



UNISONIC TECHNOLOGIES CO., LTD.

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UTC Product Introduction



Integrated Device Manufacturer



Power & Analog Integrated Circuit
High-quality Semiconductor Device



Site	Capacity	
Taiwan x 2 China x 6	1. Circuit design 2. Pattern layout 3. Process development	Design
(XiaMen) Jaysun Semiconductor Manufacturing	6" CMOS/BiCMOS/DMOS 50k / month	Wafer
(FuZhou) Fushun, Heshun Microelectronics	8",6" CMOS/Bipolar/BiCMOS 100k / month	
(FuZhou) Fushun Semiconductor Manufacturing	Assembly / Final test 300M / month	Packaging
Taiwan, China, Korea, Japan, Germany, Turkey, USA		Sales

Vertical Integration



Product Tree

IC (Integrated Circuit)

PWM Controller

Lighting Driver

Photo-Coupler

Voltage Reference

DC Converter

Regulator / LDO

USB Power Switch

Reset / Volt. Detect

Comparator

74- Logic IC

Op Amplifier

Audio IC / Amplifier

RS-232/485 IC

Darlington Driver

Hall IC

Special IC

Discrete Component

FRED Diode

Bridge Rectifier

Schottky Rectifier

Super-junction
MOSFET

Low- V_F Rectifier

Planar MOSFET

Digital Transistor

Trench MOSFET

Power Transistor

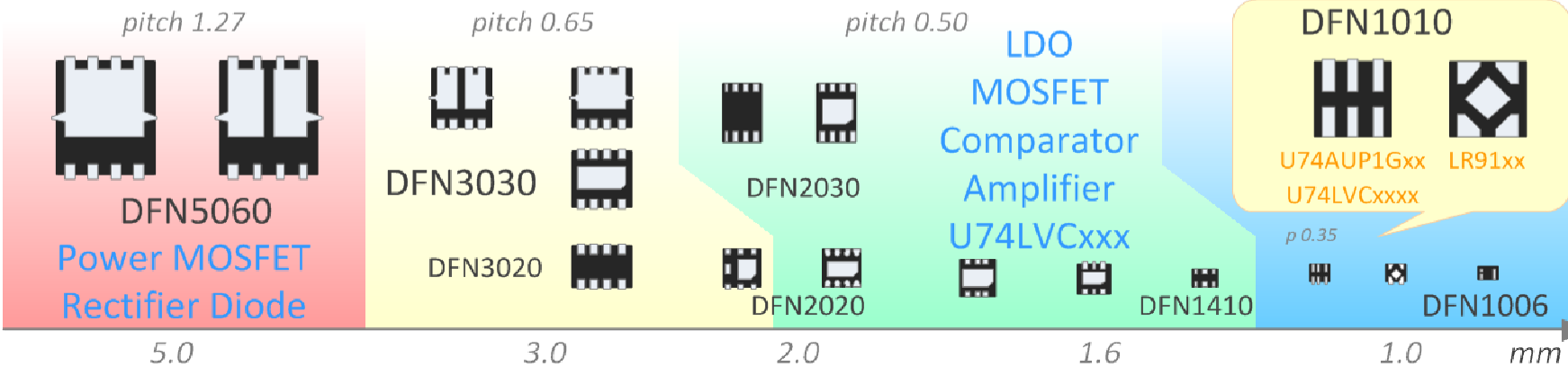
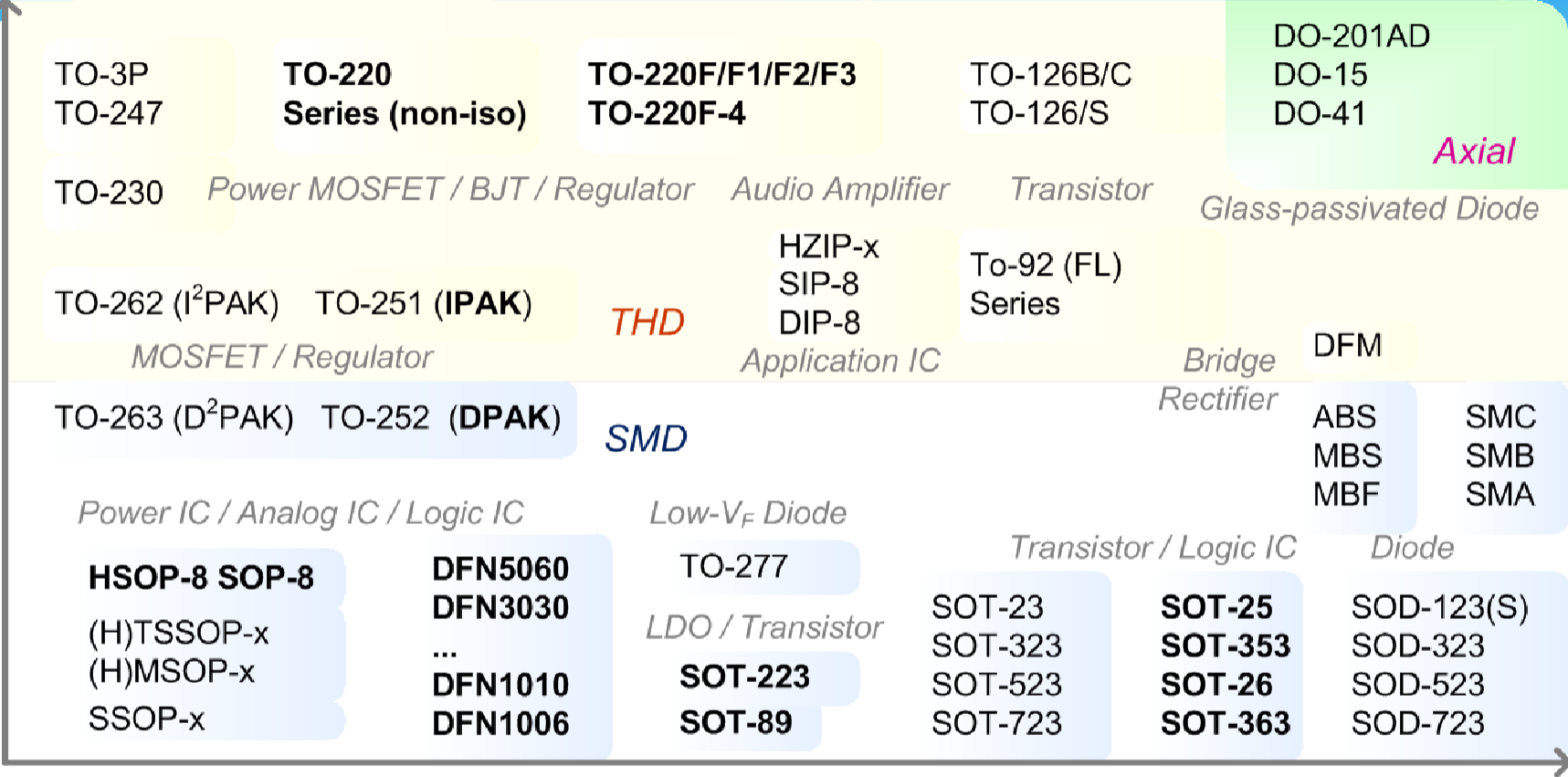
JFET

