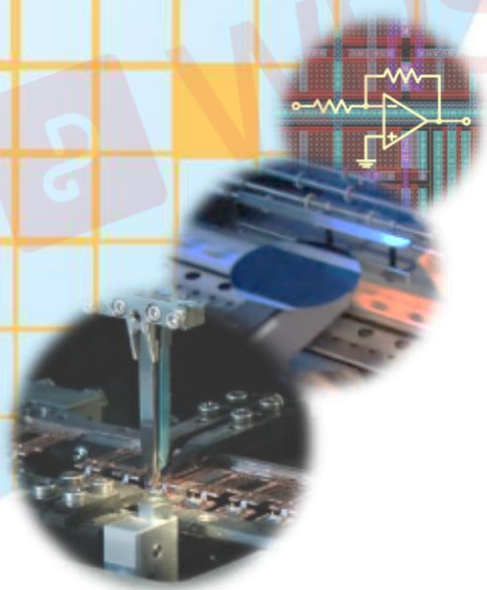


UTC

Unisonic Technologies

公司简介

2022.06



功率 & 模拟 **集成电路**
 高品质 **半导体元器件**

设计

晶圆

垂直整合

封测

销售



集团总部:

» 台北 (台湾) 1990 成立

专有生产基地:

» 福州, 厦门

» 2座晶圆厂, 1座组装厂 (测试 & 封装.)

» 2千万美元 (台北总部.)

员工

» 台北总部: 40个研发, 总员工230人

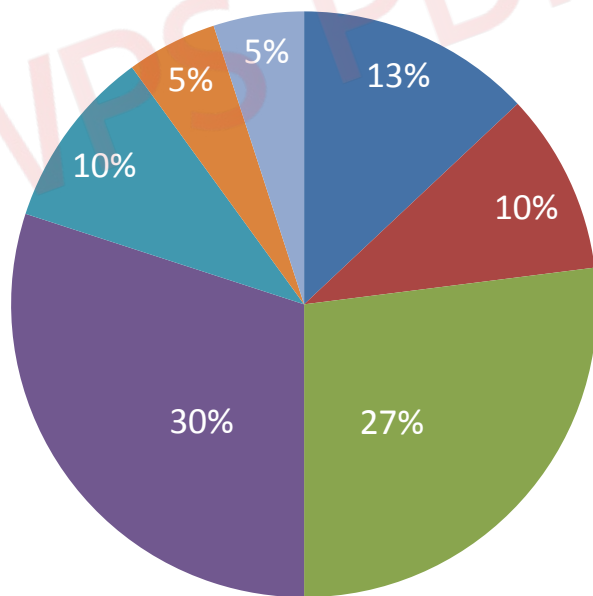
» 全球: 150个研发, 总员工2300人

2021 营收: USD 4.65亿美元



◆ 福顺半导体电子 (福州)

- » 6寸晶圆 CMOS/Bipolar/BCD/ 功率器件
- » 60,000个 晶圆片/月
- » 100,000 个晶圆片 /月 2023 Q1
- » 授权认证 ISO 9001:2008, ISO14001:2004, GB/T28001:2011 and ISO/TS16949:2009.



Product share rate

of 6" wafer

■ SCR

■ TRIAC

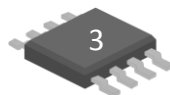
■ IC

■ MOSFET

■ SJMOS

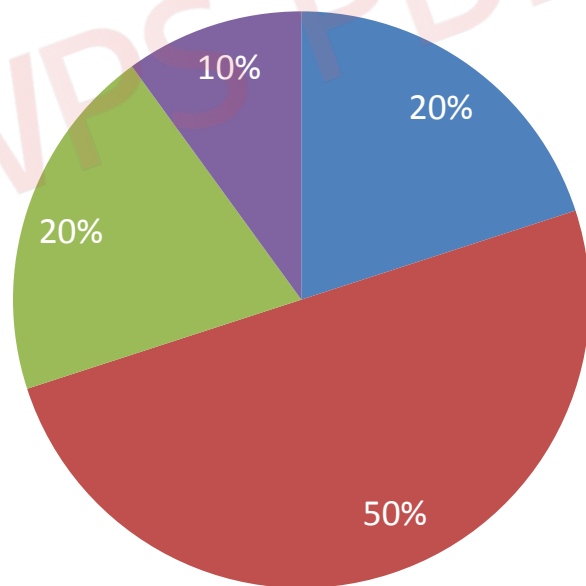
■ Diode

■ IGBT



◆ 吉顺半导体电子 (厦门)

- » 6寸晶圆 CMOS/BCD/肖特基 二极管/DMOS 和其它功率器件
- » 0.35um 制程
- » 60,000 个晶圆片 /月
- » 100,000 个晶圆片 /月 2023 Q1



Product share rate
of 6" wafer

- IC
- Dmos
- Diode
- TR-MOS

福顺半导体电子(福州)

- ◆ 600KK (最大) 产能/每月
 - » CP/ BGBM/ 组装/ 最终测试
 - » THD/ 含铅SMD/ 无铅包装
- ◆ 进程:
 - » Die attach: 环氧树脂/ 共熔/ 销售
 - » 线焊接: 金/ 铜/ 铝
 - » 无卤/ 无铅
 - » ISO9000/ ISO14000 / IATF16949 认证



UTC

客户群（中国台湾）

ASUS

FOXCONN
鴻海科技集團

wistron

LITEON

CyberPower

DELTA

arcadyan

EATON

Voltronic Power
Advancing Power

MEDIA TEK

AcBel

MW
MEAN WELL

FSP

客户群（中国大陆）



东风汽车
DONGFENG MOTOR



INVT 英威腾



EAST 易事特

GROWATT

HIKVISION
海康威视



BOE



鼎信通讯
TOPSCOMM



INOVANCE

ECOVACS

HCFA
禾川股份

XINJE

INVENTRONICS

MEGMEET

UTC

客户群 (全球)



SONY

AVAYA



Panasonic

JVC

intelbras



HITACHI



SHARP

bharti



brother



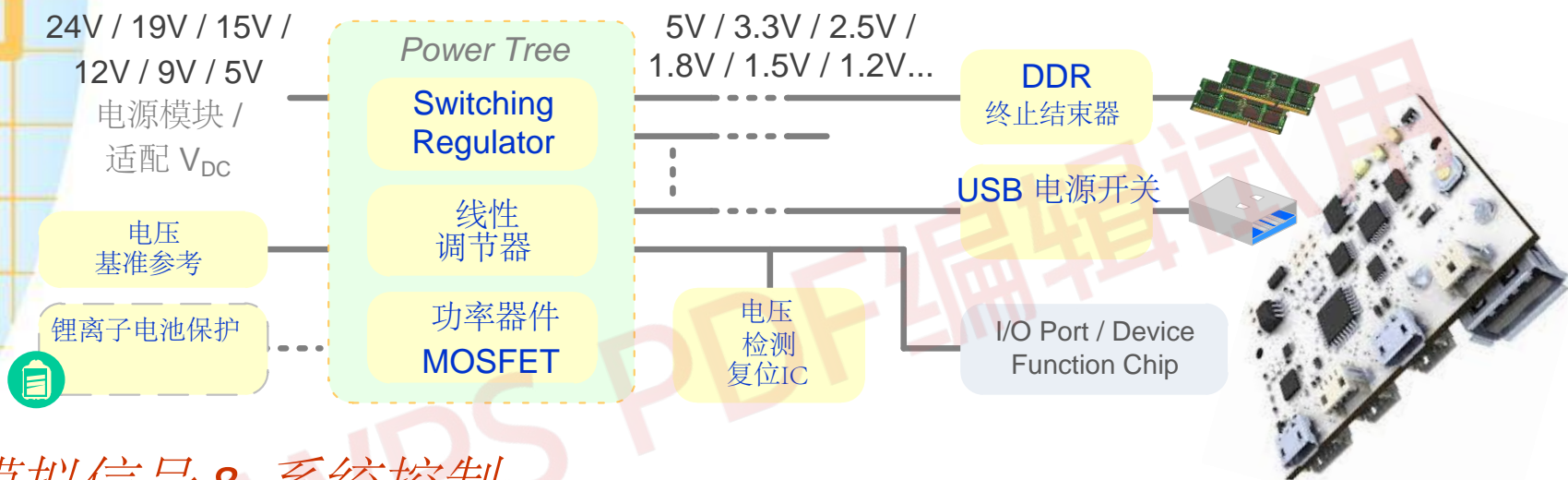
VESTEL

TechniSat

CASIO



电源管理 主板, 控制板, PCBA



模拟信号 & 系统控制

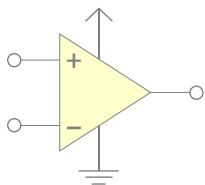
比较器 IC
运算放大器 IC

逻辑门电路, 移位寄存器
模拟开关 / 多路复用器 /
中继器 IC

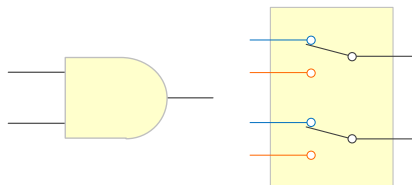
分立器件
小信号MOSFET
数字晶体管

ESD 保护
TVS

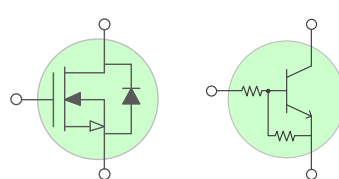
LM358 LM393 series



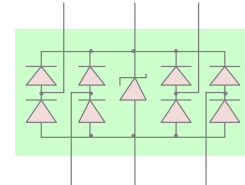
U74- series, CD40- series



2N7002, DTA-/DTC- series



USB/RJ45...



离线电源应用

电源模块

(desktop, PoS, server, whitegoods, TV...)



PWM控制器和驱动器IC

准谐振回程绿色模式

MOSFET-集成
PSR-拓扑结构

适配器

(Laptop, set-top box, WiFi router, monitor...)

