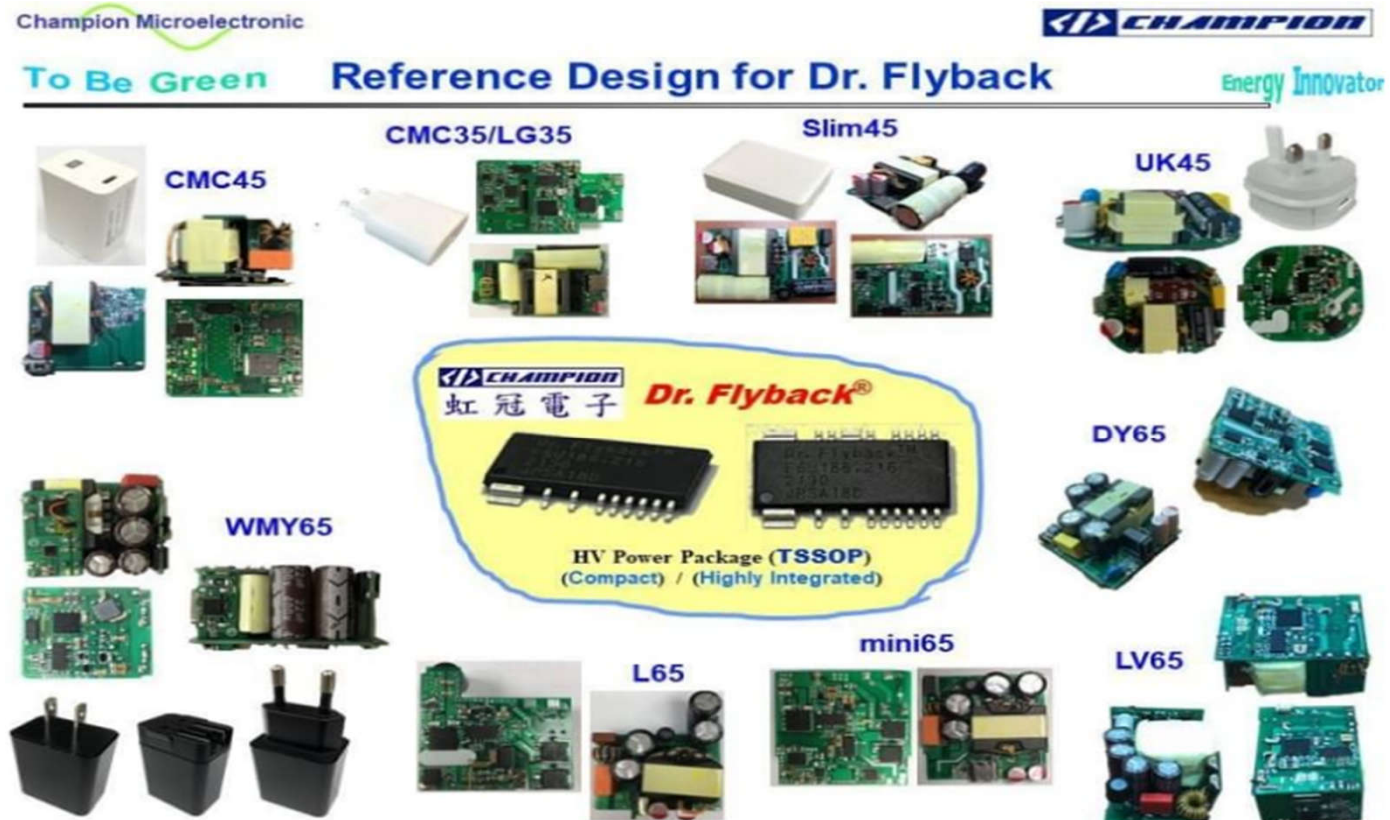
優越效能(Case 溫度)

Input: 90Vac Output: 20Vout Full load: 65W	Efficiency (Board End)
CMC PDPPS-65W (Dr. Flyback®)	92.30%
ANKER 65W (A2663) (PI: PowiGaN INN4075C + ClampZero)	91.60%
Xiaomi 65W (AD65G) (TI: ACF + GaN-NA6117 + GaN-NA6115)	92.41%

Design Product Reference

AC/DC 小功率電源推廣策略

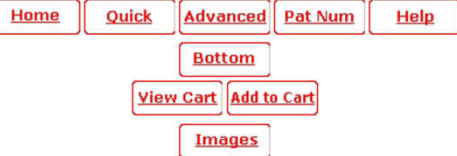
- 系統廠65W NB Adaptor
- 系統廠Gaming Power:大功率+小功率(Champion 高效率方案+Dr.Flyback) 達到全功率最高效率
- 系統廠65W LV65W Design
- ✓ Retail Market推廣:
CMC PD+PPS65W





Patent Protection

USPTO PATENT FULL-TEXT AND IMAGE DATABASE



(1 of 1)

United States Patent 9,716,437
Hwang July 25, 2017

Power converter for a switching power supply and manner of operation thereof

Abstract

A switching power supply comprises a power converter that includes a transformer, a low side switch and a high side switch. The low side switch draws current from a supply voltage through a primary winding of the transformer. The high side switch discharges current from the primary winding of the transformer to a snubber capacitor. The controller synchronously controls the opening and closing of the low side switch and the high side switch. The power converter can be included in a flyback converter. The power converter can generate a regulated output voltage.