TRIAC

SCR

IGBT

TVS / ESD Array



Lighting Solution IC

- Lighting solution IC
 - AC-DC isolated PSR solution
 - AC-DC non-isolated solution (buck topology)
 - AC-DC linear solution
 - DC-DC lighting solution
- 2nd-side control IC
 - Photo-coupler UPC816 / UPC817
 - Shunt-voltage reference TL431 series
 - CC/CV control IC: TL431 + amplifiers
- Discrete Component
 - MOSFET
 - Diode
 - Thyristor (SCR/TRIAC)

UTC Lighting Solution

Topology	Application	Part Number	Feature
AC-DC Isolated PSR	60W Lighting	UPSL101 UCL5811	High PF, high Efficiency
AC-DC Non-isolated Buck	10~30W Indoor Lighting	UPSL304 USL3533 UL98, UL82 UL51 UL52	High-PF, Ind. ballast comp. Wide-range buck with built-in MOSFET High-PF, bulk-cap-free
AC-DC Linear Solution	<25W Indoor Lighting	UL66 UL68 UL67 UL69 UL23	Single string CC output Dimmer compatible Switching-controlled
DC Boost	20~70W DC Lighting Flashlight	L5107 ULC6001 L5030	6V~45V driving Battery-driven lighting
DC Buck	Flashlight	L3010 L3012	MOSFET built-in
Ripple Removing	Illumination	ULD5131	Adapt. 100/120Hz removing
Display Driver	Sign Board	UL316	LED control with keyscan

AC-DC Isolated Solution

Solution IC

Fly-back PWM Controller IC —Low-cost PSR
—MOSFET Built-in

Non-isolated Buck Low-cost AC-DC

Volt. Reference TL431

Photo-coupler UPC817 UPC816

DC Power manage. LDO, DC converter

Supporting IC USB port, DDR, reset IC

Discrete Component

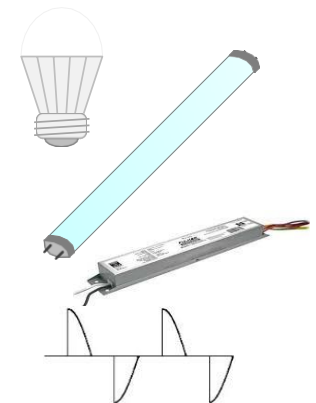
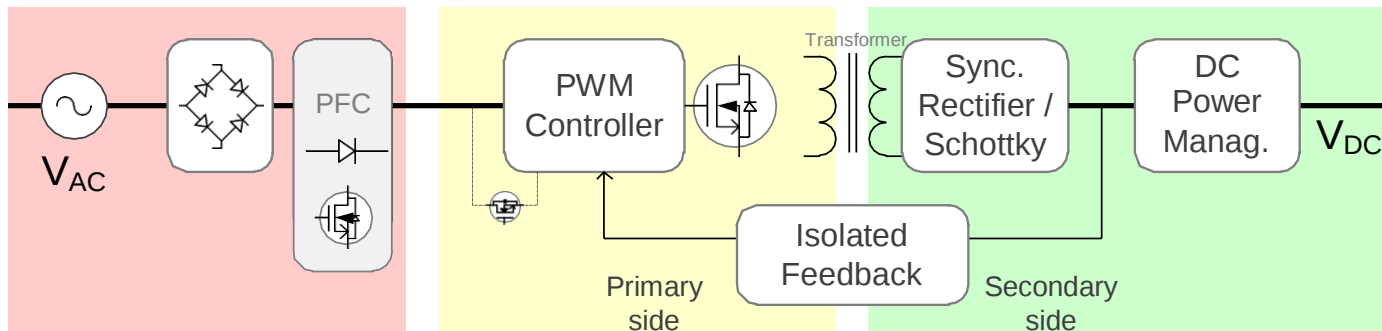
TVS P6KE/SMDJ... (up to 3kW)

High-V diode FRED 600V~1200V
Bridge rectifier

Enhance / Depl. MOSFET Super-Junc. 500V (for PFC)
600V~1000V (for AC-DC)

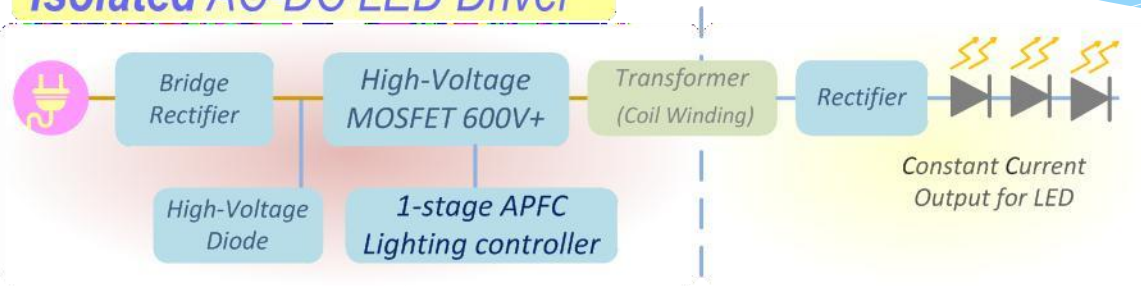
Rectifier diode MBR/MGBR/TGBR
40~200V, 300V

