CorEnergy®

CorEnergy Semiconductor

能华半导体

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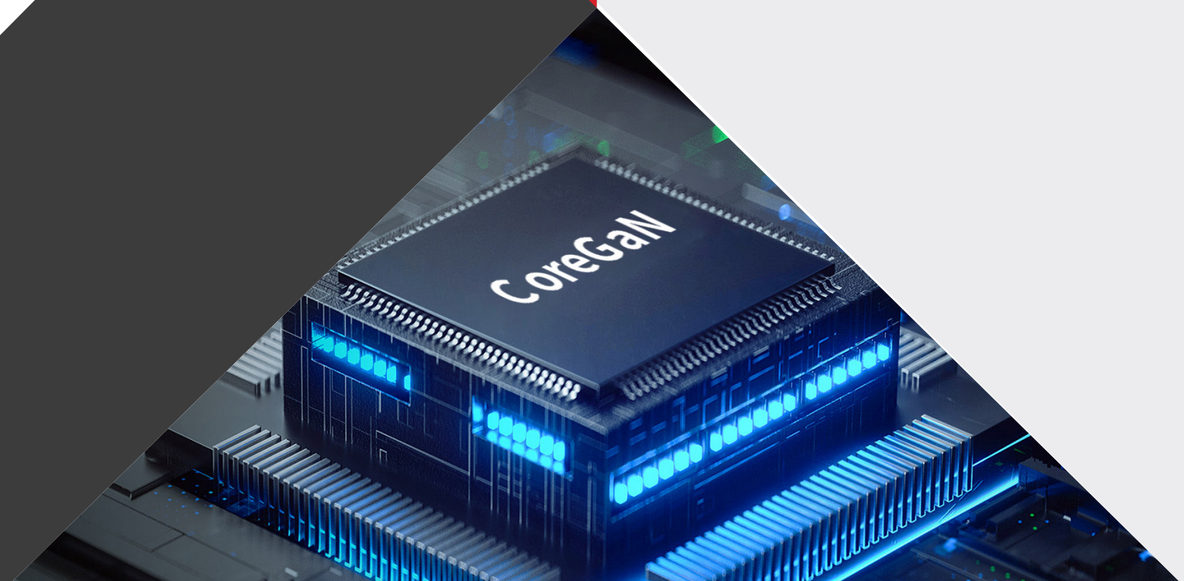


www.corenergy.com

关于能华

Power The World Greener

江苏能华微电子科技发展有限公司由海外归国高科技人才创办于2010年，核心技术团队包括从外延生长、器件设计、工艺制程、封装测试到应用模块各环节的专家，是一家专业设计、生产和销售以氮化镓（GaN）为代表的化合物半导体高性能晶圆、器件的高新技术企业。

作为行业领先的以氮化镓功率器件为主的IDM公司，目前公司的产品线涵盖氮化镓外延片、氮化镓功率场效应管、氮化镓集成功率器件以及氮化镓芯片代工等。并且能华半导体是全球少数同时掌握增强型GaN技术、耗尽型GaN技术和耗尽型GaN直驱方案的半导体公司。

About CorEnergy

Corenergy was founded in 2010 by a group of high-tech talents who returned from overseas. Its core technical team includes experts in various fields covering from epitaxial growth, device design, process technology, packaging and testing to application modules. It is a high-tech enterprise specializing in the design, manufacture and sales of high-performance gallium nitride (GaN) wafers, devices and modules.

As a leading IDM company in the industry mainly focused on GaN power devices, the company's product portfolio currently covers GaN epitaxial wafers, GaN power field-effect transistors, GaN integrated circuits, and customer-specified GaN foundry services. Moreover, Corenergy is one of the few semiconductor companies in the world that simultaneously masters the E-mode GaN technology, D-mode GaN technology, and direct-drive GaN technology.

企业价值观/Corporate Values

以客户利益为核心，务实创新，品质卓越，安全高效，诚信敬业
Customer Interests at the Core, Pragmatic Innovation, Excellent Quality, Safety and Efficiency, Integrity and Dedication.

企业文化
Corporate Culture

客户第一，成就客户，共赢发展；
积极向上，追求成长，迎接变化，务实创新！

Customer First, Achieving Customer Success, and Win-Win Development;
Positive and Proactive, Pursuing Growth, Embracing Change, Pragmatic Innovation.

氮化镓外延片
GaN Epitaxy

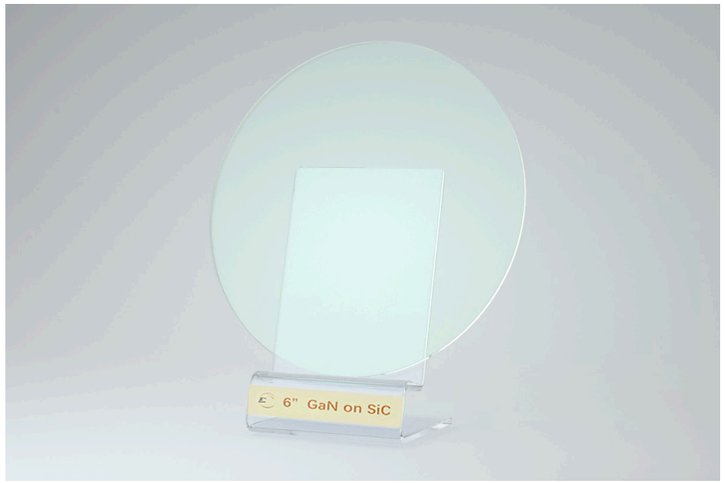
质量为先、品质承诺
Quality First, Commitment on Quality