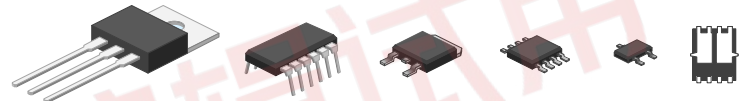


整流器组件

分栅沟MOSFE
肖特基/ Low-V

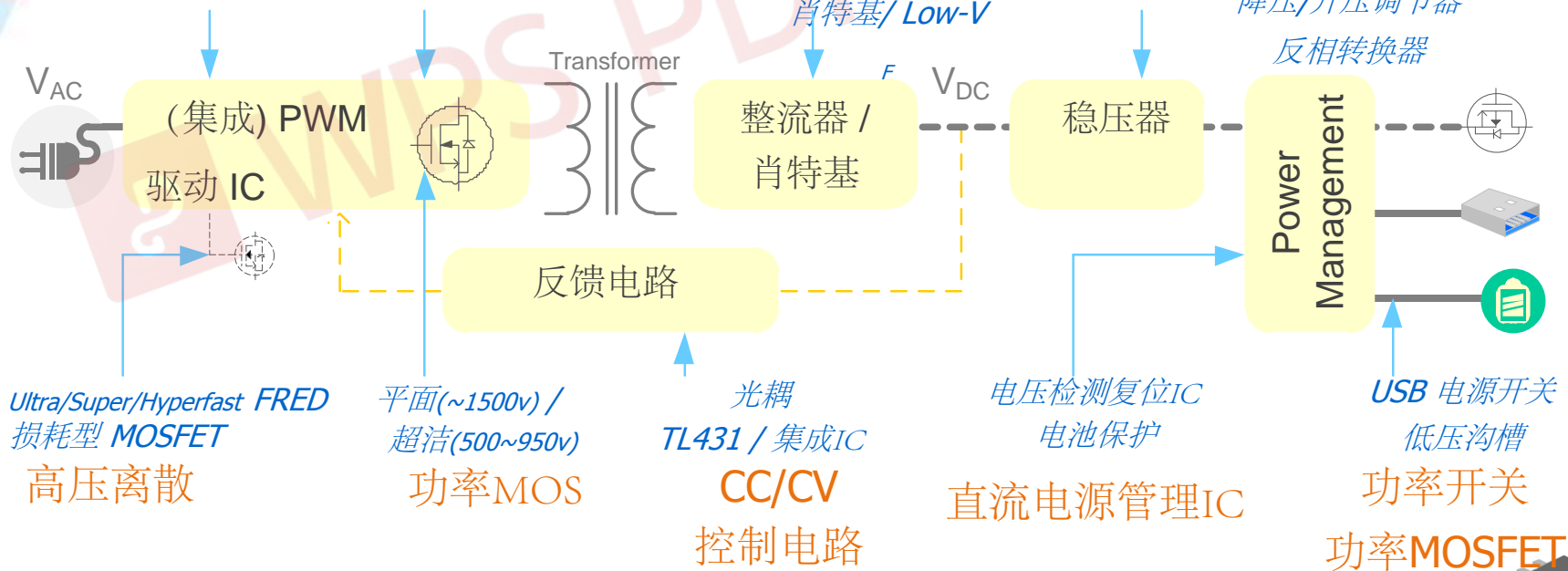
手机充电器

(cellphone, battery pack, USB powered device...)



稳压器

78系列/ CMOS LDO
降压/升压调节器
反相转换器



电源 / 充电器/
照明

- AC-DC PWM 控制器
- MOSFET-int. PWM 转换开关
- LED 照明驱动 IC
- TL431 电压参考IC
- 光耦
- 整流器肖特基/MOSFET

DC 电源管理

- 线性稳压器 / LDO
- 开关直流转换器
- DDR 终止器
- 稳压电源开关 IC
- 电压检测复位IC
- 锂电池保护IC

模拟/ 数字
接口驱动IC

- 运算放大器/ 音频IC
- 电压比较器
- 74-系列逻辑IC / 40-系列
- 模拟 Sw / Mux / Demux
- RS-232/485 / 达林顿管
- 霍尔IC/ 电动机控制器

特殊应用

- 泄露检测 / GFI
- LNB Bias / Switch
- 自动应用
- 旋律 / 声音发生器
- 电话/ 对讲机 IC
- 时钟 IC

分立元器件

- 超洁 MOSFET (500~950V, Max 75A)
- 平面 MOSFET (N-ch max 1500V, P-ch max 500V)
- 沟槽 MOSFET (P-ch / N-ch / Combo)
- Transistor / JFET / IGBT
- TRIAC / SCR
- Diode / TVS



主要的封装

TO-3P/3PN

TO-247

TO-230

TO-220 series

TO-220-2/3/4/5

TO-220B/Z7/Z9
(non-isolated)

TO-220F/F1/F2/F3

TO-220F-4/6
(isolated/molded)

TO-126B/C

TO-126/S

TO-92 series

Audio Transistor
Hall IC / Thyristor

HZIP-11/15/25

(H)SIP-3/4/...14

DIP-4/7/8/...40

Audio Amplifier
Special App. IC

Super-junction / Planar MOSFET / Voltage Regulator

TO-262 (I²PAK)

TO-251 (IPAK)

THD

TO-263 (D²PAK)

TO-252 (DPAK)

SMD

Power IC / Logic IC / Analog I/O Driver

HSOP-8 SOP-8

(H)SOP-14...28

(H)TSSOP-x

(H)MSOP-x

SSOP-x QSOP-x

DFN/QFN5060

DFN/QFN3030

...

DFN1010

DFN1006*

LDO / DC converter
Reset / Pwr Switch
Small Logic / Hall
MOSFET/Transistor

SOT-223 SOT-89

SOT-23 (-3/4/5/6)

SOT-323 (3~6pin)

SOT-523

SOT-723

Glass-passivated
Diode / Bridge

DFM ABS

MBS MBF

Low-V_F Diode

TO-277

Ultrafast FRED

SMC

SMB

SMA

Special

DO-201AD

DO-15

DO-41

Diode / TVS

SOD-123(S/F)

SOD-323(S/F)

SOD-523

SOD-723

Photo-coupler

SMD-4 LSOP-4

Thin, flat DFN/QFN packages

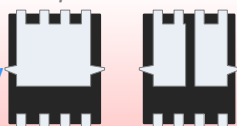
pitch 2.0



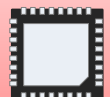
DFN8080

Power
MOSFET /
Diode

pitch 1.27

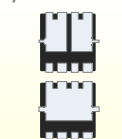


PDFN5x6



QFN5050
(pitch 0.5)

pitch 0.65



PDFN3x3



DFN3030

pitch 0.50



QFN3030

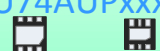


DFN2030



DFN2020

LDO
Comparator
Amplifier
U74LVCxxx
U74AUPxxx



DFN1410

DFN1010



U74AUP1Gxx LR91xx
U74LVCxxxx

p 0.35



DFN1006*

8.0

5.0

3.0

2.0

1.6

1.0

min

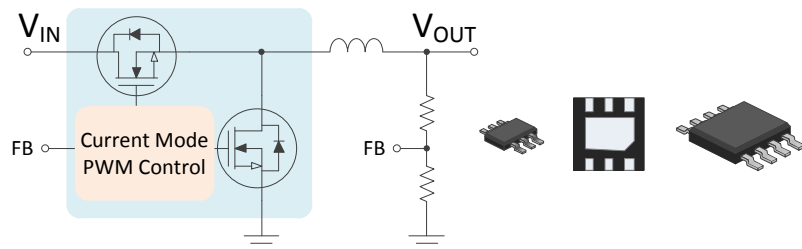


- ◆ DC 电源管理
 - » DC 开关式稳压器
 - » 线性稳压器 / LDO
 - » 电源管理类 IC
- ◆ 主板 模拟 / 数字 信号驱动
- ◆ 分立元器件
- ◆ 电源元器件

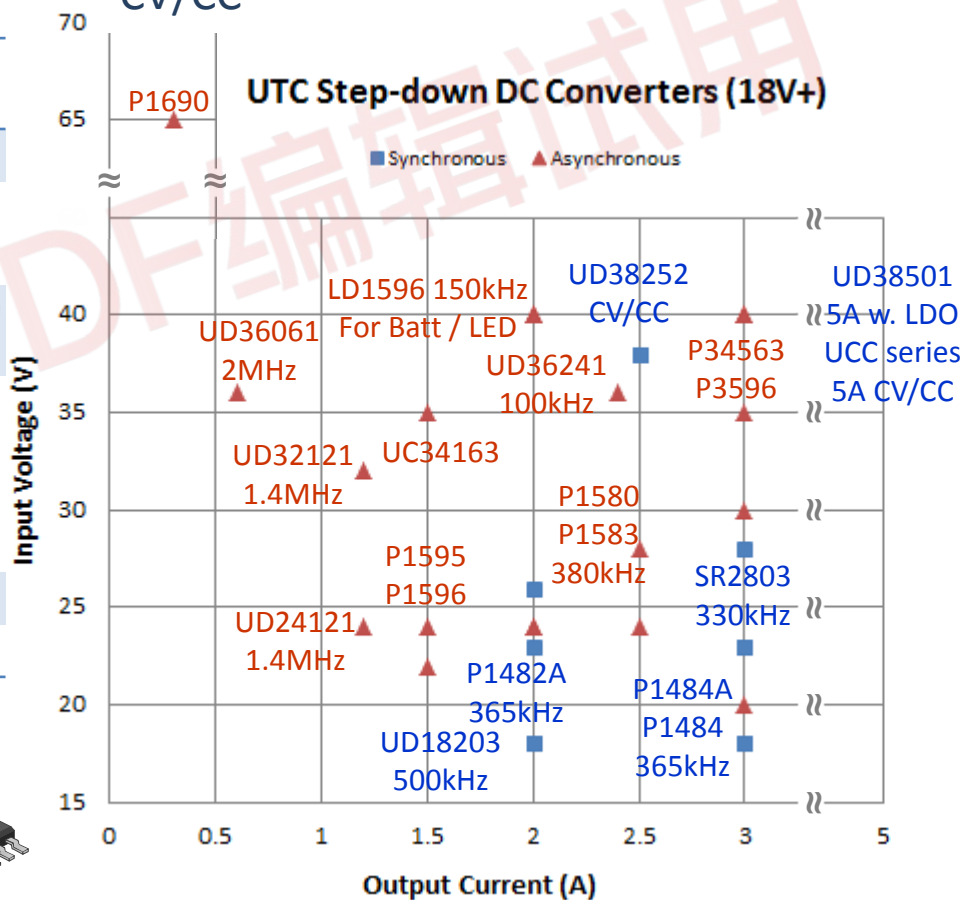
DC 降压转换器

- 高效5V同步降压转换器($V_{FB}=0.6V$)
EN软启动, mos集成, 小封装.