Sync. MOSFET 60V~100V <20mΩ



AC-DC Isolated Solution

Isolated AC-DC LED Driver

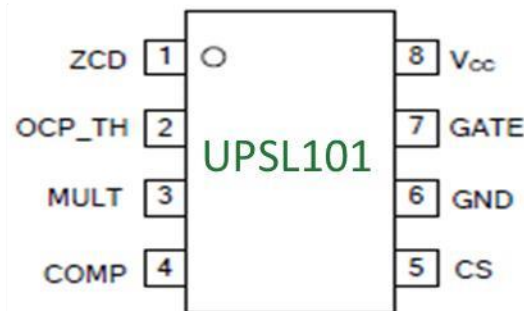


UPSL101

Isolated PSR fly-back

Single stage active PFC up to 50W

Input OVP, UVLO, load SCP, OCP, OTP, auto-recovery

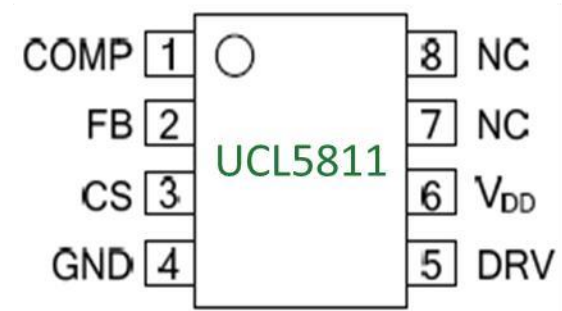


UCL5811

Isolated PSR fly-back

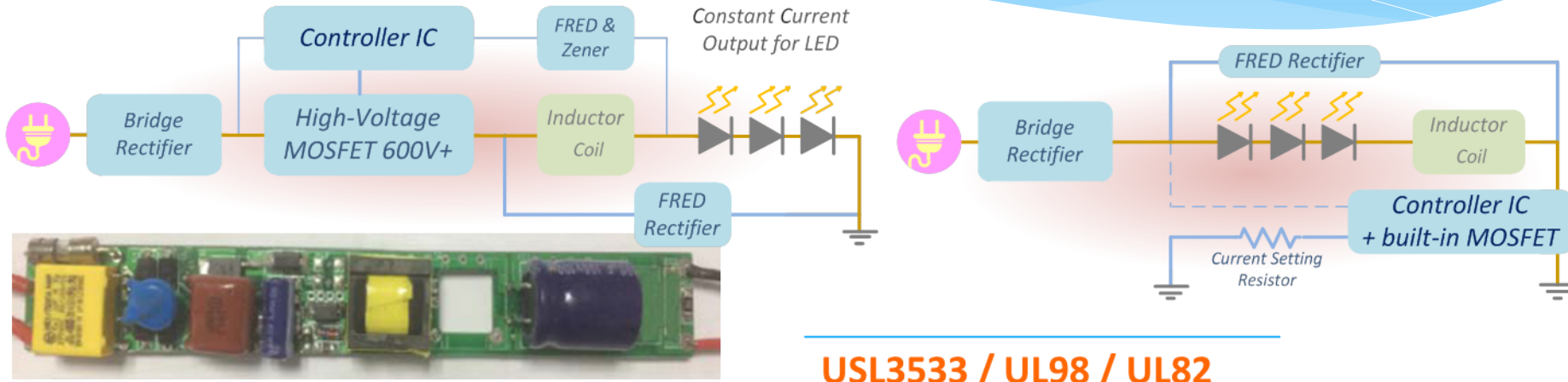
High PF with QR (quasi-resonant) mode

Input OVP, UVLO, load SCP, OCP, OTP, auto-recovery



AC-DC Non-isolated Solution

Non-isolated AC-DC LED Driver



USL304

Buck LED driver with PFC control

Input OVP, UVLO, load O/S, OLP, recovery

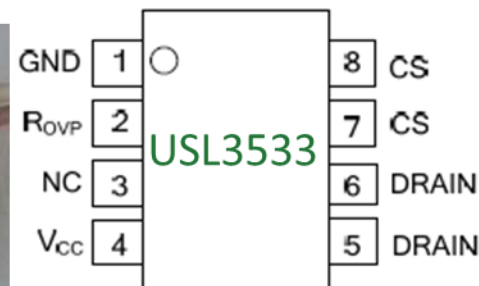
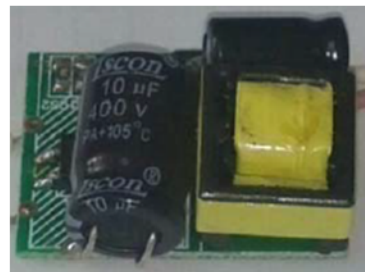
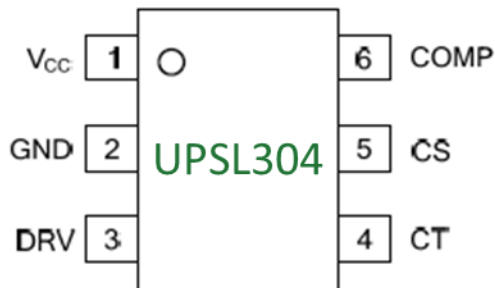
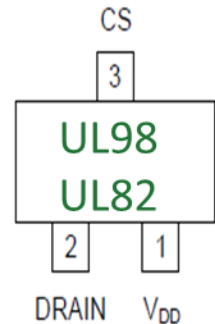
Inductance ballast compatible

USL3533 / UL98 / UL82

Low BoM-count with built-in MOSFET

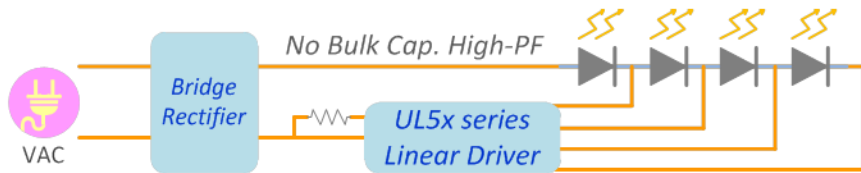
Critical-conduction mode

Wide input range



AC-DC Linear Solution

Linear AC-DC LED Driver



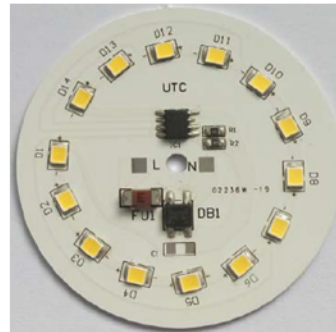
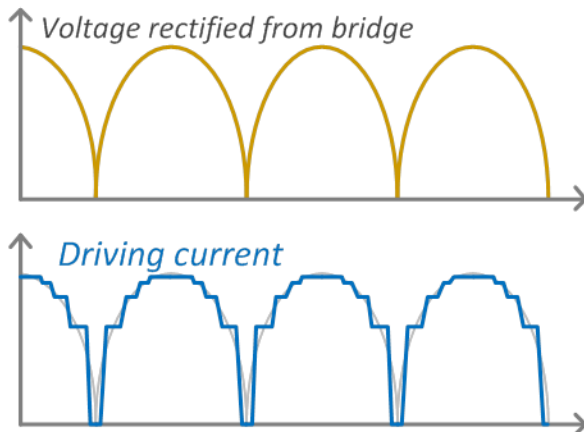
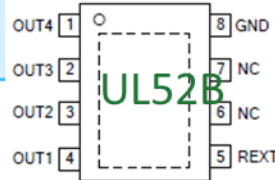
UL51x: 100 V_{AC}

UL52x: 230 V_{AC}

No-need for transformer and electrolytic cap.