公司拥有完善的质量管理体系，高效的数字化运营管理流程。
Comprehensive Quality Control and Efficient Manufacturing Management Systems installed and running across the Fab

按照客户及相关质量体系的要求，严格把关每一件产品，真正把放心的产品交到客户手中。

Follow strict manufacturing procedures and production quality control to meet and exceed customers' expectations and product specifications

Power HEMT on SiC



Cap layer
AlGaN/(In)AlN barrier
GaN channel
C doped GaN buffer
AlN Buffer
SiC

Substrate thickness: 350, 500 μm

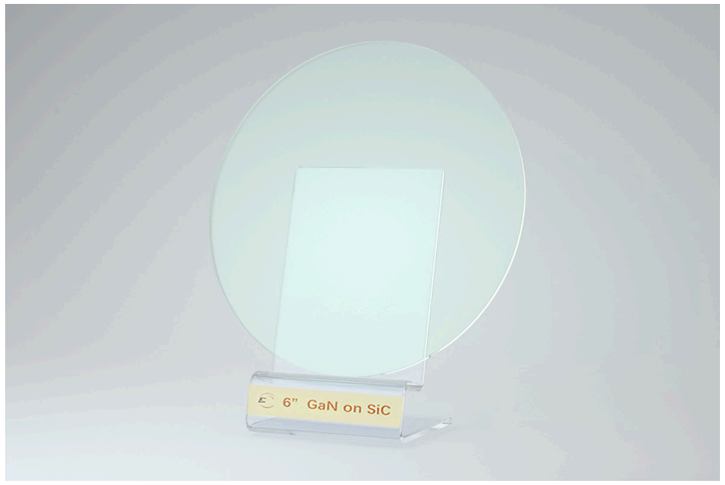
Wafer size: 2", 3",4", 6"

Main technical parameters

Specification	Nominal Value
4H-SiC(SI) substrate size	2",3", 4", 6"
GaN buffer layer (um)	2~3
AlGaN/(In)AlN barrier layer (nm)	15~30 for AlGaN/4~10 for InAlN
Al%/In%	Al% 15~30/In% 17 for InAlN
SiN passivation layer (nm)	0~30
Rs (ohm/sq)	200~450
Carrier density (cm^{-2})	6E12~2E13
Hall mobility ($cm^2V^{-1}s^{-1}$)	1300~2200
Bow (um)	<±50
Edge exclusion (mm)	<2
Lateral BV (V) for 2um GaN:C, L_{gd}=4um	>200 @1uA/mm

氮化镓外延片
GaN Epitaxy

RF HEMT on SiC



Cap layer
AlGaN/(In)AlN barrier
GaN channel
Fe doped GaN buffer
AlN Buffer
SiC

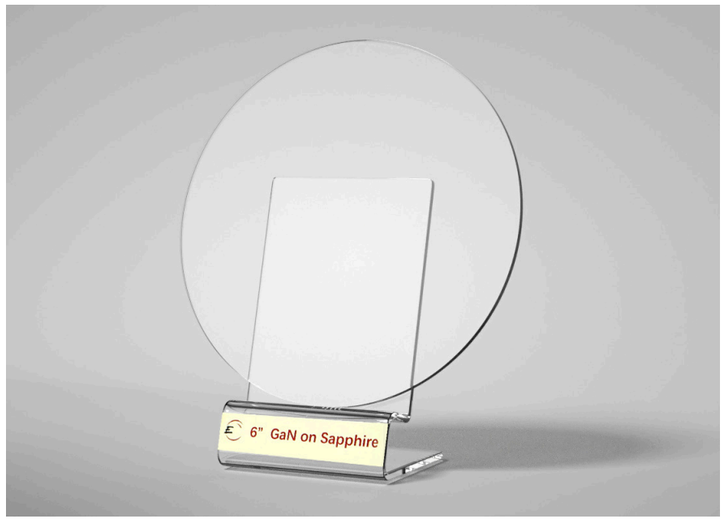
Substrate thickness: 350, 500 μm

Wafer size: 2″ , 3″ ,4″ , 6″

Main technical parameters

Specification	Nominal Value
4H-SiC(SI) substrate size	2",3", 4", 6"
GaN buffer layer (um)	0.5~1.8
AlGaN/(In)AlN barrier layer (nm)	15~30 for AlGaN/4~10 for InAlN
Al%/In%	Al% 15~30/In% 17 for InAlN
SiN passivation layer (nm)	0~30
Rs (ohm/sq)	200~450
Carrier density (cm^{-2})	6E12~2E13
Hall mobility ($cm^2V^{-1}s^{-1}$)	1300~2200
Bow (um)	<±30
Edge exclusion (mm)	<2
Lateral BV (V) for 2um GaN:Fe, L_{gd}=4um	>200 @1uA/mm

