

新唐无线充电解决方案

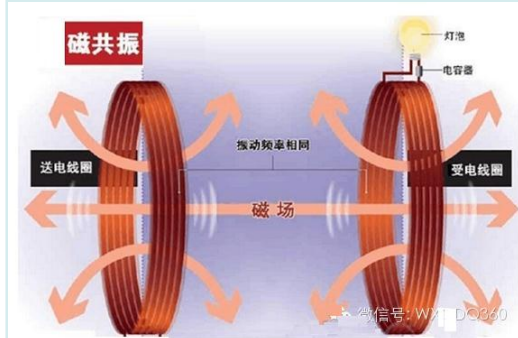
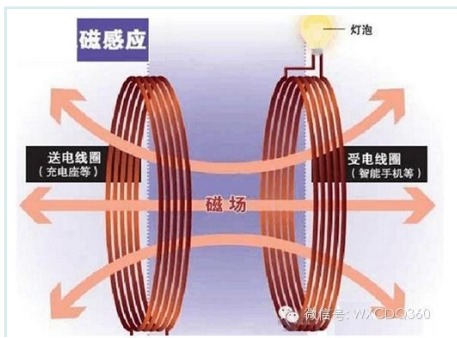
James Jia

议程




- 无线充电技术初探
- 无线充电市场状况
- 新唐无线充电解决方案介绍

无线充电技术分类

	磁感应(MI)	磁共振(MR)
技术原理	通过发射端与接收端两个线圈之间的磁场耦合进行能量的传输。	接收端线圈电路与发射端线圈电路达到谐振,从而实现能量的传输。
传输功率	数W~数百KW	数mW~数百mW
传输距离	小于1cm	数cm~数m
相关优点	<ol style="list-style-type: none"> 1. 适合短距离接触充电 2. 转换效率高(65%~75%) 3. 成本相对便宜 	<ol style="list-style-type: none"> 1. 适合稍远距离充电 2. 充电位置相对自由 3. 可以一对多充电
相关挑战	<ol style="list-style-type: none"> 1. 充电距离较短 2. 充电位置相对受限 3. 金属等导体会感应发热 	<ol style="list-style-type: none"> 1. 安全与健康遭受质疑 2. 成本相对较高 3. 效率相对较低 (50%~60%)
相关标准	WPC的Qi, PMA的Power2.0	A4WP的Rezence



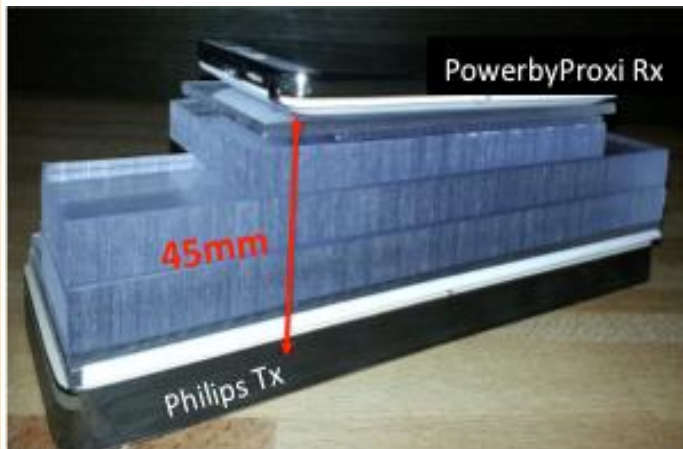
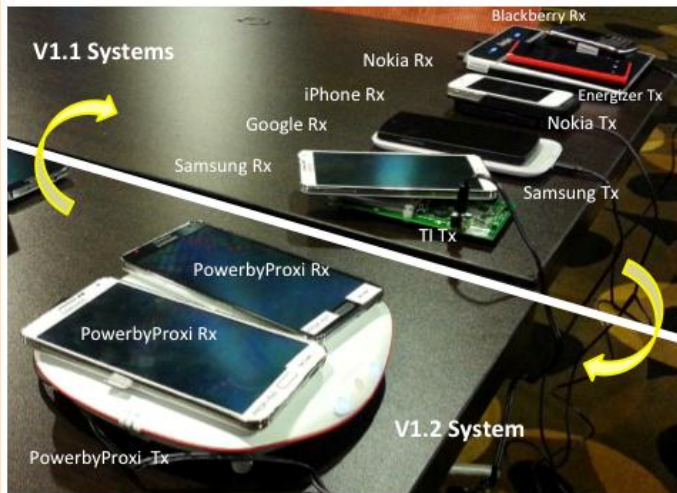
Wireless Charging Technology Alliances