Inventors: Hwang; Jeffrey (Saratoga, CA)

Applicant: Name City State Country Type

Champion Microelectronic Corporation Hsinchu N/A TW

Assignee: Champion Microelectronic Corporation (Hsinchu, TW)

Family ID: 1000002729744

Appl. No.: 14/975,692

Filed: December 18, 2015

Prior Publication Data

Document Identifier	Publication Date
US 20170179832 A1	Jun 22, 2017

Current U.S. Class:

1/1

中華民國專利證書

新型第 M620509 號

新 型 名 稱: 變壓器

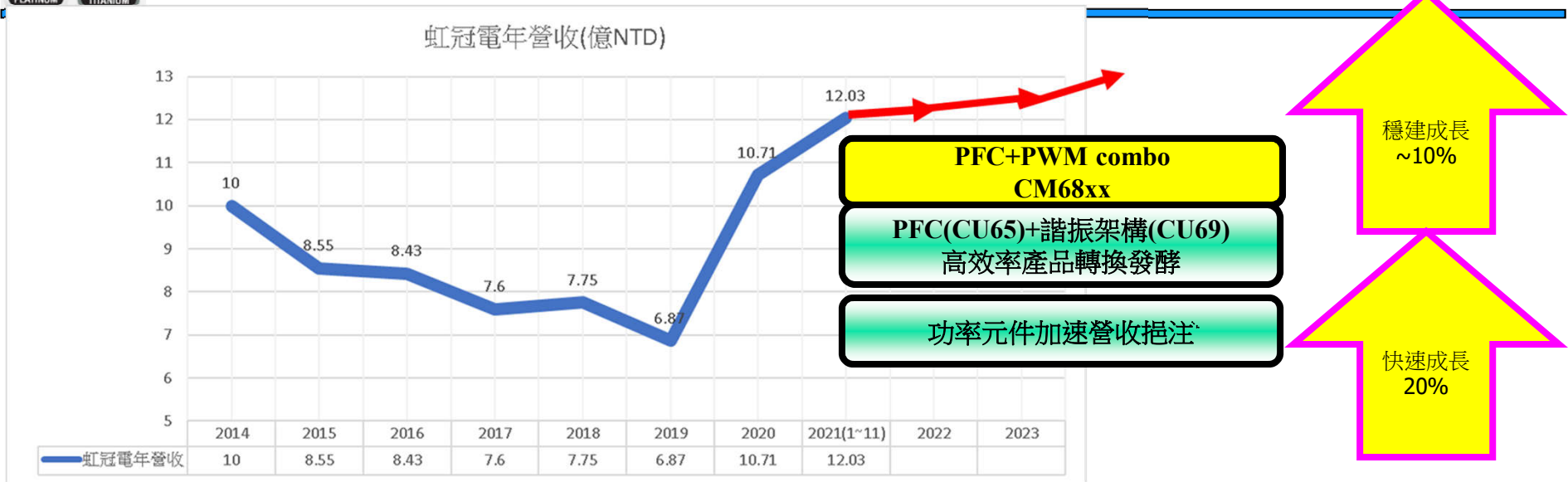
專 利 權 人: 虹冠電子工業股份有限公司

新 型 創 作 人: 林保偉、林韋良、王沛、林加耀、陳聿廷、賴建志

專利權期間: 自 2021 年 12 月 1 日 至 2031 年 7 月 5 日 止



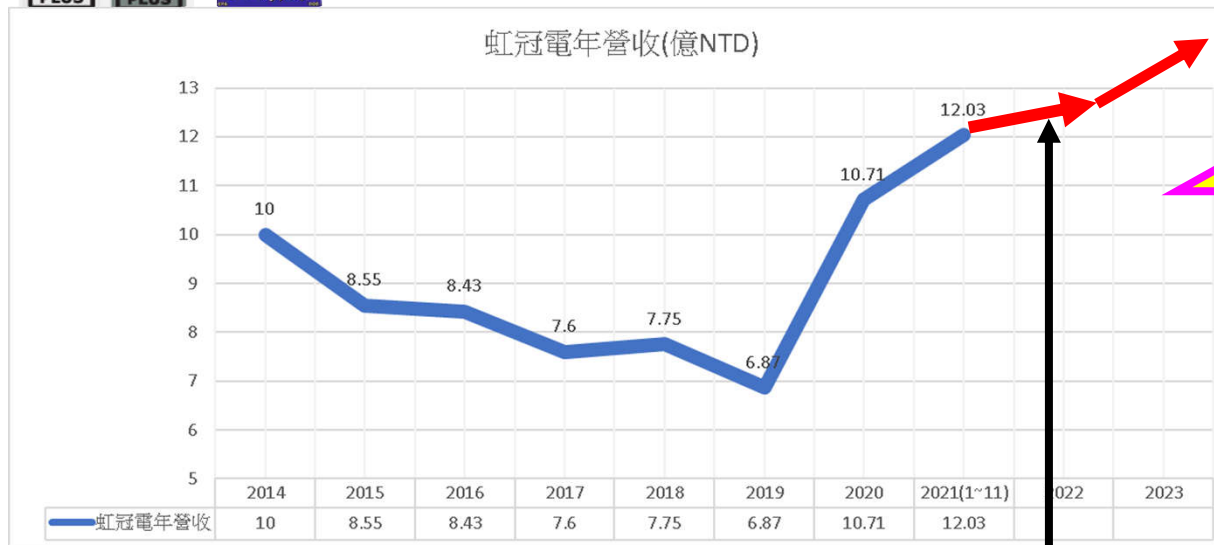
虹冠電營運展望(Cash Cow)



■ Cash cow 成長動能：

- ✓ 內需PC市場提升主動式PFC AC/DC Combo銷售
- ✓ 遊戲機/電競桌機/網路直播平台配件:顯示卡耗電程度大幅提升，帶動大功率高效率應用新需求。
- ✓ 高效率產品轉換:大功率電源節能、省電效率提升。
- ✓ 功率元件:高壓SJ MOSFET搭配AC/DC 控制器市佔率快速提升。

虹冠電營運展望



飛速成長

- **TAM**
包括手機/筆電/Monitor..等應用
- **Application:**
Type C電源共用化/小型化已成未來趨勢
- **Topology:**
小型化新控制架構方案成為未來主流
- **Power Reliable/CP值**
材料使用(穩定)/**Total Bom Cost**最優化

✓ Cash star:
小功率Dr.Flyback

- 虹冠電小型化高效率電源 **Power IC**整合方案的問市，剛好順勢搭上**Type-C**快充/NB電源小型化未來趨勢主流成為公司未來明星產品，期許再創虹冠歷史/年營收飛速長成。
- 產品應用面除了上述充電器外，亦可用於**Monitor**、**USB多port**充電、**45W-65W**多項產品主流亦可延伸至**100W~160W**電競筆電應用
- **IC**搭配自制**SJ HV MOS**和**LV SPT SRMOS** **ASP~USD2**、飛速營收成長成指日可待。



Consolidated Income Statement

Unit : NT\$ in thousand

	1Q 21		2Q 21		3Q 21		2021/1/1~9/30	
Operating revenue	278,969	100%	335,327	100%	379,021	100%	993,317	100%