D-Mode HEMT on Sapphire

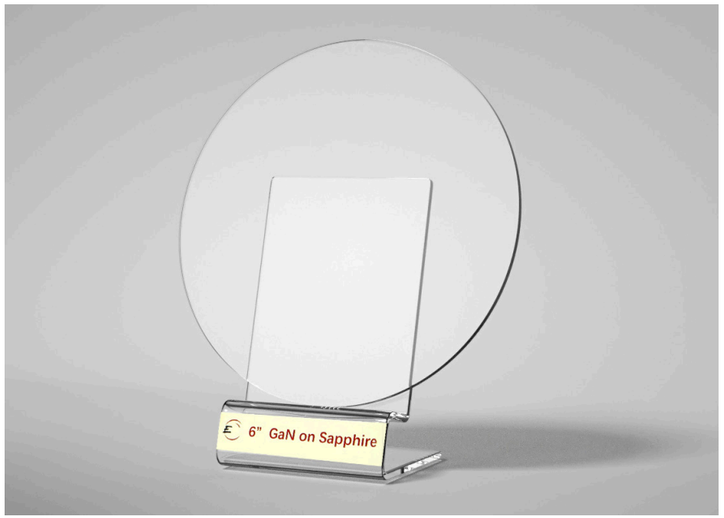


Cap layer
AlGaN/(In)AlN barrier
GaN channel
C doped GaN buffer
AlN Buffer
Sapphire

Main technical parameters

Specification	Nominal Value
Substrate size	2",3", 4", 6"
GaN buffer layer (um)	2~4.5
AlGaN/(In)AlN barrier layer (nm)	15~30 for AlGaN/4~10 for InAlN
Al%/In%	Al% 15~30/In% 17 for InAlN
SiN passivation layer (nm)	0~30
Rs (ohm/sq)	200~450
Carrier density (cm^{-2})	6E12~2E13
Hall mobility ($cm^2V^{-1}s^{-1}$)	1300~2200
Edge exclusion (mm)	<2
Lateral BV (V) for 4um GaN:C, L_{gd}=15um	>600V @1uA/mm

E-Mode HEMT on Sapphire

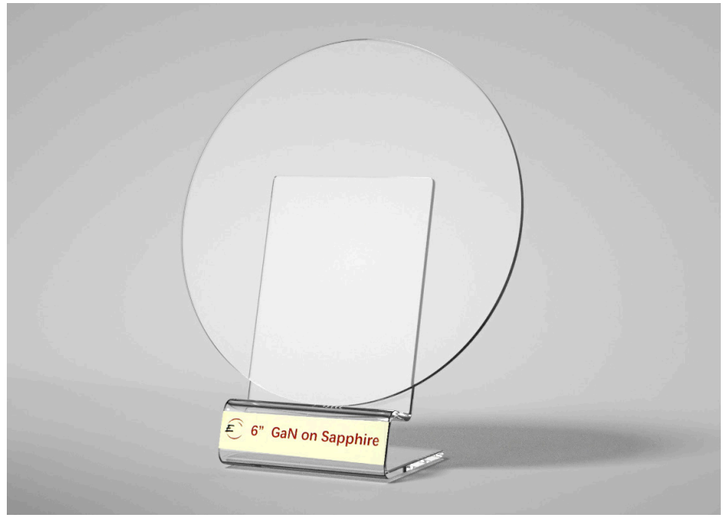


pGaN cap
AlGaN/(In)AlN barrier
GaN channel
C doped GaN buffer
AlN Buffer
Sapphire

Main technical parameters

Specification	Nominal Value
Substrate size	2",3", 4", 6"
GaN buffer layer (um)	2~4.5
AlGaN barrier layer (nm)	10~20 (Al% 15~25)
p-GaN cap layer (nm)	70~100
Sheet Resistance (Ω/sq) (w/o depletion)	< 550
Threshold Voltage (V)	1-3
Residual 2DEG density (Vg = 0 V)	<1e18/cm^3
Edge exclusion (mm)	<2
Lateral BV (V) for 4um GaN:C, Lgd=15um	>600V @1uA/mm

RF HEMT on Sapphire

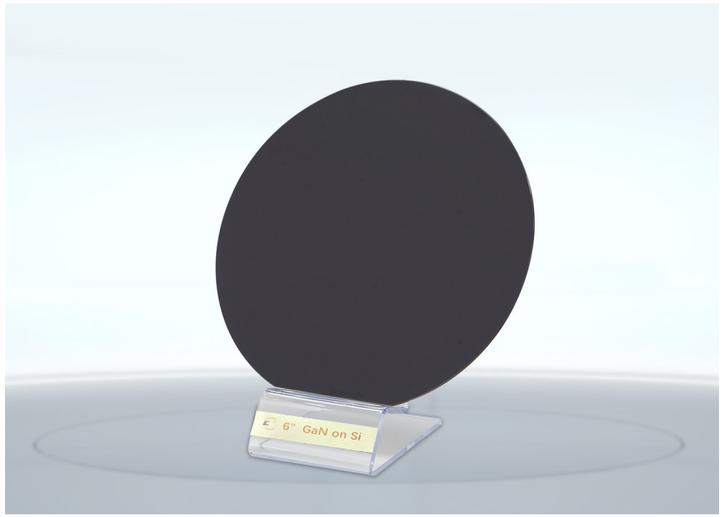


Cap layer
AlGaN/(In)AlN barrier
GaN channel
Fe doped GaN buffer
AlN Buffer
Sapphire