Table VI: Wireless Charging Technology Alliances			
	WPC	A4WP	PMA
Full Name	Wireless Power Consortium	Alliance for Wireless Power	Power Matters Alliance
Logo			
Basic Technique	magnetic induction	magnetic resonance	magnetic induction
Member Number	205	100+	100+
Certified Product	626	0	0
Main Member	Philips, Panasonic & HTC	Qualcomm, Samsung & NXP	BlackBerry, Starbucks & NEC



- 2010 45 WPC members; 4 types of transmitters; First Qi products in market (US) ; First Qi test lab; Power levels = 5w.
- 2011 90 WPC members; 8 types of transmitters; Multiple Qi products in markets (US,JP,EU); Multiple Qi test labs; Power levels = 5w.
- 2012 120 WPC members; 8 types of transmitters; Increasing numbers of Qi products available worldwide (US, JP,EU); Power levels = 5w .
- 2013 160 WPC members ; 10+ types of transmitters; Increasing numbers of Qi products available worldwide (US,JP,EU); Higher power levels, Kitchen Application up to 2000w.
- 2014 213 WPC members; Resonant application; 62 phones of Qi products in market (US,JP,EU,GC) . Totally 583 products are certificated.

Major Milestones for WPC V1.2 Resonant Specification



- Q1.1 receivers based on inductive v1.1 specification and charging at a Z-height of 7 mm, are now capable being charged at a Z-height of 30 mm
- Backward compatibility between Qi v1.1 and Qi 1.2 systems (v1.1 receivers charging on v1.2 transmitters, v1.2 receivers charging on v1.1 transmitters), allowing consumers protection of investment
- Multi-device V1.2 Receivers charging on a v1.2 transmitter with one inverter, delivering lowest cost designs
- New magnetic resonance v1.2 receivers can now be charged at Z-height of 45mm, expecting further Z-Height in final production designs

Cordless Kitchen

From survey in China, there are 5 small electrical kitchen appliances in each family in average.

What a mess with all the cables and plugs.

We have 11 types of socket/plugs in the world. And this makes you have to buy local appliances



 **freescale™**

Haier



Leggett & Platt

Panasonic

PHILIPS

TOSHIBA



Wireless Transmitter

- Input: 220V/50Hz
- Power: 1kW max
- Efficiency: 85%~90%
- Dimension: 400*300*74mm