Integrated current switch and start-up circuit

High PF, low EMI

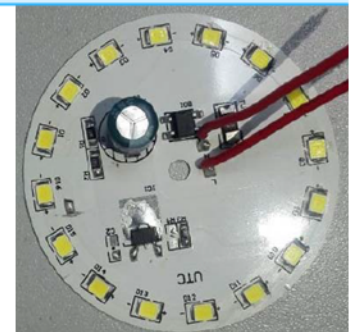


UL66x, UL68x:
Single-string linear driver

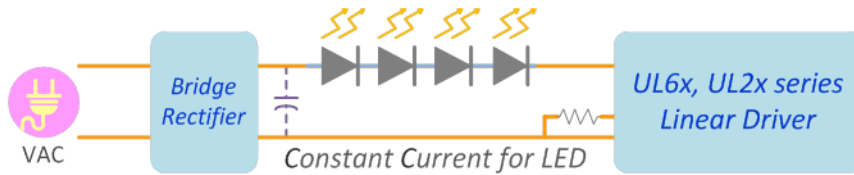
Extremely low BoM count

Constant current driving

Temperature compensation



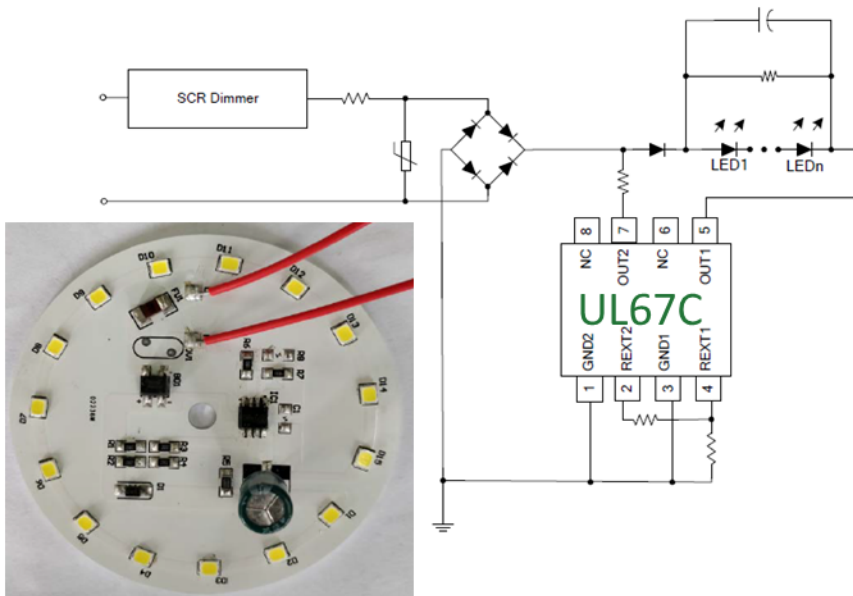
AC-DC Linear Solution



UL67x, UL69x: (Single-string linear driver)

Dimmer compatible

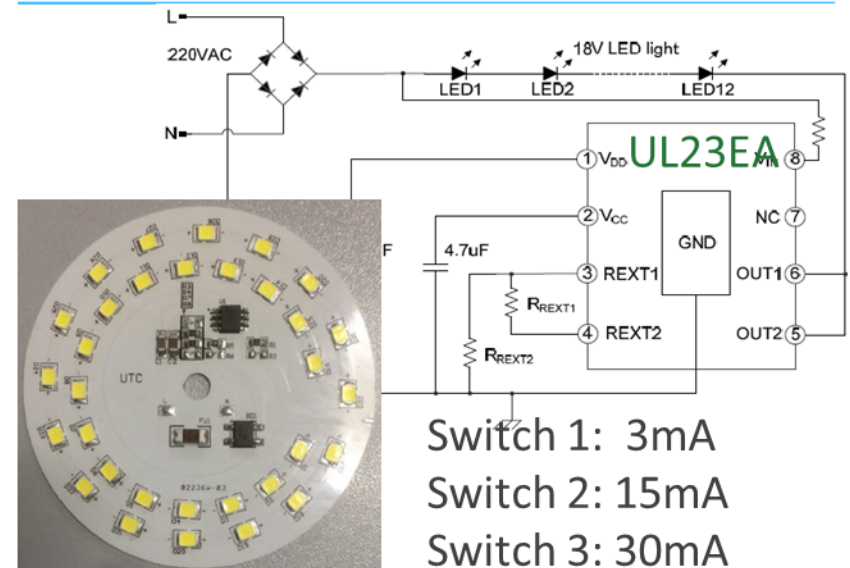
Parallel configuration available (UL69x)



UL23EA, UL23EB: (Single-string linear)

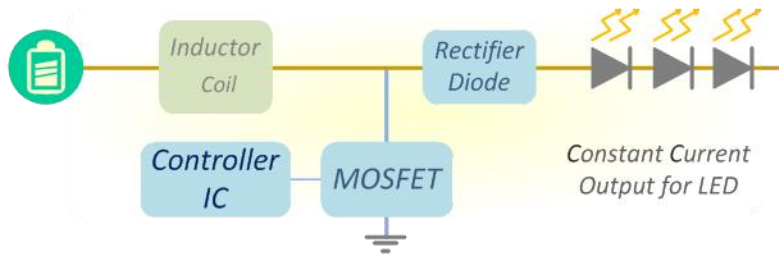
Switch-controlled brightness

Design options of
high-PF or non-stroboscopic



DC-DC Lighting Solution

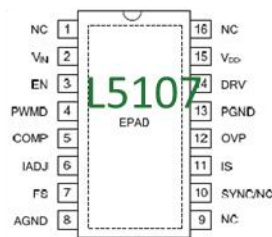
DC-DC Boost / Step-up



L5107

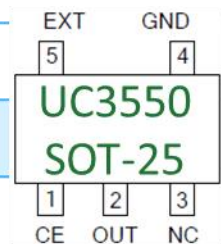
Boost controller of 6V~45V 70W

MR16, low-voltage industrial / emergency / indicator lighting

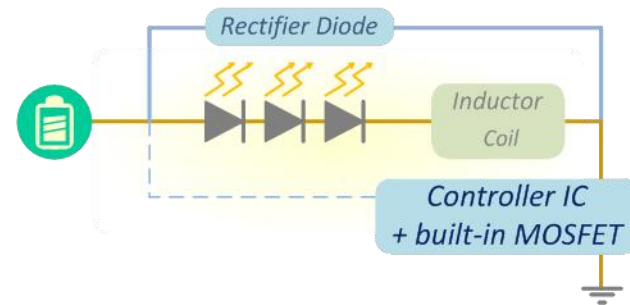


UC3550 / L5030

Battery-powered flashlight



DC-DC Buck / Step-down

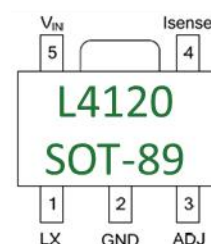


L3010 L3012 L4120

Buck converter of 18W (L3012 36V 1A)

Buck converter of 12W (L4120 40V 1.2A)