Main technical parameters

Specification	Nominal Value
Substrate size	2",3", 4", 6"
GaN buffer layer (um)	1.8
AlGaN/(In)AlN barrier layer (nm)	15~30 for AlGaN/4~10 for InAlN
Al%/In%	Al% 15~30/In% 17 for InAlN
SiN passivation layer (nm)	0~30
Rs (ohm/sq)	200~450
Carrier density (cm^{-2})	6E12~2E13
Hall mobility ($cm^2V^{-1}s^{-1}$)	1300~2200
Edge exclusion (mm)	<2
Lateral BV (V) for 2um GaN:Fe, L_{gd}=4um	>200 @1uA/mm

D-mode HEMT on Silicon

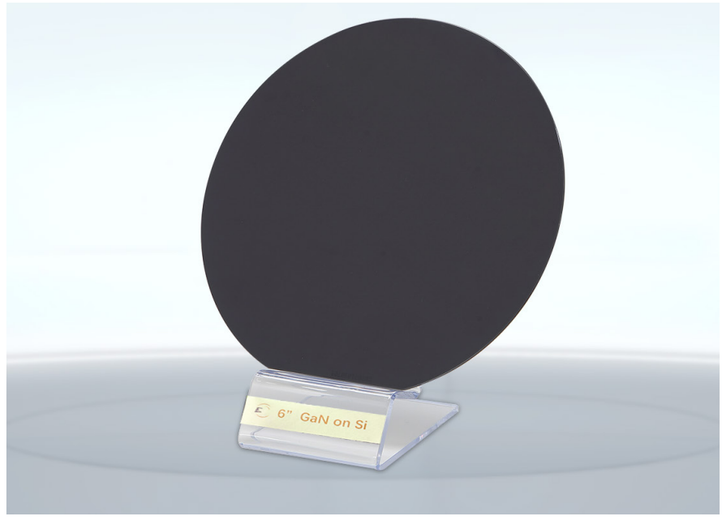


Cap layer
AlGaN barrier
GaN channel
(Al,Ga)N buffer
AlN
Silicon

Main technical parameters

Specification	Nominal Value
CZ Si (p-type) <111> wafer size	2", 4", 6", 8"
Si wafer thickness (μm)	675, 1000
Epi layer total thickness (μm)	2~6
AlGaN barrier layer (nm)	20~25 (Al% 20~30)
Rs (ohm/sq)	<400
Carrier density (cm^{-2})	>8E12
Hall mobility ($cm^2V^{-1}s^{-1}$)	>1800
Bow (μm)	<±30
Edge exclusion (mm)	<5
Breakdown voltage (V)	>1000 (@1μA/mm)