Wireless Cooker

- Power: 650W
- Volume: 3L
- Dimension: 300*240*335mm



Wireless Blender

- Power: 350W
- Volume: 1.2L
- Dimension: 260*120*370mm

Star Product with Wireless Charging



Apple Watch
Magsafe+ 感应式充电



Moto360 Smart Watch
Qi V1.1 Standard

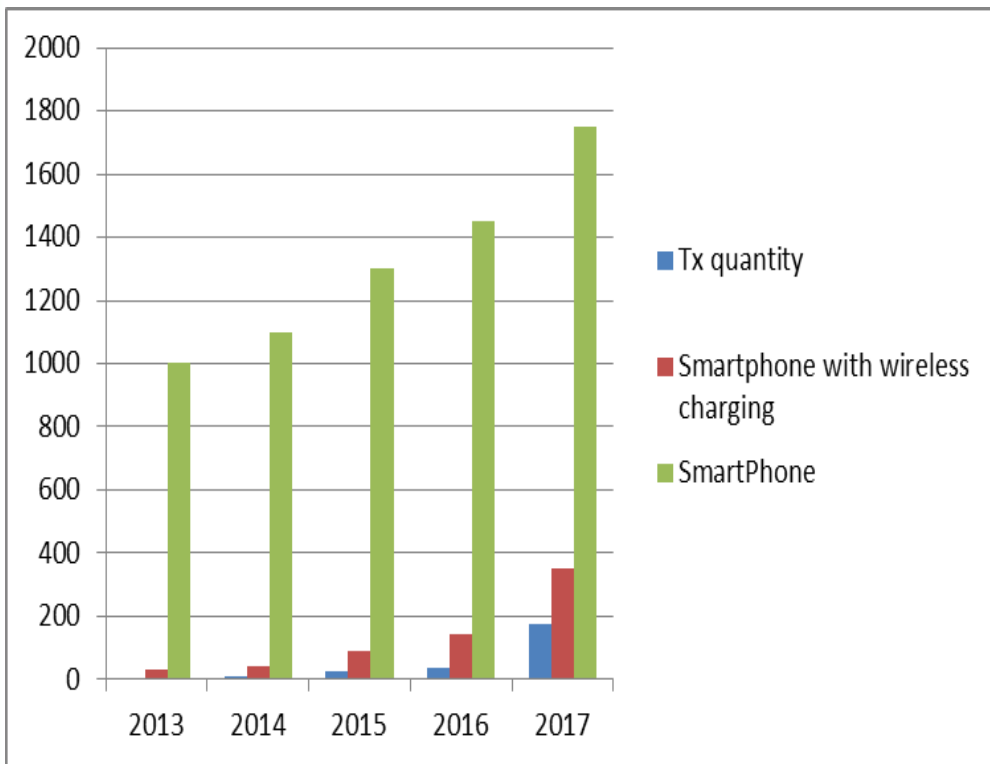
无线充电市场规模：2019年收入达到300亿美元*

规模大、高增长、可扩展的市场

无线充电市场的潜力正在释放

- 对于现有的可充电便携电子产品 >每年150亿美元^ (市场规模 >每年37.5亿^ 台)
- 对于新的充电应用 >每年6.50亿*，涵盖多个行业-汽车、可穿戴产品、家具、酒店和招待服务、物流、个人护理电子产品、可穿戴产品、房地产

M
units



(M units)	2013	2014	2015	2016	2017
SmartPhone	1000	1100	1300	1450	1750
Smartphone with wireless charging	30	44	91	145	350
Share %	3%	4%	7%	10%	20%
Tx quantity	5.1	8.8	27	37	175
Tx/ Smartphone with wireless charging	17%	20%	30%	26%	50%