5V Sync. Buck	I _{out} (A)	Freq (MHz)	Remark
UC3206	0.6	1.45 / 2.8	1.5μH
UC3656~ UC3666	0.5~ 1.0	1.3~1.6	1-ch / 2-ch DFN package
UD0510x	1.0	1~2.25	Power-saving Hiccup mode
UD0512x	1.2	1.4~2.25	SOT-25 /
UD0515x	1.5	1.5	DFN3030 / 2020
UD0520x	2.0	1~1.5	1-ch / 2-ch SOT-25 HSOP-8
UD0525x	2.5	1.2	DFN3030 / HSOP
UD0530x	3.0	1.0	1-ch / 2-ch w. PoR



- 高压Buck转换器
降压变换器范围广 ~65V, ~5A, 标准 CV or CV/CC



➤ 小封装 / 紧凑设计

➤ 低 I_Q 功率 / low ground current

➤ 低 V_{IN} & 低 V_{OUT}

NEW 标准 CMOS LDO
5V 主板应用

V_{OUT} : 1V~5V, I_{OUT} : max 3A
 $V_{D,max}$: 0.15V~0.65V (3A)
 I_Q : tens of μA
DFN packages

NEW Low- I_Q CMOS LDO
电池驱动设备

V_{IN} : max 36V
 I_{OUT} : max 0.5A
 $V_{D,max}$: 0.15V~0.65V
 I_Q : 1- μA level or less

Ultralow- V_D CMOS LDO
低压运作

I_{OUT} : 1~7A, V_{IN} : min 1V,
 V_{ADJ} : 0.8V, V_D : 0.1~0.3V
High-integration of EN, POK,
Soft-start, Discharge, Flexible

➤ Conventional P2P alternatives

78- 79- 317- series

线性稳压器

50mA~1.5A, 35/40V rated

常规 LDO

e.g. LD1117, UR133,
UZ1084, U584

相对低 V_D 稳压器

e.g. 78Rxx, LP2950,
LR1118, LM2940

◆ Low- I_Q (μA -level) high-voltage CMOS LDO

PN	Input	Output	PN	Input	Output
LR1101	6V	100mA	UT71xx	24V	20mA
LR9280	6V	150mA	UT7500	24V	60~100mA
LR9282	7V	300mA	UR78xx	36V	70mA
LR9284	7V	500mA	UR75xx	36V	70~100A
UR6225	10V	100~250mA	UR71xx	36V	80mA
UT10xx	12V	20mA	UR72xx	36V	100~150mA
LR1012	12V	30~75mA	UR76xx	36V	500mA
UR56xx	18V	500mA	UR76xx1	36V	500mA
UR57xx	18V	1A	*UR77xx	36V	1A

◆ Ultralow- V_D CMOS LDO

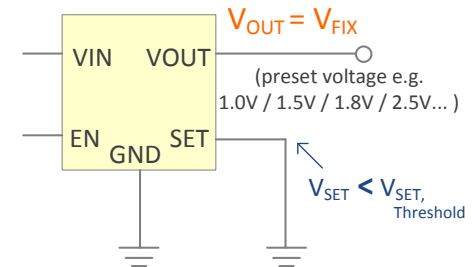
PN	Additional feature
L11831 (3A) LR18120 (2A)	PoR output, auto-discharge, selectable output (fixed 1V or adjustable with $V_{FB}=0.8\text{V}$)
LADLD10 (1A) ~LADLD70 (7A)	PoR output, soft-start, UVLO, ultralow V_D

◆ CMOS LDO 多样化功能

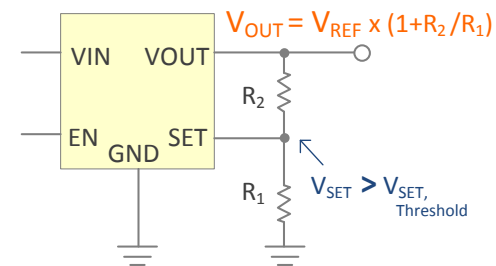
Type	Part Number
LDO 带有电源复位(POK)	LR3865 (2A) LR1965/2965/3965 (1.5A) LR1108E (1A) LR1107E (0.6A), All ultralow- V_D CMOS LDO (L11831 LR18120 LADLD10~70)
输出(可调节 / 固定) 可选择	L11831 (3A) LR18120, LR3865 (2A) LR3965 (1.5A) LR1108 (1A) LR2125, LR2128 (0.3A)
High PSRR CMOS LDO	LR9102 LR9500 UR6223(PSRR75dB~85dB)
高精度 CMOS LDO	LR1801 LR9101 LR9102 LR9103 LR9113 UR6223 LR1122D (1%) LR18120 LADLD series ultralow- V_D (1.5%)
无电容 LDO	LR9107 LR9203
浪涌保护	LR1802 UR6223

输出 FIX/ADJ 模式
可选择的 LDO:
灵活性的电路设计

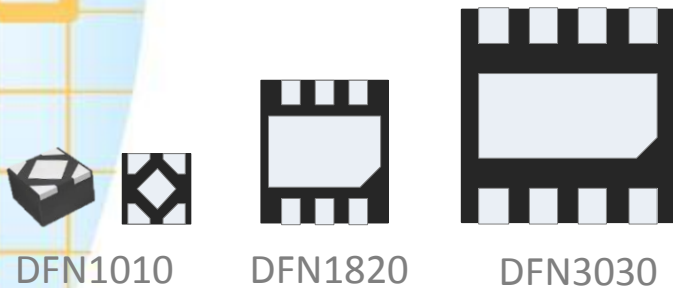
LDO works in **FIX** mode



LDO works in **ADJ** mode



Tiny DFN packages



Various Package Options

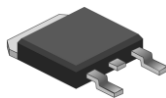


SOT series

SOP series

SOT-25 / SOT-353
SOT89 / SOT-223

SOP / HSOP
TSSOP / MSOP



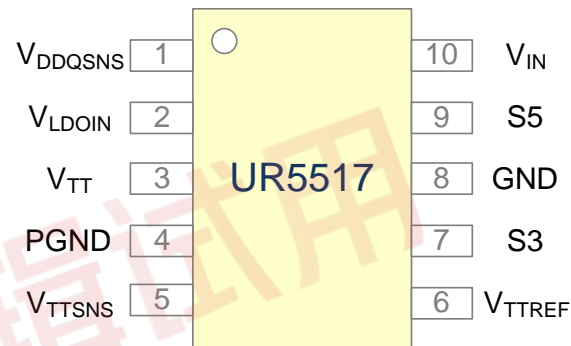
TO series

DKPAK / D²PAK
IPAK / I²PAK

I_{OUT}	P/N	DFN Pckg	Feature
150 mA	LR9103	DFN1010-4	Low- I_Q (<1.5 μ A) V_{OUT} option 1~5V High PSRR
	LR9280	DFN2020-6	
300 mA	LR9102	DFN1616-6 / DFN1820-6	
	LR9113	DFN1010-4	
	UR6223	DFN1010-4	Inrush protection
400 mA	LR9282	DFN1010-4	Low- I_Q (<1.5 μ A)
	LR1106	DFN1820-6	V_{IN} 8V operation
500 mA	LR9153	DFN1010-4	
1.0 A	LR1805	DFN2020-6	inrush protection Flexible V_{OUT} or POK
	LR1108	DFN3030-8	
3.0 A	L1806	DFN3030-10	Ultra-low V_D
2-ch 300mA	LR6401	DFN1820-6	Dual Channel

➤ DDR RAM 总线终端稳压器

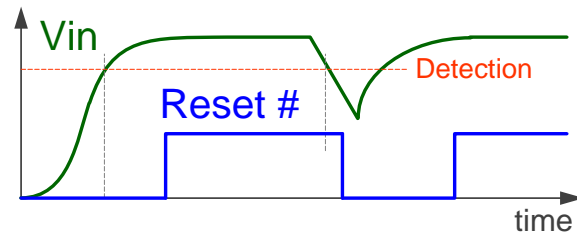
Support DDR	Part Number
DDR1(2.5V) / DDR2(1.8V) / DDR3(1.5V)	UR5596 UR6512, UR5517
DDR3L (1.35V) / LPDDR3, DDR4 (1.2V)	UR6517 (1.8A)



PN	Delay	Misc
81xx / 82Nxx / 82Cxx	-	
81Nxx / 81Cxx	1~400ms	
88Nxx / 88Cxx 89Nxx / 89Cxx	T _{REC} adjustable	
82xx / 83Cxx UIC811 / UIC812	30ms~1.2s	Manual Reset
UIC813	140~560ms	Active-high
UWD706 UWD817*	120~280ms	Watchdog

➤ 电压检测复位 IC

- 0.9~6.2V 电压故障保护检测
- 电源开关复位关于电源顺序管理
- 低电平有效, 开漏极 / 推挽式输出



稳压器参照对比

➤ 线性稳压器

产品类别	UTC Example	竞争品牌	竞争者 PN
Linear Regulator -- Positive / Adjustable/ Negative DFN / SOT-89 / SOT-223 / SOP-8 / TO-252 (DPAK) / TO-263 (D2PAK) / TO-251 (IPAK) / TO-262 (I2PAK) / TO-92 / TO-126 / TO-220 / TO-220F	78Lxx LM78xx 78Dxx LM78xxA LM317 LM317A 79Lxx LM79xxA	TI (Texas Instrument) ST Fairchild (On-semi)	78L05 LM7805 78D12 LM7824 LM317 LM317A 79L05 LM7912
LDO (Low-dropout) Regulator	LD1117 LP2950 78R05 UZ1084	ST On-semi Rohm	LD1117 LP2950 78R05 UZ1084
CMOS LDO Regulator 5.5~10V input, conump. 20~200μA Enable function, small package	LR1801 (1A SOT-89) LR9103 (DFN1010)	TI Rohm On-semi	TLV733xx BuxxTD NCP702xx
<i>Special CMOS LDO:</i> Ultralow-dropout ($V_D < 0.35V$) Low-quiescent (μA -level) Dual-channel LDO	LR18120 LxxLD30 LR9280 UR75xx LR6401 LR3xxyyB	Rohm R**** T**** A**** H***** G**	R1180x HT75xx AP6401 R5323

- ◆ DC 电源管理
- ◆ 主板 模拟 / 数字信号驱动
 - » 运算放大器 & 比较器
 - » 逻辑系列: 逻辑门电路, 总线管理, 电压转换
 - » 接口 IC & 线性驱动器
- ◆ 分立器件
- ◆ 电源集成