E-mode HEMT on Silicon

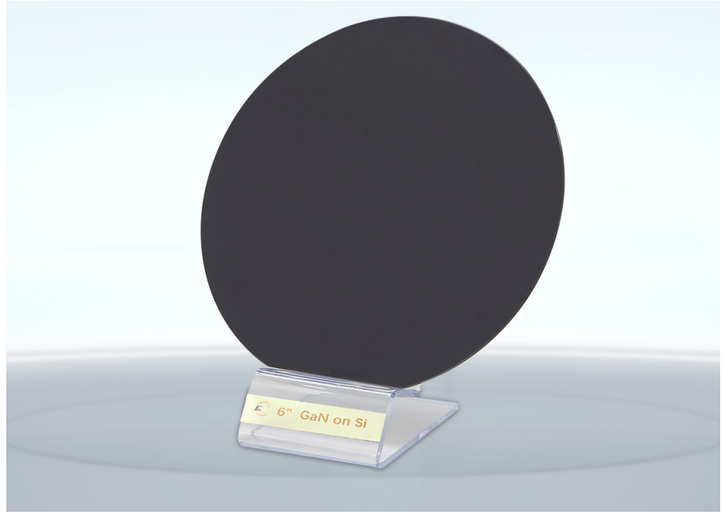


pGaN cap
AlGaN barrier
GaN channel
(Al,Ga)N buffer
AlN
Silicon

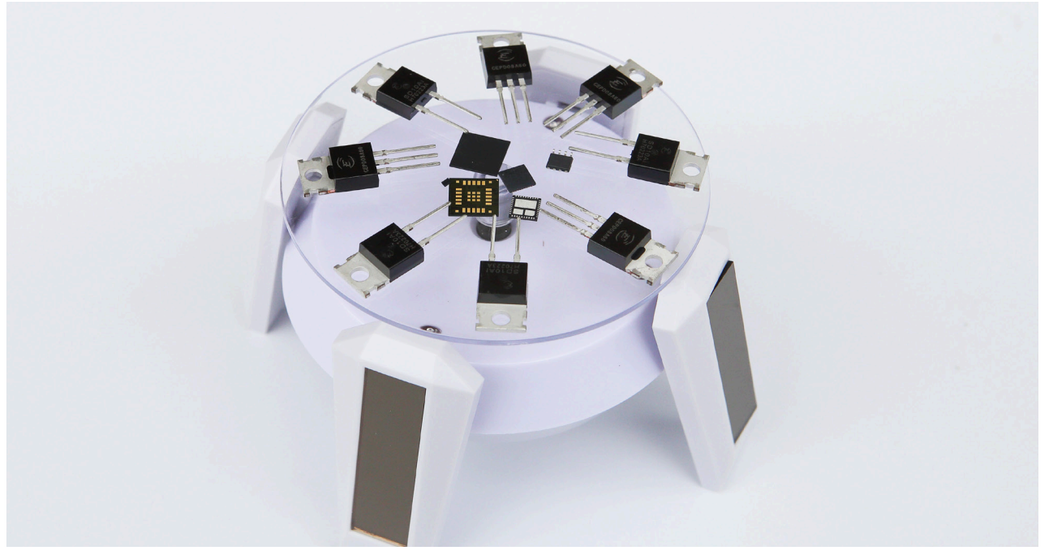
Main technical parameters

Specification	Nominal Value
CZ Si (p-type) <111> wafer size	2",4",6",8"
Si wafer thickness (μm)	675,1000
Epi layer total thickness (μm)	2~6
AlGaN barrier layer (nm)	10~20 (Al% 15~25)
p-GaN cap layer (nm)	70~100
Sheet Resistance (Ω/sq) (w/o depletion)	< 550
Threshold Voltage (V)	1-3
Residual 2DEG density (Vg = 0 V)	<1e18/cm^3
Bow (μm)	<±30
Edge exclusion (mm)	<5
Breakdown voltage(V)	>1000 (@1μA/mm)

RF-HEMT on Silicon



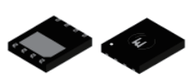
Cap layer
AlGaN barrier
GaN channel
GaN:Fe buffer
(Al,Ga)N buffer
AlN
HR Silicon 1 mm (res>5000 ohm cm)



Main technical parameters

Specification	Nominal Value
HR Si (SI) <111> wafer size	6"
Si substrate resistivity (Ω cm)	> 5000
Si wafer thickness (μm)	1000
Epi layer total thickness (μm)	1.5-2.0
AlGaN barrier layer (nm)	15~25 (Al% 20~25)
Rs (ohm/sq)	<450
Carrier density (cm^{-2})	>7E12
Hall mobility ($cm^2V^{-1}s^{-1}$)	>1800
Bow (μm)	<±30
Edge exclusion (mm)	<5
BV (V)	>200 (@1μA/mm)