Operating costs	132,788	48%	155,462	46%	166,300	44%	454,550	46%
Gross profit	146,181	52%	179,865	54%	212,721	56%	538,767	54%
Operating expenses	58,715	21%	54,785	16%	61,358	16%	174,858	17%
Operating Income	87,466	31%	125,080	38%	151,363	40%	363,909	37%
Non-operating revenue and expenses	7,122	2%	(8,404)	-3%	4,414	1%	3,132	0%
Income tax expense	11,929	4%	16,818	5%	18,747	5%	47,494	5%
Net Income	82,659	29%	99,858	30%	137,030	36%	319,547	32%



Consolidated Balance Sheets

Unit : NT\$ in thousand

	2021/3/31		2021/6/30		2021/9/30	
Cash and Cash Equivalents	380,944	20%	763,890	38%	662,053	35%
Current Financial Assets at amortised cost	595,728	32%	275,850	14%	275,775	15%
Accounts Receivable	159,660	8%	211,738	11%	211,239	11%
Inventories	248,578	13%	263,380	13%	264,354	14%
Property, Plant and Equipment	171,578	9%	167,858	8%	171,289	9%
None current financial assets at fair value through other comprehensive income	128,128	7%	128,128	6%	128,128	7%
Others Assets	206,220	11%	192,991	10%	188,009	9%
Total Assets	1,890,836	100%	2,003,835	100%	1,900,847	100%
Accounts Payable	196,763	10%	206,429	10%	179,958	9%
Others Liabilities	51,200	3%	58,729	3%	56,922	3%
Total Liabilities	247,963	13%	265,158	13%	236,880	12%
Total Stockholders' Equity	1,642,873	87%	1,738,677	87%	1,663,967	88%



虹冠電子工業股份有限公司
Champion Microelectronic Corp.



股票代號Code:3257
<http://www.championmicro.com.tw>