➤ 运算放大器

Category	Part Number
1-ch Op Amp	M2125 LM318 LM321 LV321
2-ch Op Amp	MC4580 LM358 MC34072 TL072
4-ch Op Amp	LM324 MC34074

Low-consumption rail-to-rail

Category	Part Number
Output Rail-to-Rail Amplifier	LMH358 LV358 LV324
Input & Output Rail-to-Rail Amplifier	LV2460 LV2461 ULV8542

➤ 电压比较器

Popular p2p item

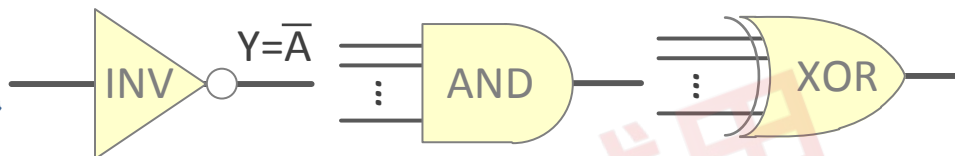
Category	Part Number
1-ch Comparator	LMV331
2-ch Comparator	LM393 LMV393
4-ch Comparator	LM339

Low-consumption alternative

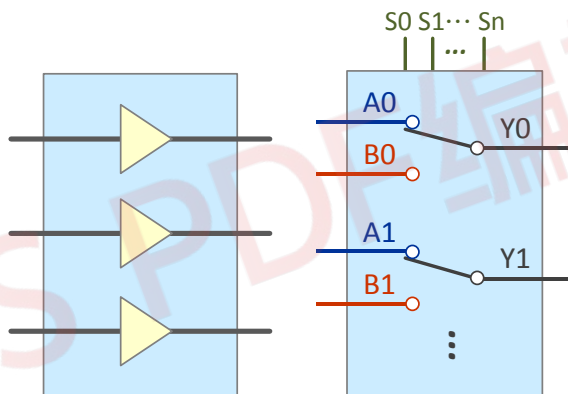
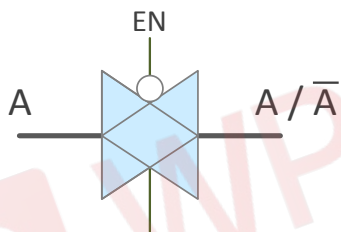
Part Number	Description
ULC393	Low-consumption 18V voltage comparator
ULC831	Voltage comparator with push-pull output

◆ 功能

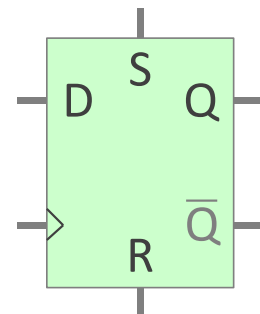
逻辑门电路, 反相器, 锁存器, 与/或/异或/与非/或非门电路, 多功能门电路



总线收发器开关/
多路复用器



移位寄存器
触发器



计时器, 振荡器, 振荡器, 编码器, 计数器...

◆ Circuit Technology

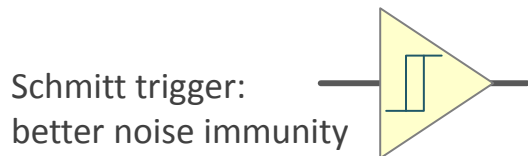
Low-voltage: AUP/AUC/LVC/AHC...

TTL 兼容: AHCT/HCT...

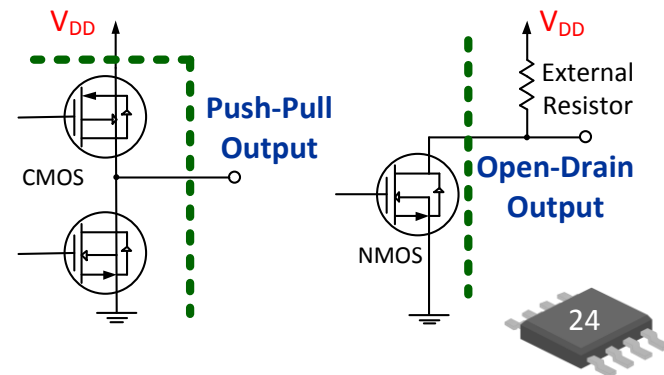
15-V application: CD4000 logic

Function	Symbol	Logic gate (example)	High-V logic	
AND		U74AUC1G08 U74AHC1G09 U74AHC21	UCD4081B	
OR		U74AHCT32 U74AUP1G32 U74LVC2G32	UCD4071B	
XOR		U74LVC86A U74AHCT86 U74AUC1G86	UCD4070B	
NAND		U74AUP1G00 U74LVC1G10 U74LVC2G132	UCD4011B	
NOR		U74LVC02A U74AUC1G02 U74AUP1G02	UCD4001B	
Inverter		U74AUP1G04 U74AUP1G06 U74LVC2G240	UCD40106B	
Buffer		U74LVC1G125 U74AUC1G126 U74LVC2G241	UCD4050B	
Multi-function gate		U74LVC1G57 / U74LVC1G58 / U74LVC1G97 / U74LVC1G99		

- Gate numbers (1G/2G/3G...)
- Input numbers
- Normal / Schmitt trigger input



- Output type:
Push-pull /
Open-drain /
Tri-state



- Bus switch / Mux

Function	Symbol	Example		High-V logic
Bus Switch		U74LVC2G66 U74CBTLV3125	U74CBT1G384 U74CBT3306	UCD4066
Line Decoder / Mux / Demux		U74LVC1G19 U74AUP1T157	U74HCT138 U74LVC258	
Analog Mutiplexer (Non-74 series)		U7SB3157 74LVX4051	US5C3257 U74LVX4053	4051 4052
		UMX4215	UMX2215	

- Data register

Function	Symbol	Example		High-V logic
Flip-flop		U74AUP1G74 U74LVC574	U74AHC374 U74HCT73 (J-K)	UTC4013
Latch		U74LVC373	U74LVC573	
Register		U74AHC164	U74AHC595	UCD4015B

74-系列命名规则

- ◆ 普通 74- or 40- 系列
- 部分相同名称或命名规格

- ◆ 不同的型号号码

-检查功能/特性的技术支持

-趋势: 高速, 低功耗, 低压, 多电压, 小封装

U 7 4 A U P 1 G 0 2

Circuit tech.
(Vcc & speed)

Function code

Gate number

产品前缀 参考对照	
UTC	U74-
TI	SN74-
On semi	MC7-, NL-
STM, NXP	74-
Toshiba	TC7-

前缀	V _{DD}	Partial Power-Down	TTL comp.
U74AUP/AUC	0.8V~3.6V	V	
U74LVC	1.65V~3.6V/5.5V	(V)	
U74LVX	2V~6V	V	
U74CBTLV	2.3V~3.6V	V	
U74CBT	4~5.5V	(V)	V
U74AHC	2V~5.5V		
U74AHCT	4.5V~5.5V		V

➤ 串行接口线性驱动器

Protocol	Part Number	Application
RS-485 /	UTRS485 UTRS458 UTRS3082	1-driver 1-receiver
RS-422	UTRS3085 UTRS3088 UTRS3080	
RS-232	75323	5-driver 3-receiver
	75185 75232 UT3243	3-driver 5-receiver
	UT3223 UT3222 UT3232 UT232A UT232E	2-driver 2-receiver
	UT3221	1-driver 1-receiver

➤ 达林顿管驱动器系列

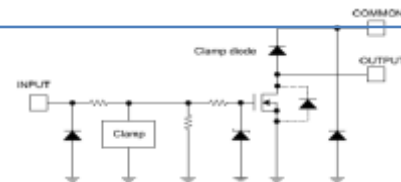
Part No.	Number of Driver	Max. Voltage / Max. Current
ULN2003	7	50V / 0.5A
ULN2004	7	50V / 0.5A
ULN2803	8	50V / 0.5A
ULN2804	8	50V / 0.5A
62783	8	50V / 0.5A
62784	8	50V / 0.5A

➤ 新的DMOS 驱动器系列

- ✓ 低压差输出
- ✓ 高输入阻抗和低驱动电流
- ✓ 稳定驱动要求
- ✓ 低功耗

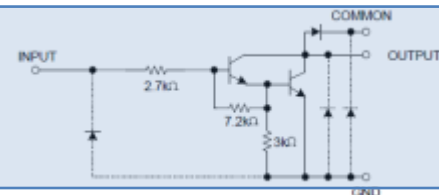
NEW
ULD2003

7-ch DMOS transistor array



ULN2003

7-ch Darlington transistor array



霍尔 IC (磁传感器)

- 接近感测, 3.3V/5V circuit
- 应用: 笔记本电脑

盖感测

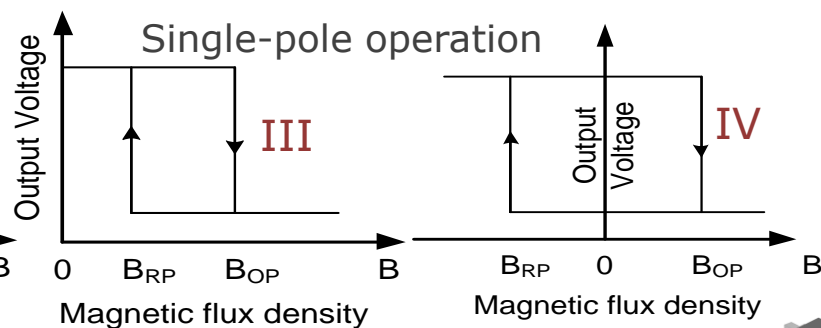
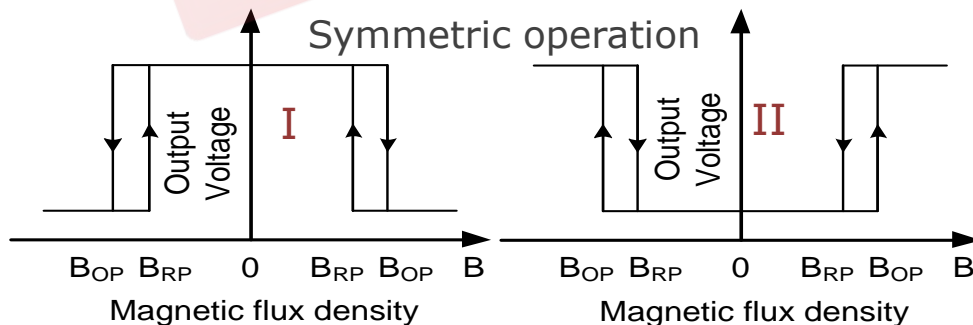
Curve	Part Number	Output Type	B_{OP} (Gauss)
I	*UH8106-x	N/I/C	18
	UH8105	C	30
	UH8104	N	40
	UH8103	N	50
	UH8102B-x	N	8~70
II	UH8102A-x	N	8~70
III	UH8100x	N	40