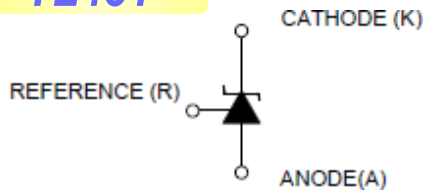
MR16, low-voltage lighting, flashlight



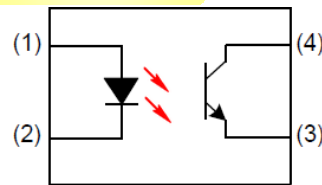
2nd-side Component for High Power Lighting

- * Photo-coupler (UPC816/UPC817)
- * Shunt Voltage Reference (TL431 series 0.8/1.25/2.495/2.5V)
- * CC/CV circuit (V_{REF} + op amp)

TL431



UPC817



CC / CV Control IC

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 x 2 Comp x 2	2.5V
UM604A	Vref x 1 OP x 4	2.5 V
UM605A/B UM606/D UM607B/D	Vref x 1 OP x 2	2.5 / 1.25 1.21 / 1.24
UM608	Vref x 1 OP x 2 for CC/CV Comp x 2 for Charge Status	2.5 V

TL431: high precision **0.5%**

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

Various options of packages and pin-assignment

Discrete Component

➤ **Transistor**

➤ **MOSFET**

- Trench MOSFET (~200V)
- Planar MOSFET (~1200V)
- Super-junction MOSFET (500~950V, 0.2~75A)

➤ IGBT (600V/1200V)

➤ JFET

➤ Bipolar junction transistor

➤ Darlington transistor

➤ Digital transistor

➤ **Diode**

➤ FRED (~1200V, ~80A)

➤ Schottky diode (~200V, ~40A)

➤ MGBR/TGBR (Low- V_F , ~300V, ~60A)

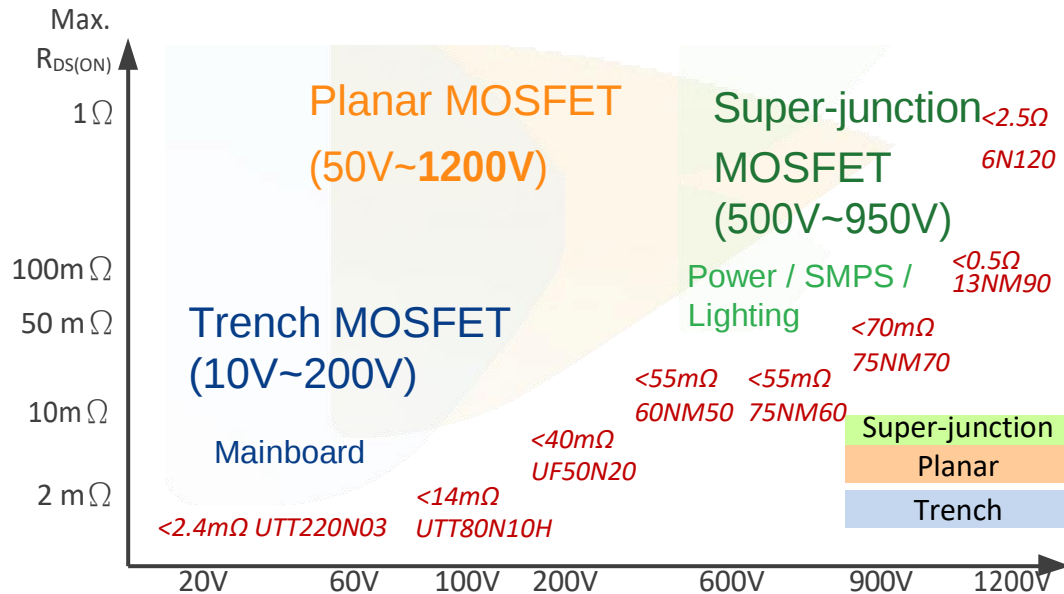
➤ TVS diode / array

➤ **Thyristor**

➤ SCR (200~800V, ~20A)

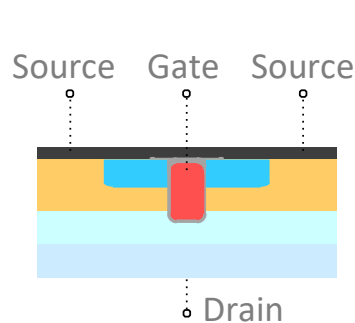
➤ TRIAC (400~800V, ~40A)

UTC Power MOSFET

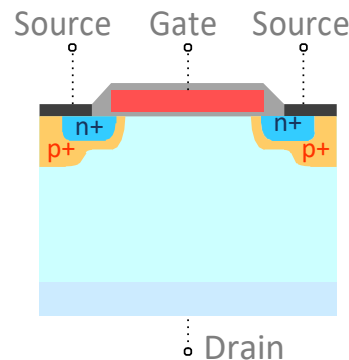


Application

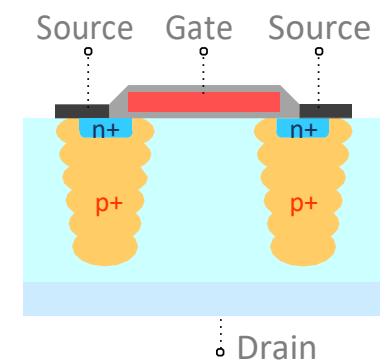
- Low-voltage Trench MOSFET
 - Mainboard application
- 100~400V Planar MOSFET
 - Motor / Industrial application
- High-voltage Super-junction / Planar MOSFET
 - AC-DC power / lighting
 - Up to **1200V**
 - Low $R_{DS(ON)} < 55\text{m}\Omega$ (**75A**) at 600V



Trench MOSFET
(Low R_{ch})

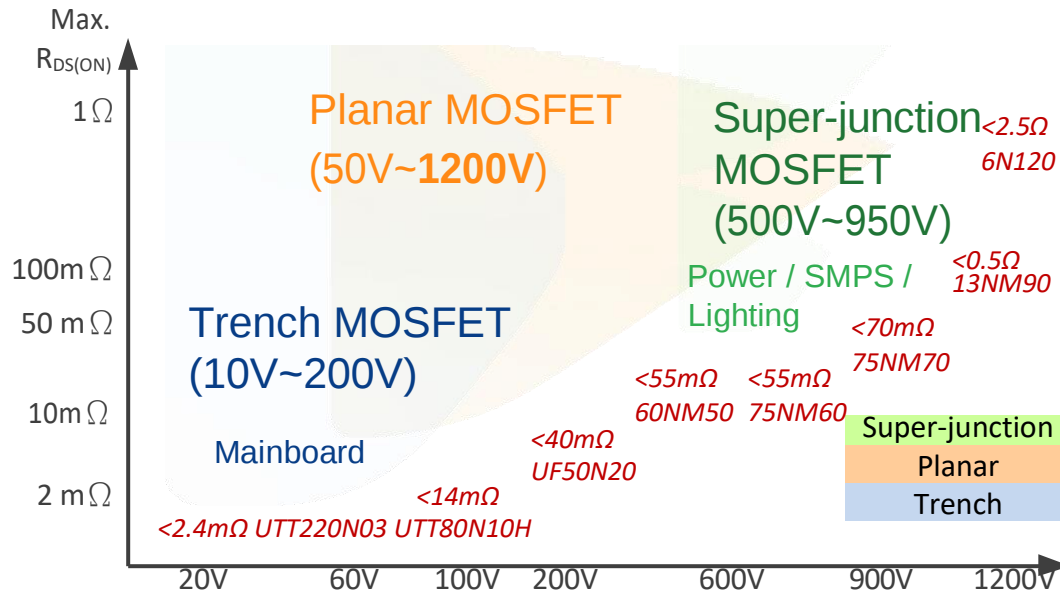


Planar MOSFET
(up to 1000V, high EAS)