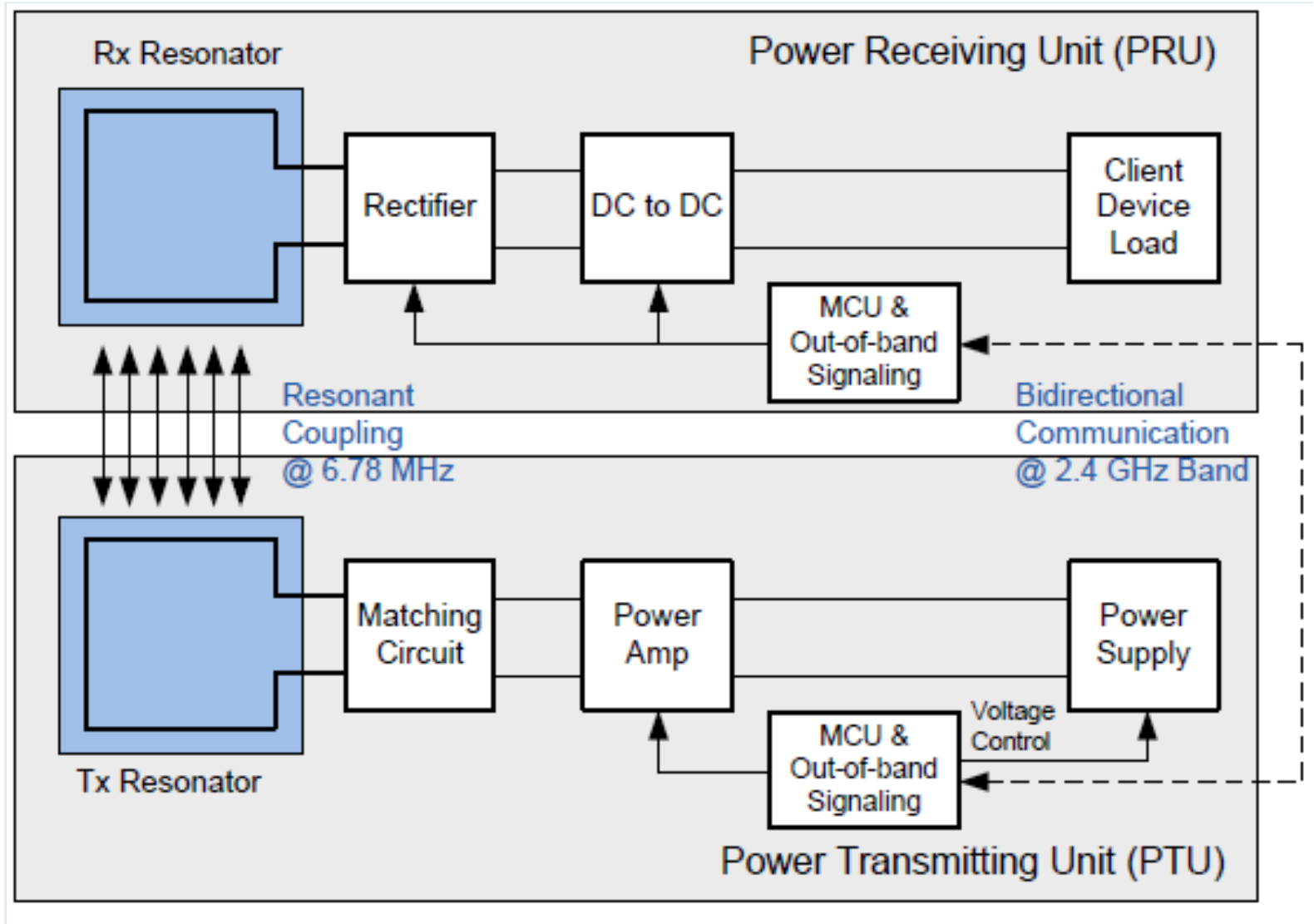
Data from Gartner

A4WP BSS1.2 Spec. Announced

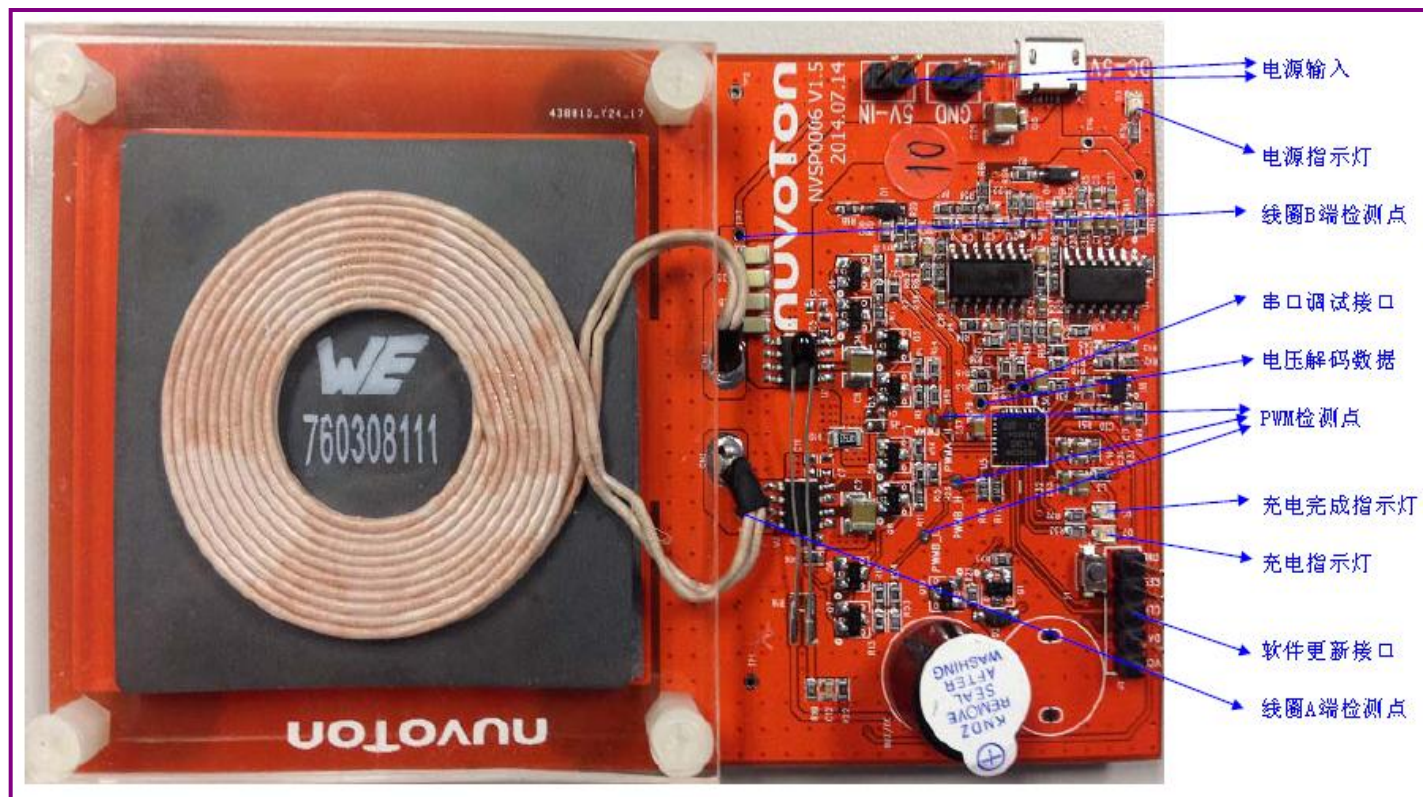
	$P_{TX_IN_MAX}$	Minimum PRU Support Requirements
Class 1	TBD	1 x Category 1
Class 2	10 W	1 x Category 1, 2, or 3
Class 3	16 W	2 x Category 1,2, or 3, or 1 x Category 4
Class 4	22 W	3 x Category 1, 2, or 3, or 1 x Category 4
Class 5	TBD	TBD