- 旋转传感 V_{cc_max} 20V~28V
- 电机、仪表、流量

计

Curve	Part Number	Output Type	B_{OP} (Gauss)
II	SK8552	I	>20
	SK1816A	I	50
IV	SK1816/M	N	50
	UHS41	N	70
III	SK1901	N	<100

Output type: **N**: Open-drain
I: Internal Pull-up **C**: Push-pull



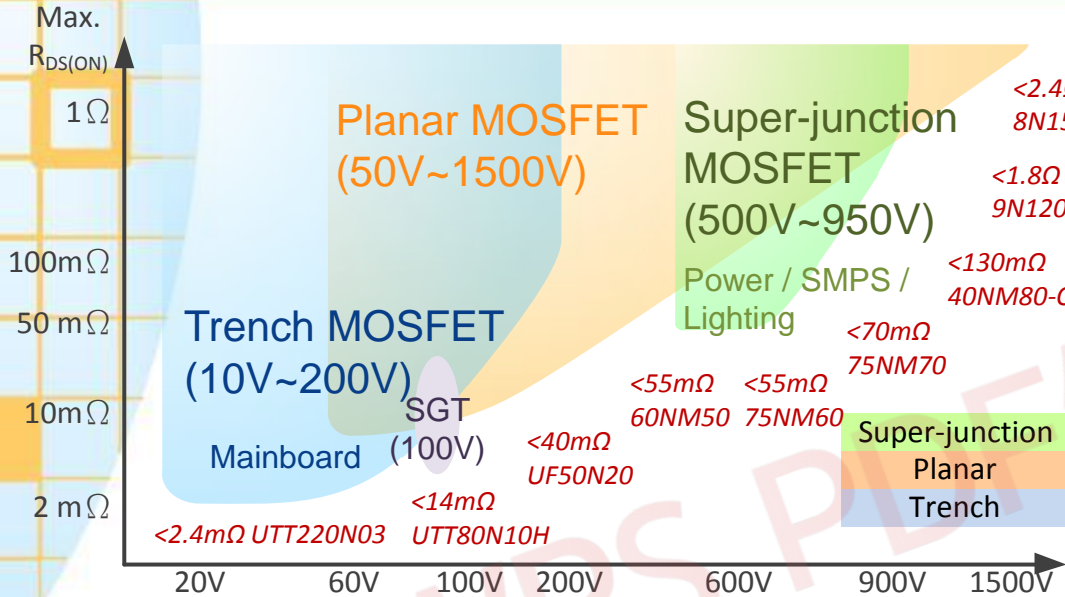
➤ 常用的集成电路

Product Category	UTC Example	Competitor	Competitor PN
Shunt Voltage Reference	TL431 ULVH431	TI Diodes	TLVH431
Voltage Detection Reset	89N09 UIC809 81Nxx 88Cxx	Rohm Mxxxx Txxxx Sxxxx	BU4209 MAX809 XC61CN S-809
Voltage Comparator	LM393 LM339 ULC393	TI ST	LM393 LM339
Operational Amplifier	LM358 MC4580 LM324	TI ST JRC	LM358 MC4580 LM324
Audio Amplifier	TDA2030A MC34119	ST NXP	TDA2030A MC34119
74-series 40-series Logic Gate / Register / Bus Switch / Multiplexer	U74AHCTxxx U74LVCxxx U74AUPxxx UCD40xx	TI NXP On-semi	SN74AHCT86 74LVC373 74AUP1G04 CD4052
RS-485 / RS-232	UTRS485 UT232A	TI Maxim	MAX485 SP232A
Darlington Driver	ULN2003 ULN2803	Rohm	ULN2003 ULN2803

- ◆ DC 电源管理
- ◆ 主板 模拟 / 数字信号驱动
- ◆ 分立器件
 - » 功率 MOSFET
 - » 晶体管
 - » 二极管
 - » 可控硅 & 双向可控硅
- ◆ 电源集成

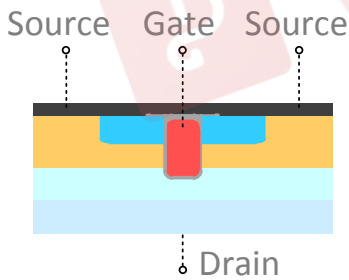
分立器件

- 超洁 MOSFET (N-ch 500~950V, Max 75A)
- 平面 MOSFET (N-ch max 1500V, P-ch max 500V)
- 沟槽 MOSFET (P-ch / N-ch / Combo)
- Transistor (Bipolar / Darlington / Digital) / JFET / IGBT
- TRIAC (400~900V, ~40A) / SCR (200~1000V, ~20A)
- Diode (FRED / Schottky / Low- V_F) / TVS

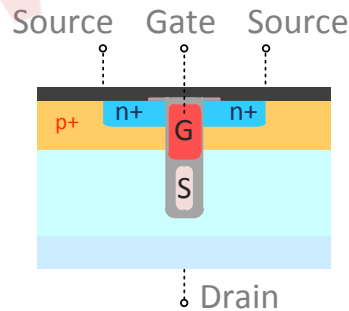


Application

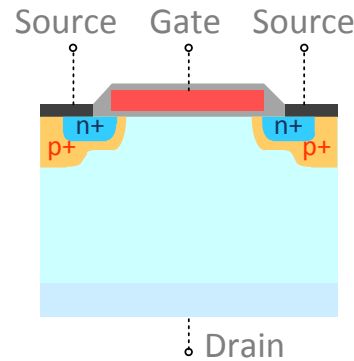
- Low-voltage Trench MOSFET
 - Mainboard application
- 100~400V Planar MOSFET
 - Motor / Industrial application
- High-voltage Super-junction / Planar MOSFET
 - AC-DC power / lighting
 - Up to **1500V**
 - Low $R_{DS(ON)}$ <**55mΩ (75A)** at 600V



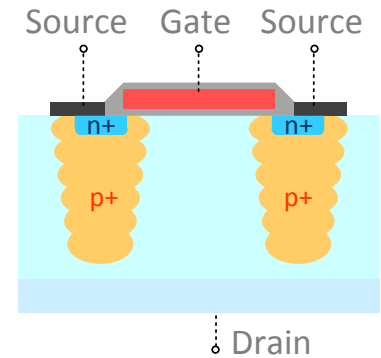
沟槽 MOSFET
(Low R_{ch})



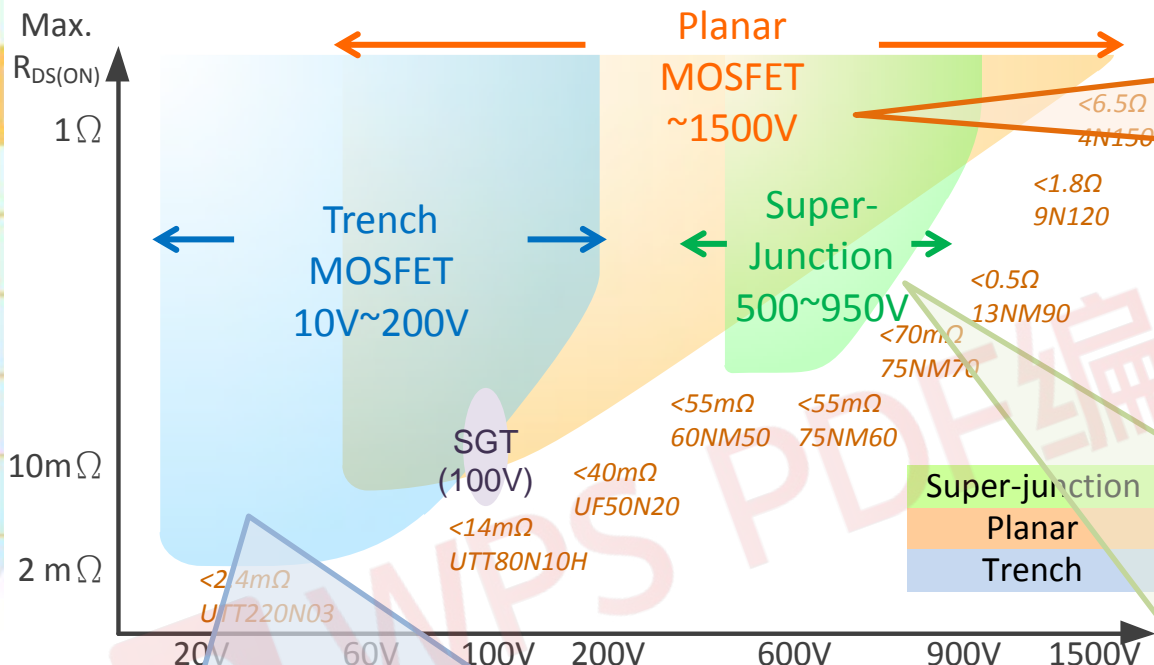
Split-gate Trench
(Low R_{ch} , Q_g)



平面 MOSFET
(up to 1500V, high EAS)



Super-junction MOSFET
(Low R_{epi})



P电动工具，电机，风扇，商用，工业-平面 MOSFET (100~400V e.g. 12N25)

照明，PFC，适配器，充电器，电源，电视电源模块，电器，机器-高压平面

MOSFET (>500V) -TO-220F/251/252户外照明，高效电源，PD/QC充电器，EV充电器-超级连接MOSFET-快速恢复 MOSFET

(平面/超结)

主板，控制板，消费电子产品

- Low-voltage N-ch / P-ch / dual power MOSFET PDFN5x6 / PDFN3x3 / SOT-23 / SOP-8 / TO-252
- Signal switching MOSFET (e.g. 2N7002...)

PD/QC充电器，电源，DC-直流转换

- U S G 系列分门沟槽，100V，PDFN封装 - 高效电源应用



◆ 应用:

» PD/QC 充电器和电源:

- 2nd-side 同步整流
- 随着USB PD应用发展, 需求不断增长.