消费级应用



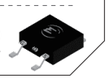
DFN5x6

DFN8x8

工业级应用

TO-220

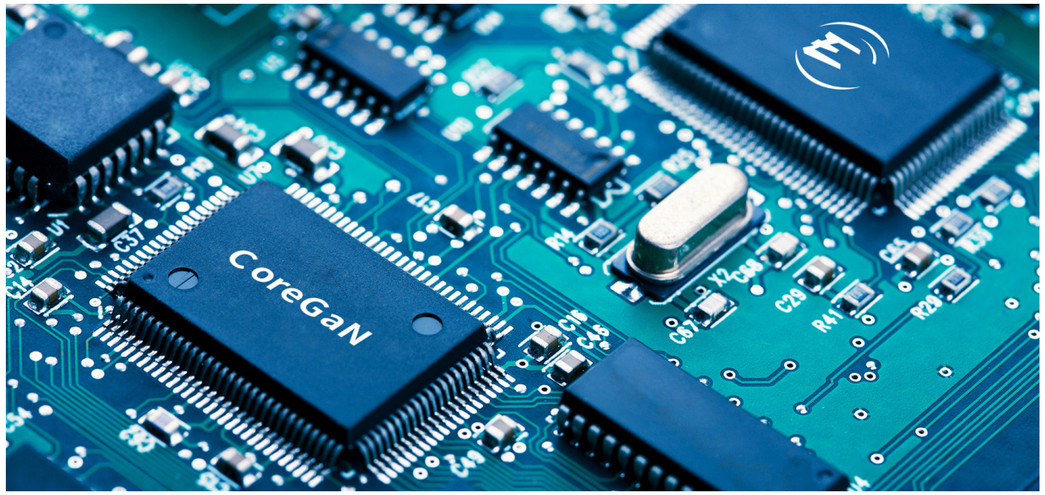
TO-247

TO-252 

汽车级应用

TO-247

TOLL

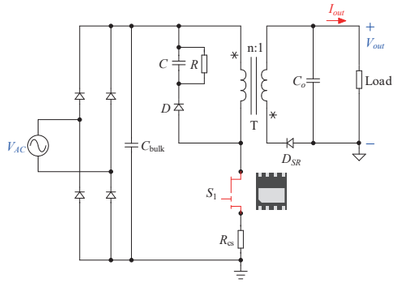


Main technical parameters

芯片型号	耐压	导通电阻	阈值电压	类型	封装形式
CE65E300DNYI	650V	300mΩ	2.5V	增强型	DFN 5*6
CE65E160DNYI	650V	160mΩ	2.5V	增强型	DFN 5*6
CE65E160DNHI	650V	160mΩ	2.5V	增强型	DFN 8*8
CE90E075DNHI	900V	75mΩ	2.5V	增强型	DFN 8*8
CE12E075DNHI	1200V	75mΩ	2.5V	增强型	DFN 8*8
CE65D150DNBI	650V	150mΩ	-18V	耗尽型	DFN 8*8
CE65H070TOCI	650V	70mΩ	4V	常关级联型	TO247-3L
CE65H070TODI	650V	70mΩ	4V	常关级联型	TO247-4L
CE65H110TOFI	650V	110mΩ	4V	常关级联型	TO220
CE65H110DNDI	650V	110mΩ	4V	常关级联型	DFN 8*8
CE65H160TOAIF	650V	160mΩ	1.9V	常关级联型	TO220F
CE65H160TOFIF	650V	160mΩ	4V	常关级联型	TO220F
CE65H160DNFI/DNGI/DNHI	650V	160mΩ	1.9V	常关级联型	DFN 8*8
CE65H270TOBI/TOEI	650V	270mΩ	1.9V	常关级联型	TO252
CE65H270TOGI/TOHI	650V	270mΩ	4V	常关级联型	TO252
CE65H270DNFI/DNGI/DNHI	650V	270mΩ	1.9V	常关级联型	DFN 8*8
CE65H600TOBI/TOEI	650V	600mΩ	1.9V	常关级联型	TO252
CE65H600TOGI/TOHI	650V	600mΩ	4V	常关级联型	TO252
CE65H900TOBI/TOEI	650V	900mΩ	1.9V	常关级联型	TO252
CE65H900TOGI	650V	900mΩ	4V	常关级联型	TO252
CE12H160DNFI	1200V	160mΩ	4V	常关级联型	DFN 8*8

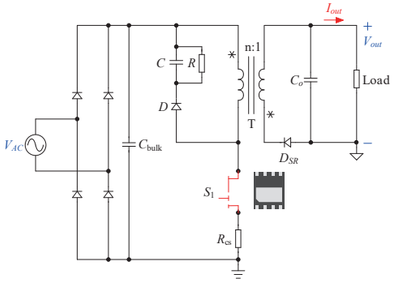
PD快充方案
PD Fast Charger Solution

33W1C1A方案



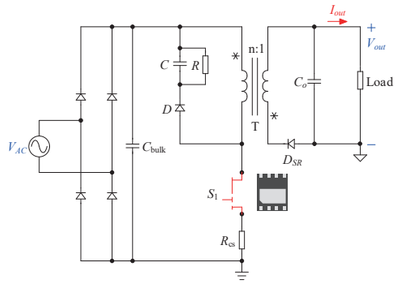
拓扑方案: QR	输入电压: AC90V-264V
CoreGaN: CE65E300DNYI/DFN5*6	输出: PD3.0,PPS
尺寸大小: 32.6mm*27.5mm*24.8mm	峰值效率: 92.4%
开关频率: 135kHz(max.)	

33W1C超薄方案



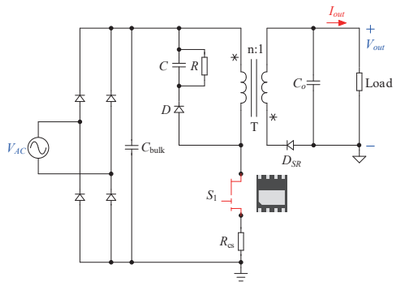
拓扑方案: QR	输入电压: AC90V-264V
CoreGaN: CE65E300DNYI/DFN5*6	输出: PD3.0,PPS
尺寸大小: 52.5mm*36mm*8.3mm	峰值效率: 91.2%
开关频率: 135kHz(max.)	

65W1C1A方案



拓扑方案: QR	输入电压: AC90V-264V
CoreGaN: CE65D150DNBI/DFN8*8	输出: PD3.0/65W
尺寸大小: 56.8mm*30.6mm*23mm	峰值效率: 93.5%
开关频率: 90kHz	

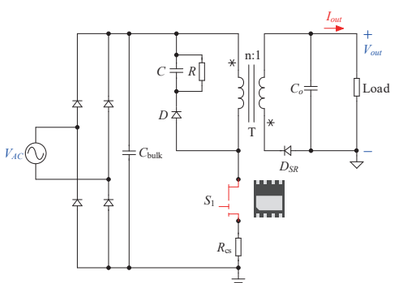
65W2C1A超小方案



拓扑方案: QR	输入电压: AC90V-264V
CoreGaN: CE65D150DNBI/DFN8*8	输出: PD3.0,PPS
尺寸大小: 52mm*32mm*24.5mm	峰值效率: 94.2%
开关频率: 150kHz(max.)	

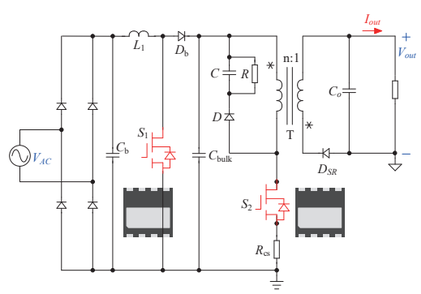
PD快充方案
PD Fast Charger Solution

65W2C1A方案



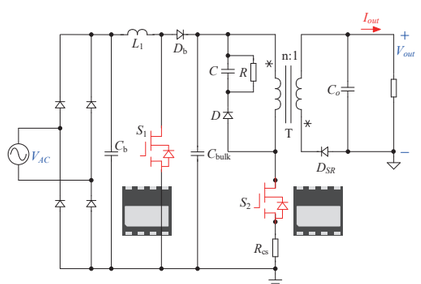
拓扑方案: QR	输入电压: AC90V-264V
CoreGaN: CE65D150DNBI/DFN8*8	输出: PD3.0
尺寸大小: 46mm*53mm*22mm	峰值效率: 93.7%
开关频率: 130kHz(max.)	