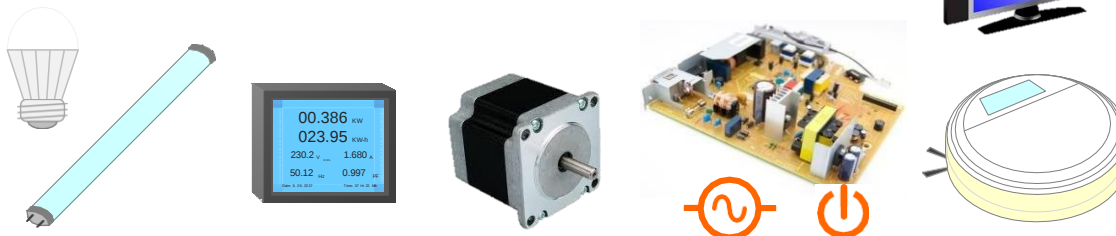


Super-junction MOSFET
(Low R_{epi})

UTC Planar MOSFET



Broad Product Coverage, Wide Application

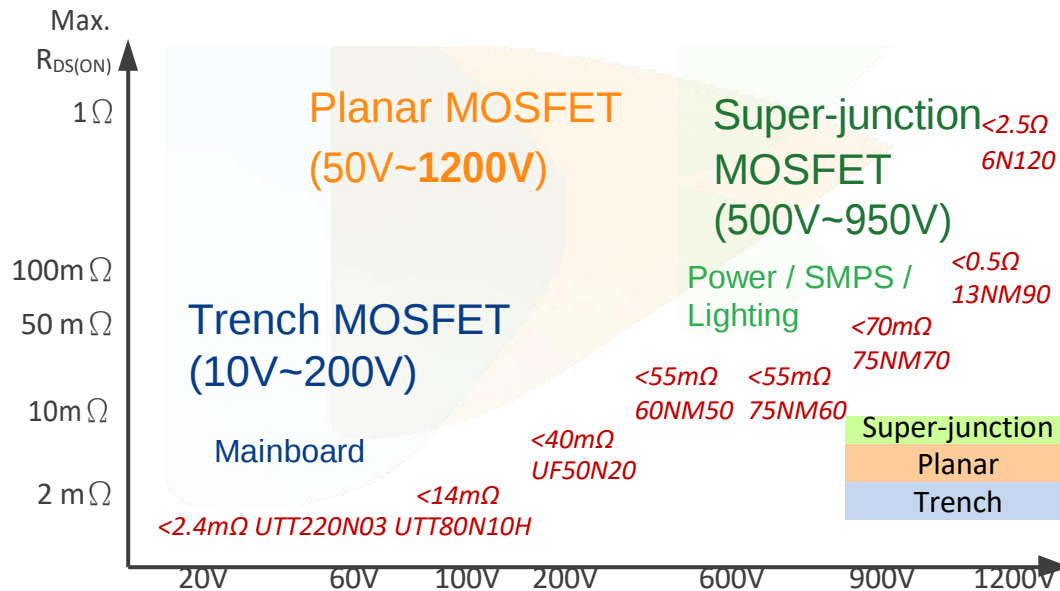


Planar Power MOSFET

V_{DS} : up to 1200 V I_D : up to 110 A

Part No.	Type	V_{DS}	$I_D (=X)$
UF5305	P-ch	-55V	-31A
UF5210	P-ch	-100V	-40A
UF9640	P-ch	-200V	-11A
7P30	P-ch	-300V	-6A
4P50	P-ch	-500V	-4A
UF3205	N-ch	55V	110A
UF8010	N-ch	100V	80A
UF50N20	N-ch	200V	50A
12N30	N-ch	300V	12A
XN40	N-ch	400V	up to 25A
XN50	N-ch	500V	up to 26A
XN60	N-ch	600V	up to 22A
XN70	N-ch	700V	up to 25A
XN80	N-ch	800V	up to 12A
XN90	N-ch	900V	up to 12A
XN100	N-ch	1000V	up to 9A
XN100	N-ch	1200V	up to 6A

Super-junction MOSFET

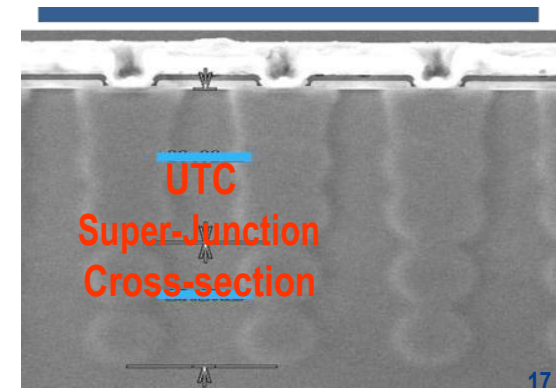


*High efficiency with low $R_{DS(ON)}$,
low Q_G & fast switching*

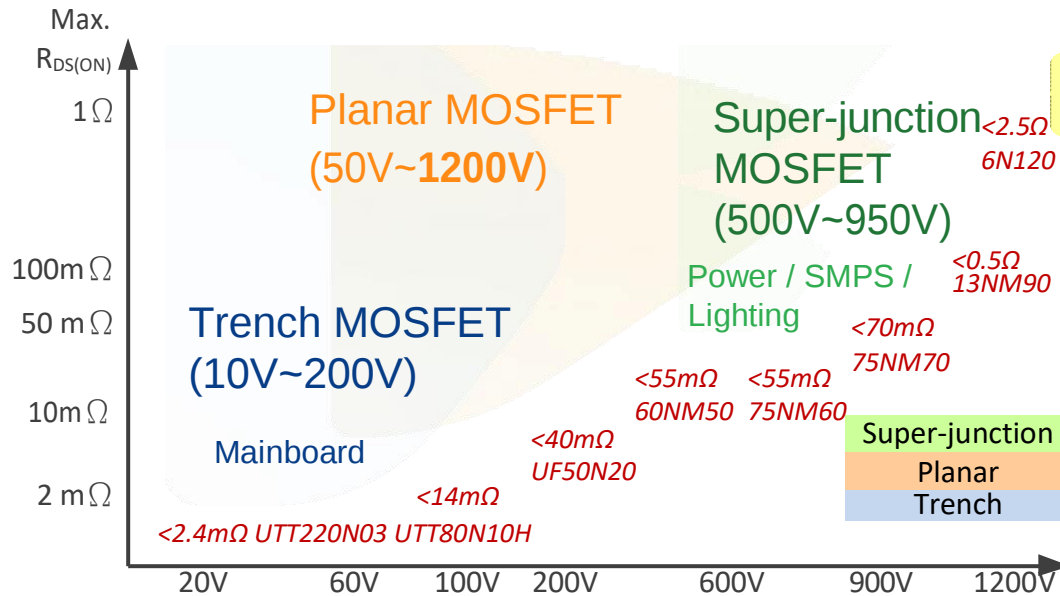
Comparison	7N65	7NM65
RDS (ON) max.	1.2 Ω	0.9 Ω
Gate Charge	29 nC	21 nC
Die size	100%	35%