» 主板, 所有应用的电源板:

- High-efficiency DC-DC conversion

» High-current (battery-powered) devices

Conventional Trench Split-gate Trench



- ✓ Low $R_{DS(ON)}$
- ✓ Fast switching
- ✓ Low-profile package



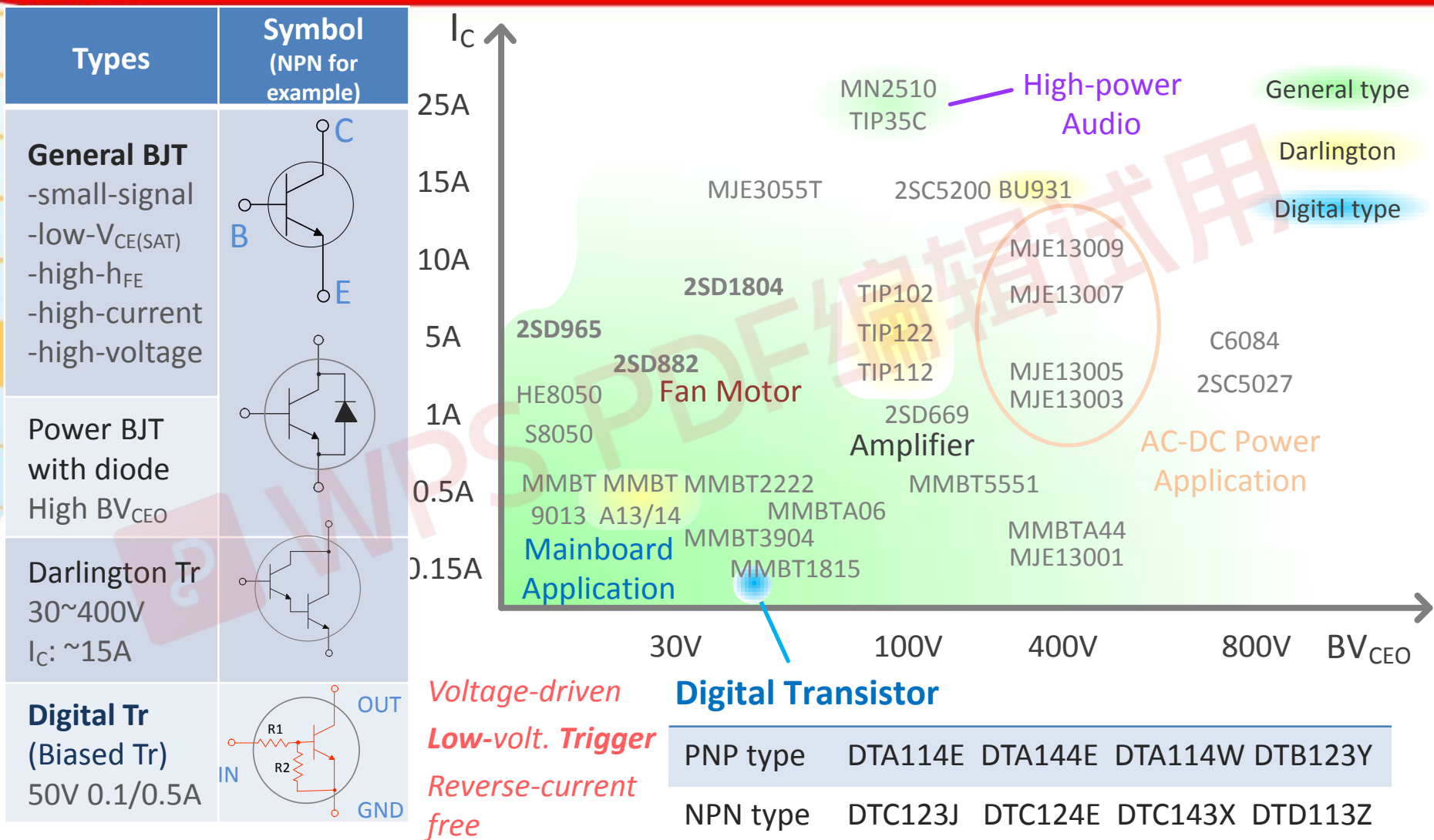
N-CH	V_{DSS}	I_D	$R_{DS(ON) MAX}$	Package
USG40N10	100V	40A	16.5 m Ω	PDFN5x6 PDFN3x3
USG60N10	100V	60A	10.5 m Ω	TO-252 SOP-8 PDFN5x6
USG80N10	100V	80A	8.0 m Ω	TO-220 TO-220F TO-220F1 TO-220F2 TO-252 PDFN5X6
USG135N10	100V	135A	5.0 m Ω	TO-220 TO-263 PDFN5X6 TO-252
USG170N10*	100V	170A	4.0 m Ω	TO-220 PDFN5X6
USG50N12*	120V	50A	16.0 m Ω	TO-220 PDFN5X6

- ◆ 组合 M O S F E T : Dual-N, Dual-P, N-ch+P-ch, Dual-N+Dual-P
- ◆ 信号 切 换 类 型 :
 - » Small package (e.g. SOT-23/SOT-323), low-current
 - » E.g. 2N7000/7002, 2N7002K/Z (with ESD protection), BSS123, BSS127, BSS139Z, BSS84Z
- ◆ 耗 尽 型 :
 - » Used in specific low standby-consumption design
 - » N-ch, normally ON, negative $V_{GS(TH)}$ to pinch off
 - » E.g. BSS169 (100V), UF600/UF601/UF601Q (600V)...

MOSFET 参照对比

Product Category	UTC Example	Competitor	Competitor PN
Super-junction MOSFET (500~950V)	xNM60 xNM65 xNM80 xNM90	Infineon ST Toshiba	STD7NM64N IPI90R500C3
Planar MOSFET (up to 1500V)	12P10 UF9640 4P50 UF3205 UF630 UF830 15N20 xN40 xN60 xN65 xN80 xN100	Vishay IR (Infineon) Fairchild (On-semi)	IRF9640 IRF3205 IRFP22N60K FQP10N80C
Low Voltage Trench MOSFET (10 ~ 200V)	UT4101 UT3419 UM6K1N UTT50N06	On-semi AoS Rohm Toshiba	NTR4101P AO3419
Signal Switching MOSFET	BSS84ZT BSS139Z 2N7002K BSS127	NXP Diodes Rohm	BSS84 2N7002K
Combo MOSFET (N-ch x 2, P-ch x2, N+P)	UD9926 QS8M11 UD4606 1NNPP10	Fairchild (On-semi) Rohm AoS Diodes	FDS9926A ZXMHC10A07N8

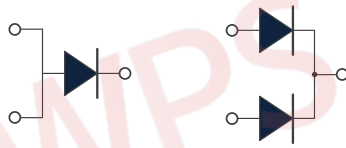
双极结型晶体管



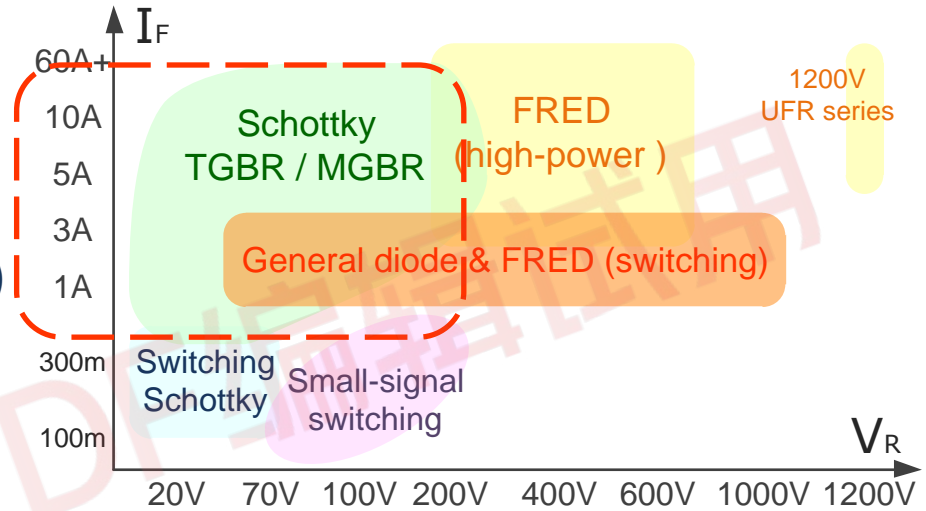
肖特基功率整流器

Low- V_F , widely seen in PSU, charger (40~200V, 5~20A) and mainboards (20~60V)

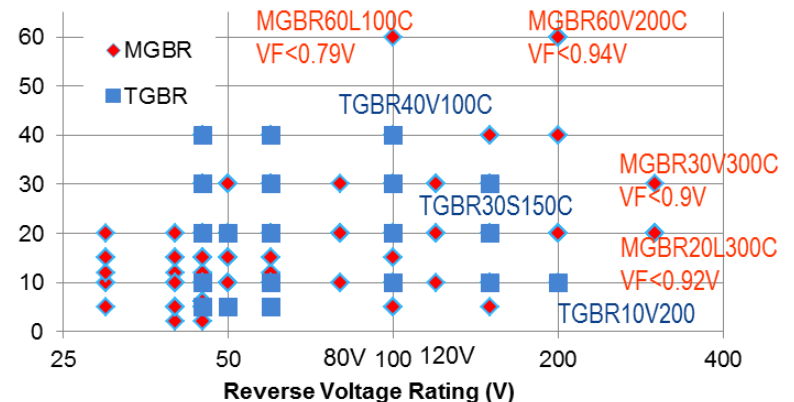
- ◆ MBR-series (150°C rated)
e.g. MBR10100 (100V 10A)
MBR10100C (100V 5Ax2)



- ◆ SB/SK/SR-series (125°C rated)
e.g. SB10100 (100V 10A)
special: SK24, SR24 (40V 2A)
- ◆ MGBR/TGBR/series
pricier but better rated (than MBR)



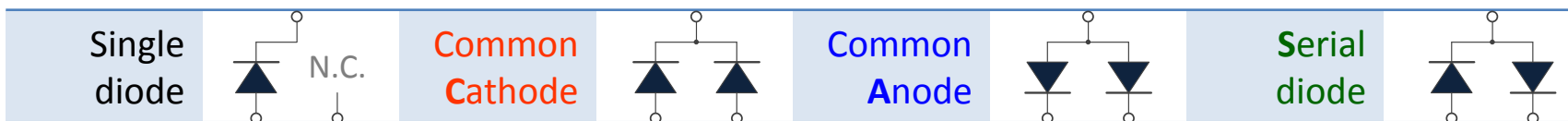
Current Rating (A) **UTC Low- V_F Schottky Portfolio**