PRU	$P_{RX_OUT_MAX}$	Example Applications
Category 1	TBD	BT headset
Category 2	3.5W	Feature Phone
Category 3	6.5W	Smart Phone
Category 4	TBD	Tablet
Category 5	TBD	Laptop

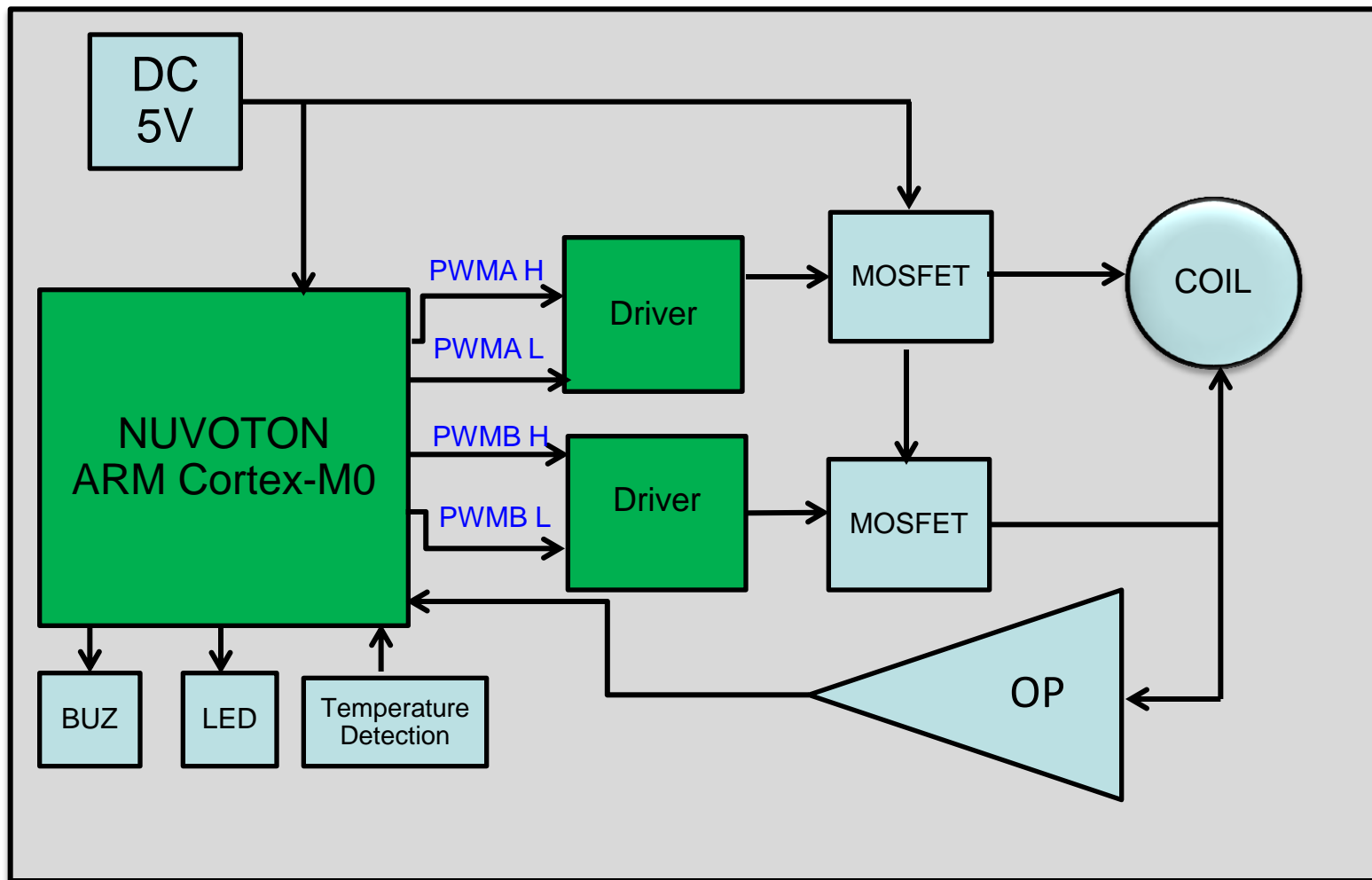
A4WP System Diagram



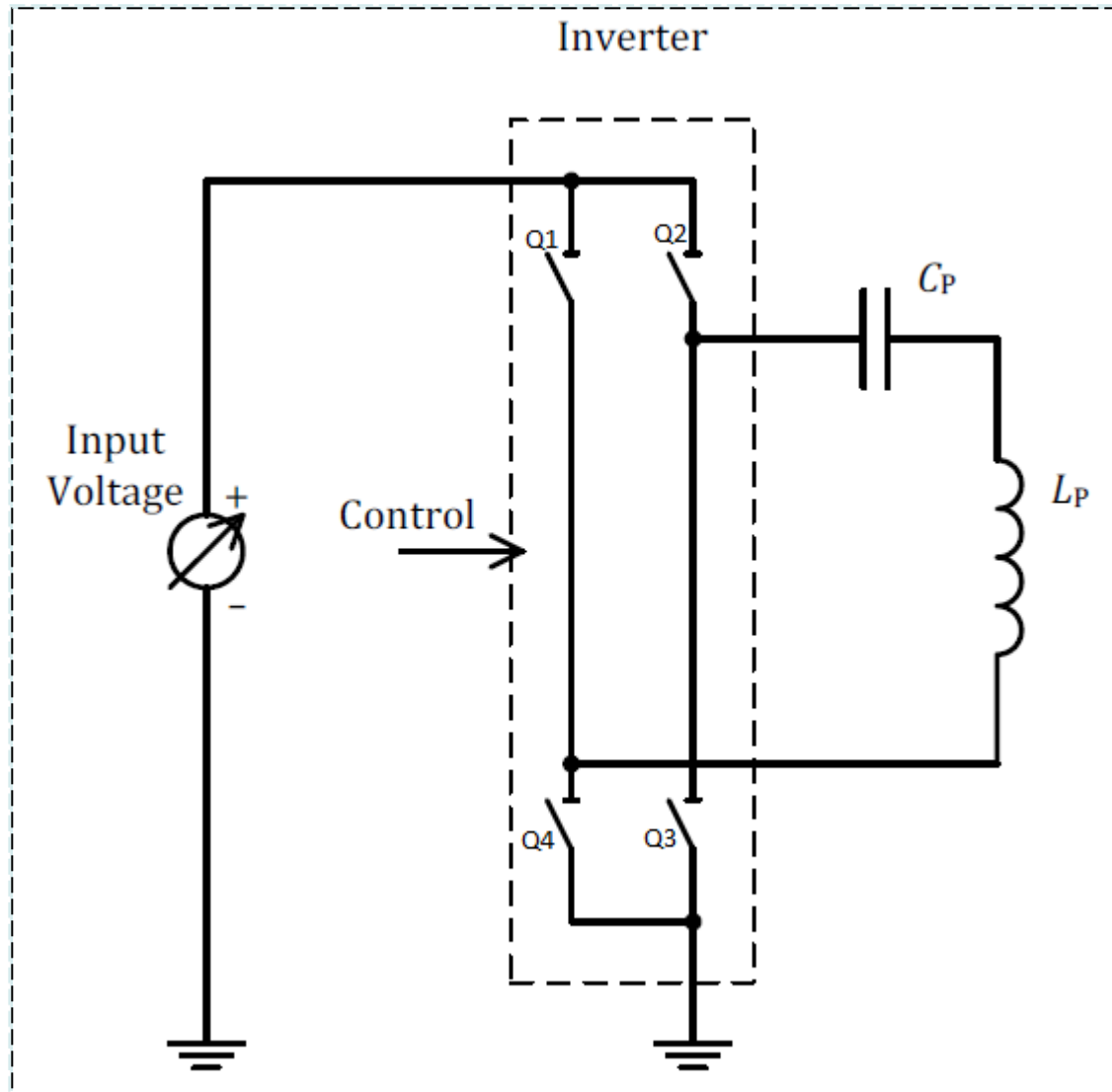
新唐无线充电方案演示板



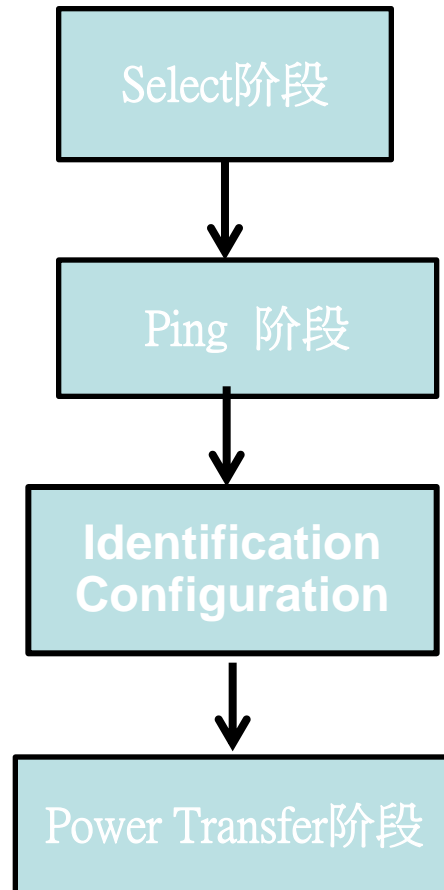
新唐无线充电方案方块图



全桥电路详解



解码流程



功能列表

- 兼容WPC Qi 1.1 协议
- 5V DC 输入
- 效率 最大75%
- 支持动态功率控制
- 4路 互补带死区功能PWM
- 蜂鸣器提醒是否进入充电状态
- LED 指示充电状态

Wireless Charger Application Portfolio

Performance

Middle/High-End Model

M0518

- Cortex™ M0 50MHz
- 36/68KB Flash / 8kB RAM
- 100Mhz PWMx24ch (互補帶死區)
- 12-bit ADC
- UART x 6
- 工作温度：-40°C ~ 105°C ;
- LQFP48/LQFP64 Package

Middle/High-End Model

Mini58

- Cortex™ M0 50MHz
- 32KB Flash / 4kB RAM
- 50Mhz PWMx 6ch (互補帶死區)
- 10-bit ADC