Part No.	V_{DSS}	$I_D (=X)$	$R_{DS(ON), MAX}$
XNM50	500V	0.4A~60A	55m Ω
XNM60	600V	0.2A~75A	55m Ω
XNM65	650V	0.2A~60A	65m Ω
XNM70	700V	0.2A~75A	70m Ω
XNM80	800V	2A~13A	0.35 Ω
XNM90	900V	2A~13A	0.50 Ω
XNM95	950V	6A~9A	1.20 Ω

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

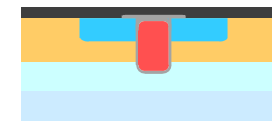


Low-voltage MOSFET



Develop and Improve

Channel resistance reduction

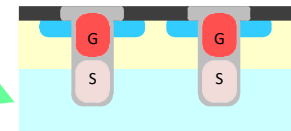


Trench MOSFET

Gate-charge minimized



Planar MOSFET



Split-gate Trench

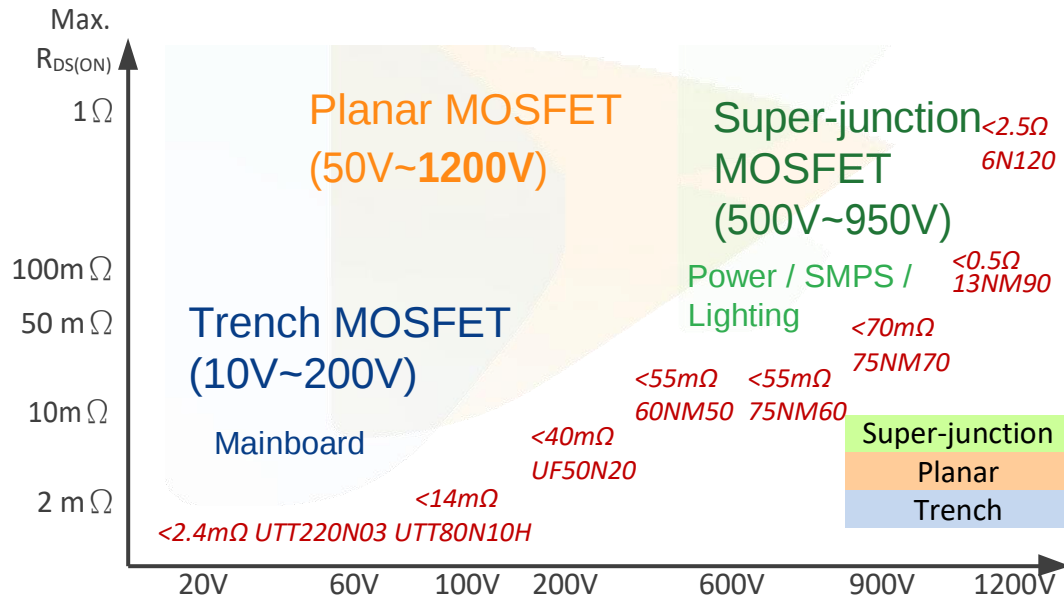
Package miniaturization

Part Number	V_{DSS} (V)	I_D (A)	$R_{DS(ON)}$ (m Ω)		Package
			TYP.	MAX.	
UTT130N06M	60	80	-	5.9	DFN5060
UTT60N10M	100	60	15	16	DFN5060
USG80N10*	100	86	6.4	7.7	DFN5060

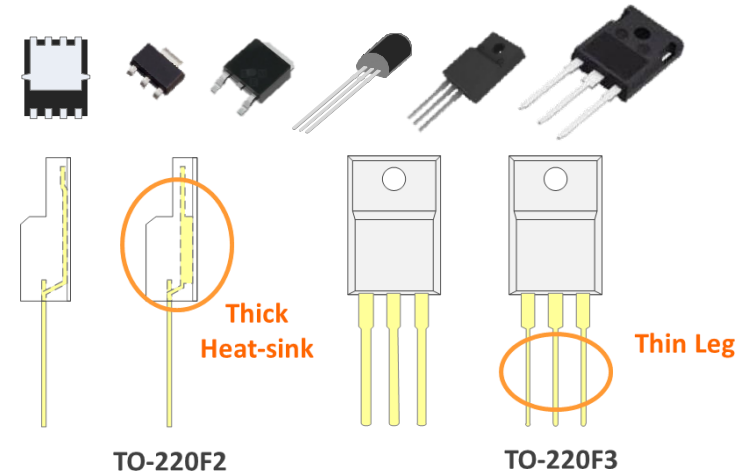
Combo solutions available

Config.	V_{DSS}	Package
N-ch x2	20V ~ 600V	SOT-26 SOT-363 TSSOP SOP DIP DFN3030 DFN5060
P-ch x2	-20V ~ -50V	SOT-363 SOP-8
N-ch + P-ch	$\pm 20V \sim \pm 100V$	SOT-26 TO-252-4 SOP-8 DIP-8 DFN3030 DFN5060
Nx2 + Px2	$\pm 30V \sim \pm 100V$	SOP-8

MOSFET Variants



Various Package Options



MOSFET with Fast Recovery Diode

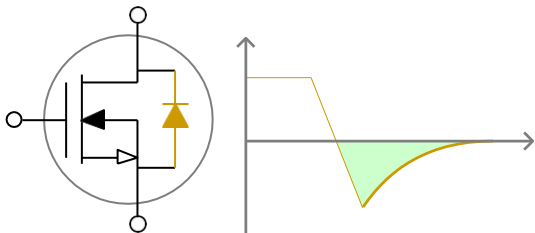
Planar / Super-junction

Part No.	V_{DSS}	I_D
2N65-F	650V	2A
75NM60-F	600V	75A
60NM65-F	650V	60A
11NM70-	700V	11A

Signal Switching MOSFET

Part No.	V_{DSS}	$V_{GS(TH)}$
UT3P01Z	-30V	-0.4~-1.4V
BSS84ZT	-50V	-0.8~-2V
BSS139Z	50V	0.5~1.5V
2N7002K	60V	1~2.5V
BSS123	100V	1.6~2.6V
BSS127	600V	1.4~2.6V
(Depletion Type)		
UF601Q	600V	-1.4~-2.7V