信号开关二极管

V_R (V_{RM})	SOD-123	SOD-323	SOD-523	Special
200V (250V)	BAS21	BAS21		
150V (200V)	BAV20W	BAV20W		
100V	1N4148 MMBD4148	1N4148 MMBD4148	1N4148	1N4148 (MiniMelf)
80V (90V)		1SS355	1SS400	1SS133 DO-34
75V (85V)		BAS316	BAS316	

V_R (V_{RM})	SOT-23	SOT-323	SOT-523	SOT-363
200V (250V)	BAS21 BAV23C BAV23A BAV23S			
100V	1N4148 MMBD4148 MMBD4148CC MMBD4148CA MMBD4148SE	1N4148 MMBD4148	MMBD4148	
85V	BAV70 (V_{RM} 100V) BAV99	BAV99	BAV99	BAV99 (x2)
80V	1SS184 (V_{RM} 85V)			UMR11N (x2)
75V (100V)	BAW56 MMBD7000 MMBD6100 (70V)	BAV70W BAW56W	BAV70T	BAV70S (x2)
85V (low-leak.)	BAV199	BAV199W		



信号开关肖特基

$V_R = 70V$ Signal switching Schottky diode

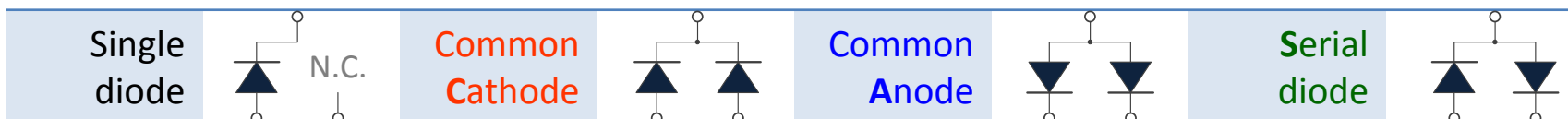
SOT-23	SOT-323
BAS70 BAS70C BAS70A BAS70S	BAS70W BAS70CW BAS70AW BAS70SW

$V_R = 40V$ Signal switching Schottky diode

SOT-23	SOD-123	SOD-323	SOD-523
BAS40 BAT64A BAT721A BAT721C	SD103AWS	SD103AW RB501-V40	SD103AWS RB520S40

$V_R = 30V$ Signal switching Schottky diode

SOT-23	SOT-323	SOT-523	SOT-363
BAT54 BAT54C BAT54A BAT54S	BAT54W BAT54CW BAT54AW BAT54SW	BAT54TB BAT54CTB BAT54ATB BAT54STB	BAT54DW BAT54CDW BAT54ADW BAT54SDW
SOD-123	SOD-323	SOD-523	Special
BAT42VS SD106WS	BAT54WS SD106WS RB751V40 ($V_{RM} 40V$)	BAT54TS RB520S30 RB521S30 RB751V40 ($V_{RM} 40V$)	BAS85 (MiniMelf) BAT54TDW (3-ch SOT-363)

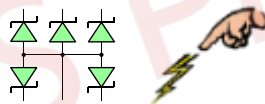


浪涌保护二极管



TVS Series	Power Rating (10/1000μs)	Package
P6KExxx	600W	DO-15
SMDJxxx	3000W	SMC
SMCJxxx	1500W	SMC
SMBJxxx	600W	SMB
SMAJxxx	400W	SMA

ESD 保护阵列



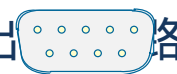
Part Number	power rating (8/20μs)	Package
SMA5V	50W	SOD-523
SOT05C	140W	SOT-23
UESDA6V1W5	150W	SOT-353
USMS05	350W	SOT-26
UZ5C056	150W	SOT-26

高速信号 ESD

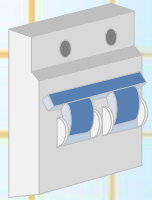


Application	Part Number
USB 2.0 Charger, USB OTG	USB4S012
Firewire , DVI and Ethernet	SRV05-4
DVI, Ethernet and USB2.0	UPRTR5V0U4D
DVI, Ethernet and USB2.0	PUSB220
HDMI LVDS SATA Ethernet	TVS4S009

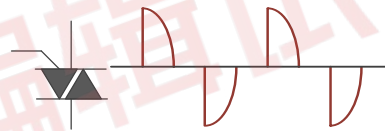
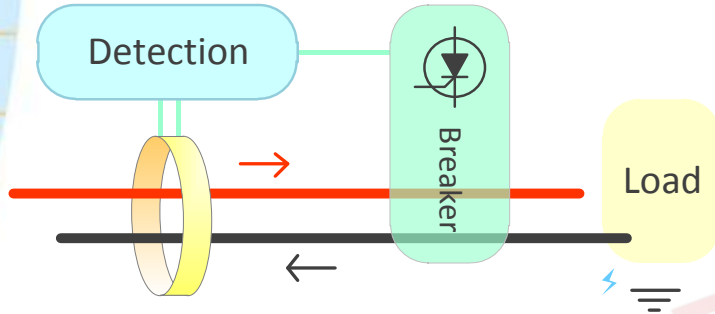
防静电输入输出



Application	Part Number	Protection
1284 Port	URCZ1284-xx	8 ESD+EMI array
VGA port	CCVGA7C5	RGB matching
	CCVGA7C9	RGB matching + DDC level-shift
	VGA7S019	RGB matching + DDC level-shift



AC Source



Power Control Dimming

SCR ($V_{DRM}=200V\sim 1000V$, $I_{T(RMS)}=0.47A\sim 20A$)

Part Number	V_{DRM}	$I_{T(RMS)}$	I_{GTMAX}	Package
CRO3AM-12	600	0.47	0.1	TO-92
X0202/A	600 800	1.25	0.2	SOT-223 TO-92
ML1225 / XL1225 PCR406	300 400	0.8	0.2	SOT-23 TO-92
MCR100	200~600	0.8	0.2	SOT-89 SOT-23 TO-92
US112	400~600	12	0.2~15	TO-251 TO-252 TO-220

TRIAC (3-Q/4-Q)

($V_{DRM}=400V\sim 900V$, $I_{T(RMS)}=0.6A\sim 40A$)

Part Number	V_{DRM}	$I_{T(RMS)}$	$I_{MAX,GT}$	Package
MAC97A	400~600	0.6	5	TO-92 SOT-223
UT131	500~800	1.0	3	TO-92 SOT-223
UT136	500~800	6.0	10~50	TO-220 TO-220F TO-252
BTA312 BTB312	600~800	12.0	5~50	TO-220 TO-220F
UCR316CM	600	16.0	20~30	TO-220 TO-220F

➤ 离散组件

Product Category	UTC Example	Competitor	Competitor PN
High Power BJT / Darlington	2SC5200 2SA1943 (230V 15A) 2SC4467 2SA1694 (120V 8A) UN2488 UP1620 (10A hFE 5k~30k)	ST Toshiba Sxxxxx	2SC5200 2SC4467 MN2488
Digital Transistor	DTA114E DTB123Y DTC143X DTD113Z	Rohm NXP	DTA114E
FRED Rectifier up to 1200V ultrafast / superfast	UFR75120 (1200V 75A super-fast) BYC20 ES1J FR107G UFR8060C	Fairchild NXP Diodes	RHRG75120 BYC20 ES1J
Schottky Diode / Low- V_F Rectifier	SR26 RB751V40 MBR20150C TGBR40U100C MGBR40V300C	Vishay Diodes	TMBS series SBR series
Surge Protection	P6KE SMDJxxxx SMAJxxxx	ST Littlefuse	P6KE SMDJ
ESD Protection (for I/O port)	TVS4S009 PUSB220 SRV05-4 UZ18C6V8 SOT05C USMS05	TI NXP On-semi	TPD4S009 BZA100
SCR (200~1000V)	BT151 US650 MCR100	NXP ST	BT151 TYN840
TRIAC (400~900V)	4Q: BTA12 UT136 3Q: BTA312A	NXP ST	BTA12 UT136

- ◆ DC 电源管理
- ◆ 主板 模拟 / 数字信号驱动
- ◆ 分立器件
- ◆ 电源集成
 - » PWM 控制器 IC
 - » 分立器件
 - » 2nd-side 控制和支持 IC

➤ 高效交流直流解决方案

- 谷值开关反激 p w m 控制器
- 一次侧调节 (PSR) 紧凑设计
- 场效应管集成

PSR, MOSFET integrated
Compact charger solution
Support cable-drop comp.

SSR, MOSFET integrated
Low stand-by consumption
Const. OLP for universal AC-in

UC3873: freq. programmable
UC3863: OTP programmable
UC3816 / UC3826 / UC3916 /
UC3879...: valley switching
UCL- series: lighting application

HV-start

UCSR3652S
650V 2.4Ω

HV-start

UCSR3654S
650V 1.6Ω

HV-start

UCS1655S
650V <1.3Ω

UC38xx

Fly-back controller series

Mobile phone Charger

12W

Adaptor / Stdby Power

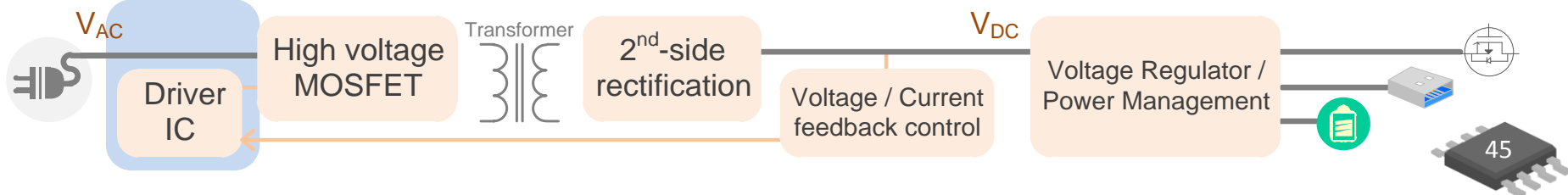
Tablet Charger / STB Adaptor

18W

36W

60W

(DoE Lv.6 compliant)