- SPI/UART/I2C
- 工作温度：-40°C ~ 105°C ;
- QFN33/LQFP48 Package

Middle-End Model

M054/058

- Cortex™ M0 50MHz
- 16/32KB Flash / 4kB RAM
- 25Mhz PWMx 8ch (互補帶死區)
- 12-bit ADC
- SPI/UART/I2C x 2
- 工作温度：-40°C ~ 85°C ;
- PWM x 8ch (互補帶死區)
- QFN33/LQFP48 Package

Middle/Low-End

Mini51X *

Cortex™ M0 48MHz
16KB Flash / 2kB RAM
48Mhz PWMx 6ch (互補帶死區)
10-bit ADC, ext Vol ref
电压工作范围 2.1V 至 5.5V
工作温度：-40°C ~ 105°C
待机模式：<5uA (RAM 数据保持)

MP

Developing

Planning

Low-End

**Mini51ZDE/
Mini54FHC**

- Cortex™ M0 24MHz
- 16KB Flash / 2kB RAM
- SPI/UART/I2C
- 工作温度：-40°C ~ 105°C ;
- PWM x 6ch (互補帶死區)
- TSSOP20/QFN33 Package

Price

?



LED lamp+TX



TX only

新唐无线充方案优势

高保密性



新唐ARM Cortex-M0
具有UCID

高灵活性



客户可根据自己需求
增添新功能

丰富产品线



高中低端产品都有
解决方案

高性价比



NuMicro 系列提供
全系列解决方案

謝謝



nuvoTon
founded by winbond