83W快充+无线充



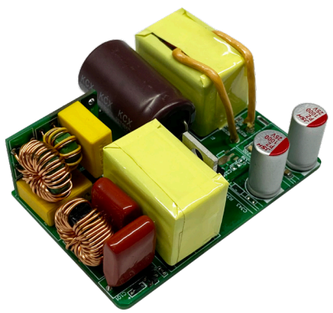
拓扑方案: PFC+QR	输入电压: AC90V-264V
CoreGaN: CE65D150DNBI/DFN8*8	输出: PD3.0, 无线充
尺寸大小: 58mm*57mm*22mm	峰值效率: 93.0%
开关频率: 90kHz	

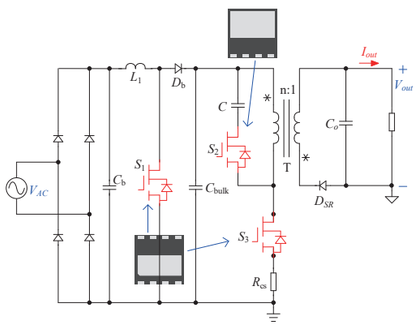
100W2C1A方案



拓扑方案: PFC+QR	输入电压: AC90V-264V
CoreGaN: CE65H160DNFI/DFN8*8	输出: PD3.0
尺寸大小: 60.8mm*56.4mm*24mm	峰值效率: 93.3%
开关频率: 150kHz	

120W2C Demo方案

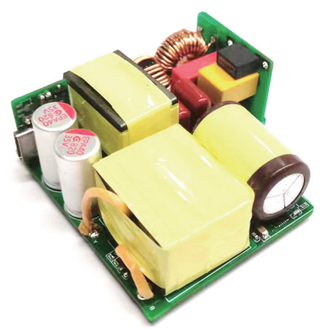


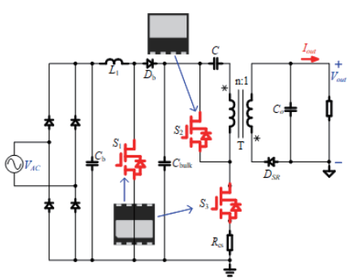


拓扑方案: PFC+ACF	输入电压: AC90V-264V
CoreGaN: CE65H160DNFI/DNHI DFN8*8	输出: 20Vdc
尺寸大小: 63.5mm*51mm*21mm	峰值效率: 95%
开关频率: 200kHz	

PD快充方案
PD Fast Charger Solution

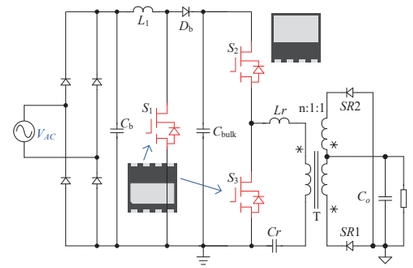
140W1C高功率密度方案





拓扑方案：PFC+AHB	输入电压：AC90-264V
CoreGaN：CE65H270DNFI/DNHI/DFN8*8	输出：PD3.1，PPS/140W
尺寸大小：60mm*60mm*20mm	峰值效率：95%以上
开关频率：125kHz	

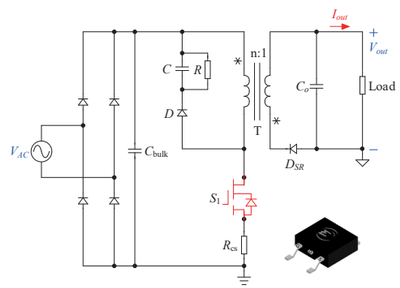
145W2C方案



拓扑方案: PFC+LLC	输入电压: AC90V-264V
CoreGaN: CE65D150DNBI/DFN8*8	输出: PD3.1
尺寸大小: 90mm*56mm*25mm	峰值效率: 95%
开关频率: 150kHz	

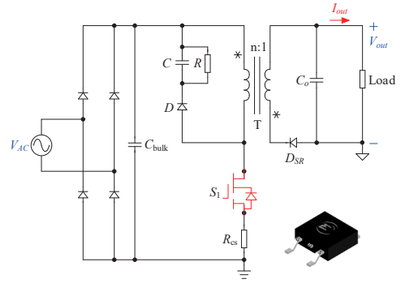
适配器方案
Adapter Solution

36W适配器低成本方案



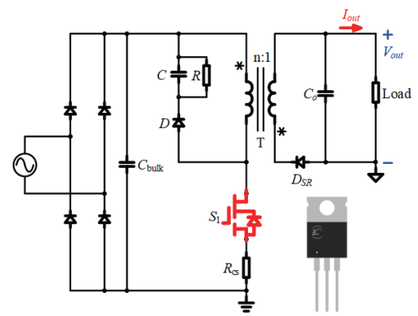
拓扑方案：QR	输入电压: AC90V-264V
CoreGaN: CE65H600TOEI	输出: 12V/3A
开关频率: 100KHz	峰值效率：92%
PCBA尺寸：65mmX39mmX23mm	