交流直流高压MOSFET

大多数AC-DC (电源 , AC-DC电源模块 , 适配器 , 充电器 , PFC , UPS...) 应用程序使用500V ~ 900V高压MOSFET

Planar MOSFET

- ✓ Cost Competitive
- ✓ EAS Robustness
- ✓ Broad Coverage

Super-junction MOSFET

- ✓ Low $R_{DS(ON)}$
- ✓ Fast Switching
- ✓ Small Package

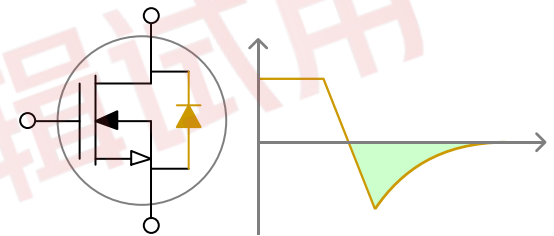
example

12N80-FC, 5N80-FCQ
10N70-ML, 10N70-MH
4N65-ML, 4N65-TC3

example

8NM80, 40NM80-Q
15NM70-U2, 7NM70
2NM65, 75NM65

肖体二极管trr增强功率 MOSFET



F4N60

F3N70

F2N60

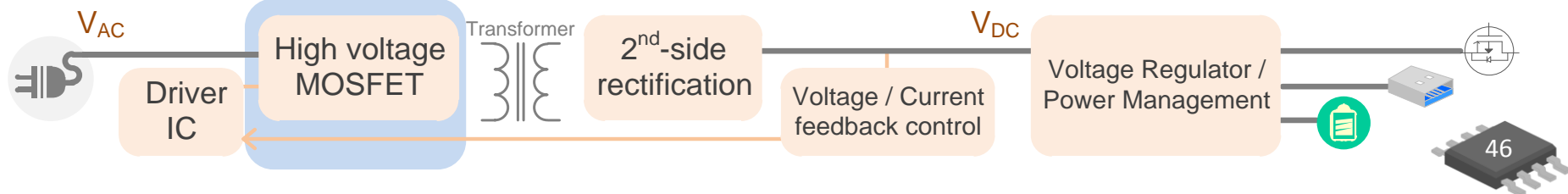
(Planar)

F30NM60

F21NM70

(Super-junction)

High-efficiency benefit for AC-DC circuit e.g. LLC resonant topology



肖特基整流器, MGBR, TGBR

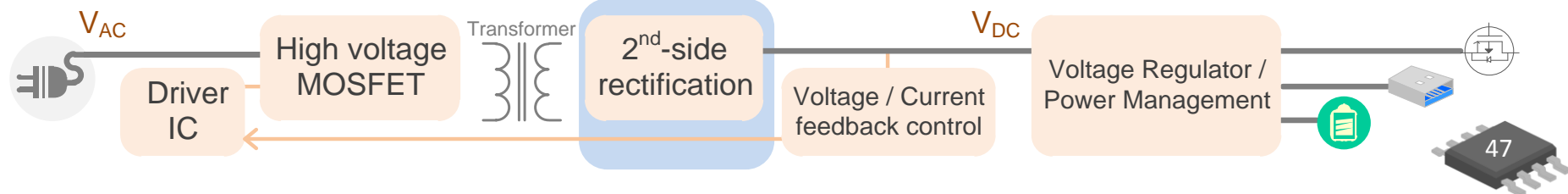
- High efficiency and slim design
- ✓ Low $R_{DS(ON)}$
- ✓ Fast switching
- ✓ Thin DFN package

N-CH	V_{DSS}	I_D	$R_{DS(ON) MAX}$	Package
USG40N10	100V	40A	16.5 m Ω	PDFN5x6 PDFN3x3
USG60N10	100V	60A	10.5 m Ω	TO-252 SOP-8 PDFN5x6
USG80N10	100V	80A	8.0 m Ω	TO-220 TO-220F TO-220F1 TO-220F2 TO-252 PDFN5X6
USG135N10	100V	135A	5.0 m Ω	TO-220 TO-263 PDFN5X6 TO-252

肖特基整流器, MGBR, TGBR

- Competitive Schottky diode SB / MBR series
- Planar / trench MOS-structured MGBR / TGBR
- ✓ Higher efficiency (low V_F & fast switching)
- ✓ Robustness against transient & temperature
- ✓ Balanced I_R and small package options

Part Number	VR	V_F Max	Package
MBR20100C	100V	0.85V	TO-220
TGBR20L100	100V	0.84V	DFN5060
MGBR20V100C	100V	0.75V	TO-252
TGBR20U100C	100V	0.67V	TO-220
MGBR40V300C	300V	0.99V	TO-220

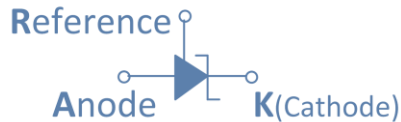


电压参考 IC

TL431: high precision **0.5%**

LL431, ULVH431: **low** $I_{K(MIN)}$ ($< 100\mu A$)

Options of **packages and pin-assignment**



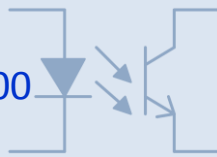
• Opto-isolation

UPC816 / UPC817 / UPC10XX

DIP-4 / SMD-4 / LSOP-4 packages

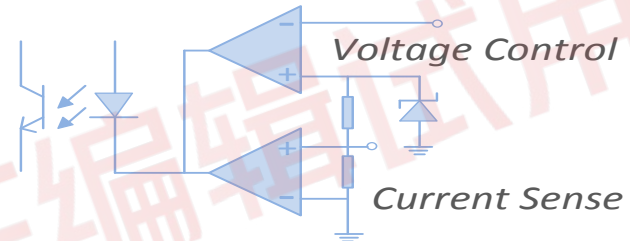
Transistor Output

UPC816 **CTR: 50~600**
 UPC817 **B:130~260 C:200~400**
 DIP-4 / SMD-4

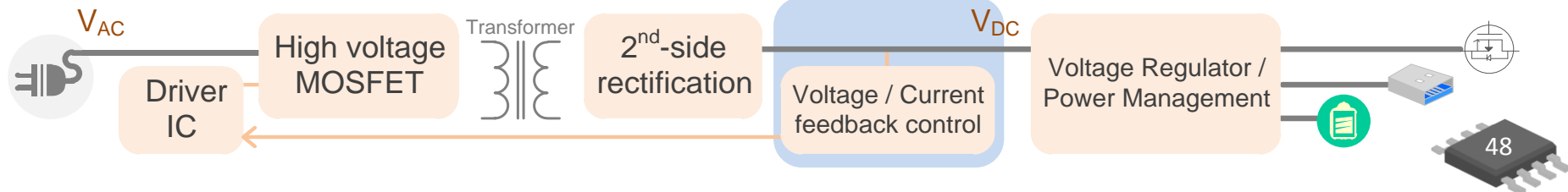


• 恒流 / 恒压 2nd-side control IC

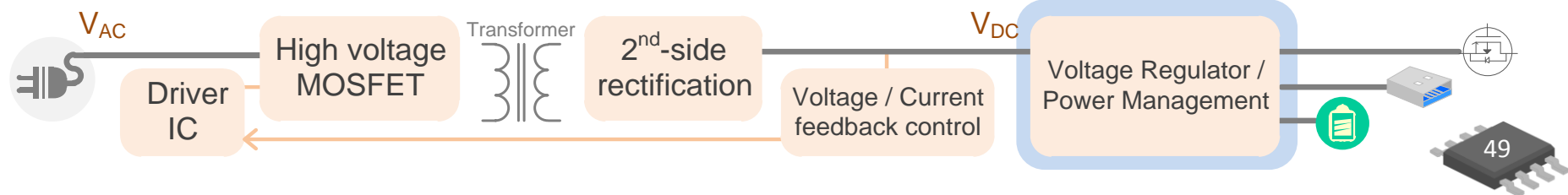
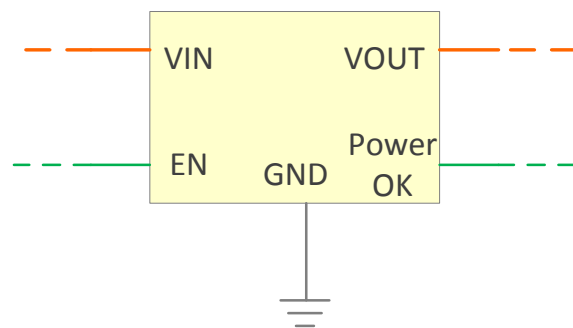
VREF+ op amp combo structure



Part No.	Configuration	V _{REF}
UM601A UM609	Vref x 1 OP x 2	1.24 V 2.5 V
UM602/A UM603/A	Vref x 1 OP x2+Comp x2	2.5V
UM604A	Vref x 1 OP x 4	2.5 V
UM605A/B UM606/D	Vref x 1 OP x 2	2.5 / 1.25
UM607B/D	Vref x 1 OP x 2	1.21 / 1.24
UM608	CC/CV for charger	2.5 V



- ◆ DC-DC 开关式稳压器
- ◆ 线性LDO调节器
 - » 传统线性稳压器和 LDO
 - » CMOS LDO 多功能和包装选择.
 - » 低静态 CMOS LDO
 - » 超低压差调节器
- ◆ 参考电压
- ◆ 电压检测和复位
- ◆ 电源开关



Power Supply / Charger / Lighting

- AC-DC PWM Controller
- MOSFET-int. PWM Switcher
- LED Lighting Driver IC
- TL431 Voltage Reference
- Photo-coupler
- Rectifier Schottky/MOSFET

DC Power Management

- Linear Regulator / LDO
- Switching DC Converter
- DDR Termination Regulator
- Power Switch IC
- Voltage Detection Reset
- Li-ion Battery Protection

Analog / Digital Interface Driver

- Op Amplifier / Audio IC
- Voltage Comparator
- 74-series Logic / 40-series
- Analog Sw / Mux / Demux
- RS-232/485 / Darlington Driver
- Hall IC / Motor Controller

Special Application

- Leakage Detection / GFI
- LNB Bias / Switch
- Automotive
- Melody / Sound Generator
- Telecom / Speaker IC
- Timer IC

Discrete Component

- Super-junction MOSFET (500~950V, Max 75A)
- Planar MOSFET (N-ch max 1500V, P-ch max 500V)
- Trench MOSFET (P-ch / N-ch / Combo)
- Transistor / JFET / IGBT
- TRIAC / SCR
- Diode / TVS