Innovation & investment



Cross-Reference

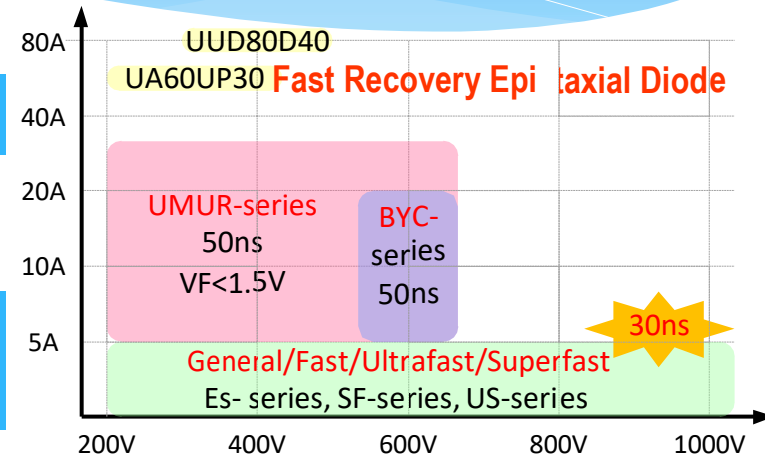
➤ MOSFET

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 1200V)	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

Rectifier Diode

➤ Rectifier

Category	Spec. Coverage
Bridge Rectifier	1000V, DFM, ABS, MBS, MBF package
FRED rectifier	1200V (UHRP15120), 80A (UUD80D40) Ultrafast / Superfast grade available
Low- V_F Schottky rectifier	Schottky (SB / MBR series): 200V, 40A MGBR / TGBR: 300V, 60A



➤ High-efficiency Schottky

	Schottky SB / MBR	MGBR	TGBR
V_F	Low	Very Low	Very Low
I_{RM}	High	Low	Low
V_{RM}	Medium (~200V)	High (~300V)	Medium (~200V)
T_j	Low	Very High (~ 200°C)	High (~ 175°C)

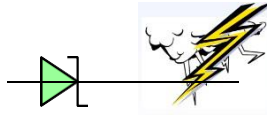
Diodes SBR Vishay TMBS

P2P cross-reference example

UTC PN.	Competitors
ES1J	ES1J (Diodes)
BYC20	BYC20 (NXP)
BAV99	BAV99 (Diodes)
MBR20100C	MBR20100C (Vishay)

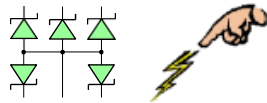
TVS Diode & Array

➤ Surge Protection Diode



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

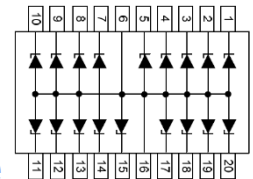
➤ ESD Protection Array



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

➤ High-speed-signal ESD Protection

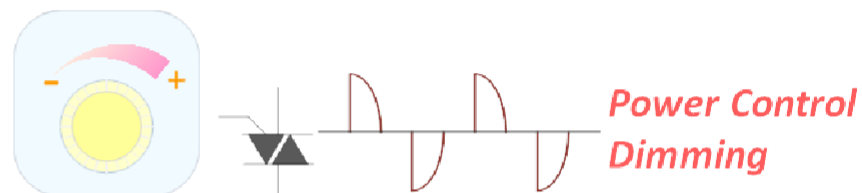
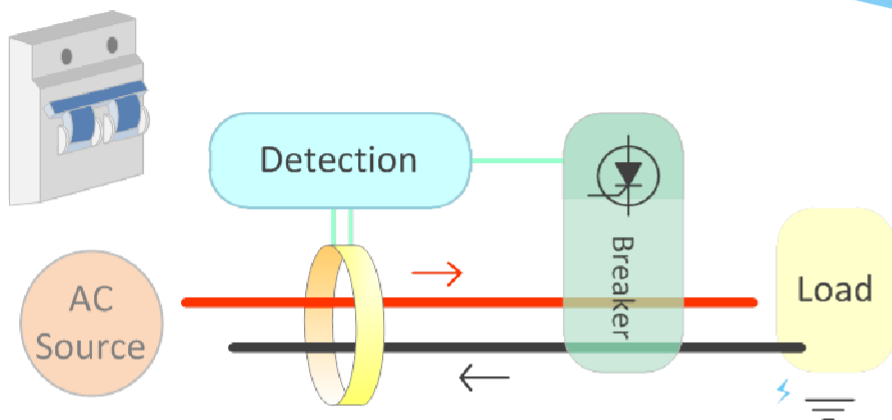
Application	Part Number
USB 2.0 Charger, USB OTG	USB4S012
Firewire , DVI and Ethernet	SRV05-4
DVI, Ethernet and USB2.0	UPRTR5V0U4D
DVI, Ethernet and USB2.0	PUSB220
HDMI LVDS SATA Ethernet	TVS4S009
1284 port for printer	URCZ1284-xx



P2P cross-reference example

UTC PN.	Competitors
UZ18C6V8 18-common-cathode TVS array	BZA100 (NXP)

Thyristor



SCR ($V_{\text{DRM}}=200\text{V}\sim 800\text{V}$, $I_{\text{T(RMS)}}=0.47\text{A}\sim 12\text{A}$)

Part Number	V_{DRM}	$I_{\text{T(RMS)}}$	I_{GTMAX}	Package
CR03AM-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)

($V_{\text{DRM}}=400\text{V}\sim 800\text{V}$, $I_{\text{T(RMS)}}=0.6\text{A}\sim 16\text{A}$)

Part Number	V_{DRM}	$I_{\text{T(RMS)}}$	$I_{\text{MAX,GT}}$	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

Cross-Reference

➤ Discrete Components

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 Sxxxxxx	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 (400~800V)	4Q: BTA12 UT136 3Q: BTA312A	NXP ST	BTA12 UT136

THANK YOU

IC (Integrated Circuit)

PWM Controller	Lighting Driver
Photo-Coupler	Voltage Reference
DC Converter	Regulator / LDO
USB Power Switch	Reset / Volt. Detect
Comparator	74- Logic IC
Op Amplifier	Audio IC / Amplifier
RS-232/485 IC	Darlington Driver
Hall IC	Special IC

Discrete Component

FRED Diode	Bridge Rectifier
Schottky Rectifier	Super-junction MOSFET
Low- V_F Rectifier	Planar MOSFET
Digital Transistor	Trench MOSFET
Power Transistor	JFET
TRIAC	SCR
IGBT	TVS / ESD Array