42W适配器低成本方案



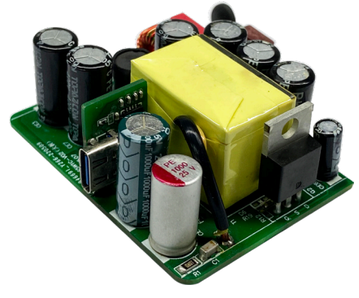
拓扑方案: QR	输入电压: AC90V-264V
CoreGaN: CE65H270TOBI	输出: DC12V/3.5A
尺寸大小: 65mm*39mm*23mm	峰值效率: 92%
开关频率: 100kHz	

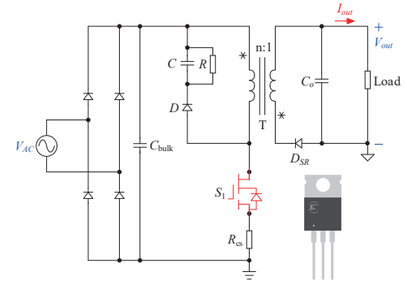
60W适配器低成本方案



拓扑方案：QR	输入电压: AC90V-264V
CoreGaN: CE65H270TOAIF	输出: 12V/5A
开关频率: 100KHz MAX	峰值效率：92%
PCBA尺寸：79mmX37mmX24mm	

65W笔电方案

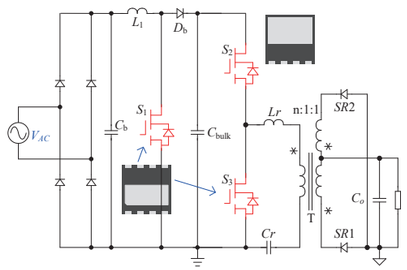




拓扑方案: QR	输入电压: AC90V-264V
CoreGaN: CE65H160TOAI/TO-220	输出: PD3.0/65W
尺寸大小: 55mm*55mm*23mm	峰值效率: 94.5%
开关频率: 90kHz	

适配器方案
Adapter Solution

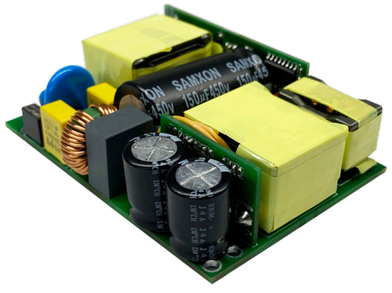
180W适配器方案

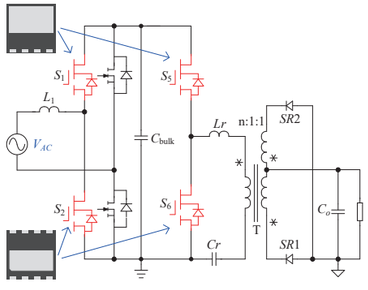


拓扑方案: PFC+LLC	输入电压: AC90V-264V
CoreGaN: CE65D150DNBI/DFN8*8	输出: 12Vdc/180W
尺寸大小: 180mm*65mm*32mm	峰值效率: 95%
开关频率: 100kHz	

电动工具方案
Power Tool Solution

240W电动工具方案

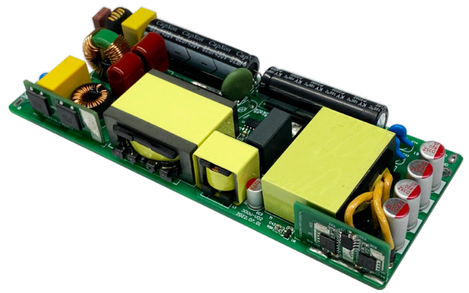


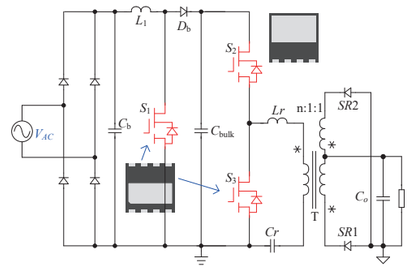


拓扑方案: Totem PFC+LLC	输入电压: AC90V-264V
CoreGaN: CE65H160DNFI/DNHI DFN8*8	输出: 48Vdc
尺寸大小: 78mm*58mm*23mm	峰值效率: 97%
开关频率: 200kHz	

TV方案
TV Solution

300W激光电视方案

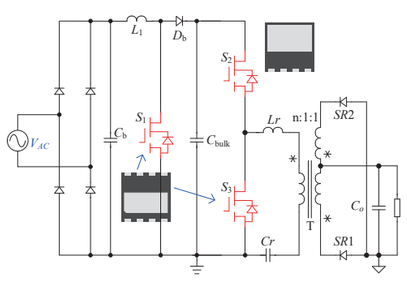




拓扑方案: PFC+LLC	输入电压: AC90V-264V
CoreGaN: CE65H160DNFI/DNHI DFN8*8	输出: 19.5V/16A
尺寸大小: 159mm*61mm*20mm	峰值效率: 95%
开关频率: 150kHz	

服务器/PC方案
Server/PC Solution

360WPC适配器方案



拓扑方案: PFC+LLC	输入电压: AC90V-264V
CoreGaN: CE65H160DNFI/DNHI DFN8*8	输出: 12Vdc
尺寸大小: 180mm*98mm*32mm	峰值效率: 95%
开关频率: 100kHz	