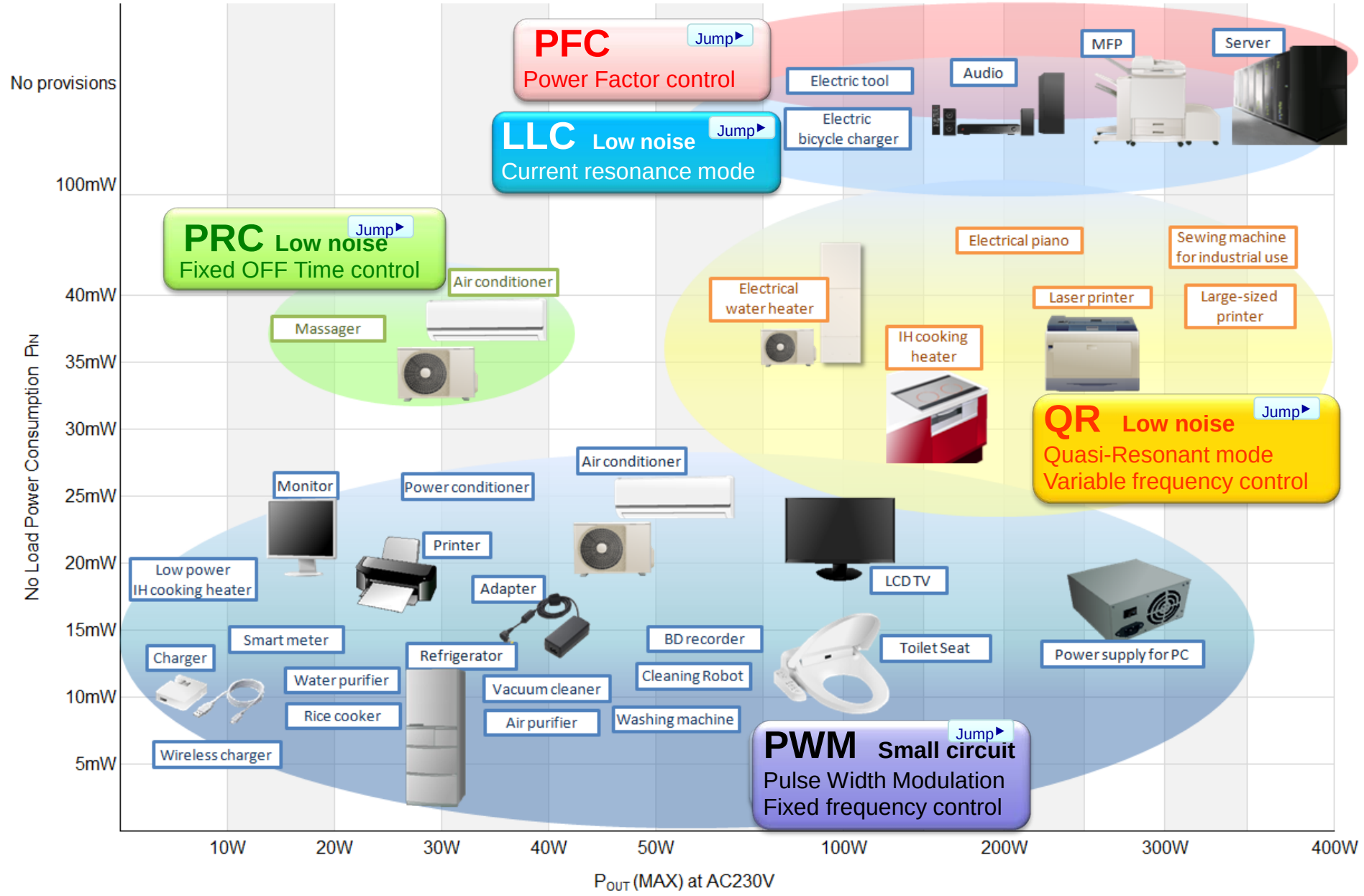
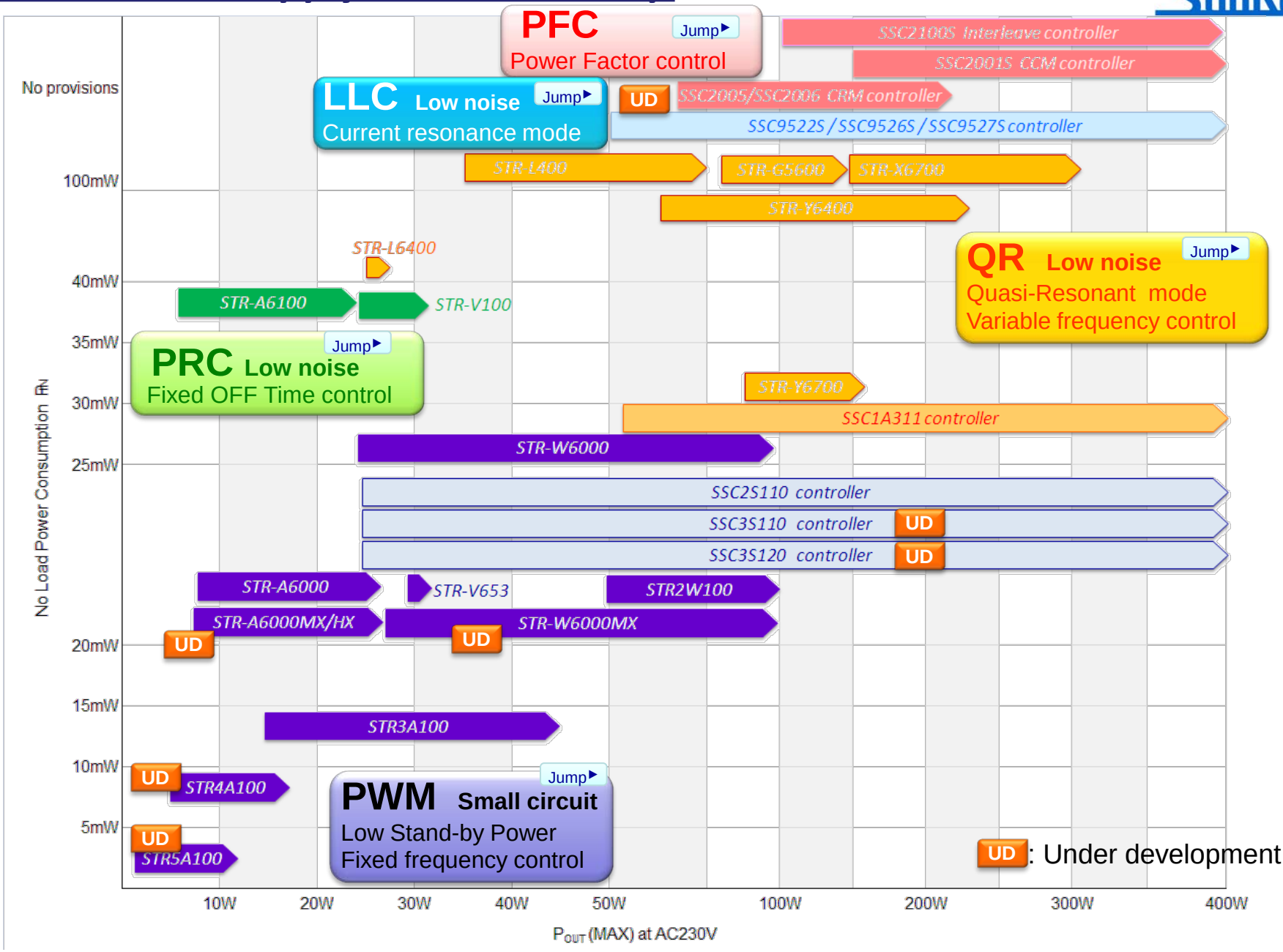
AC/DC control IC and PFC IC Selection Guide

SANKEN ELECTRIC CO.,LTD
POWER CONVERSION DEVICE DIVISION
ENGINEERING HEADQUARTERS

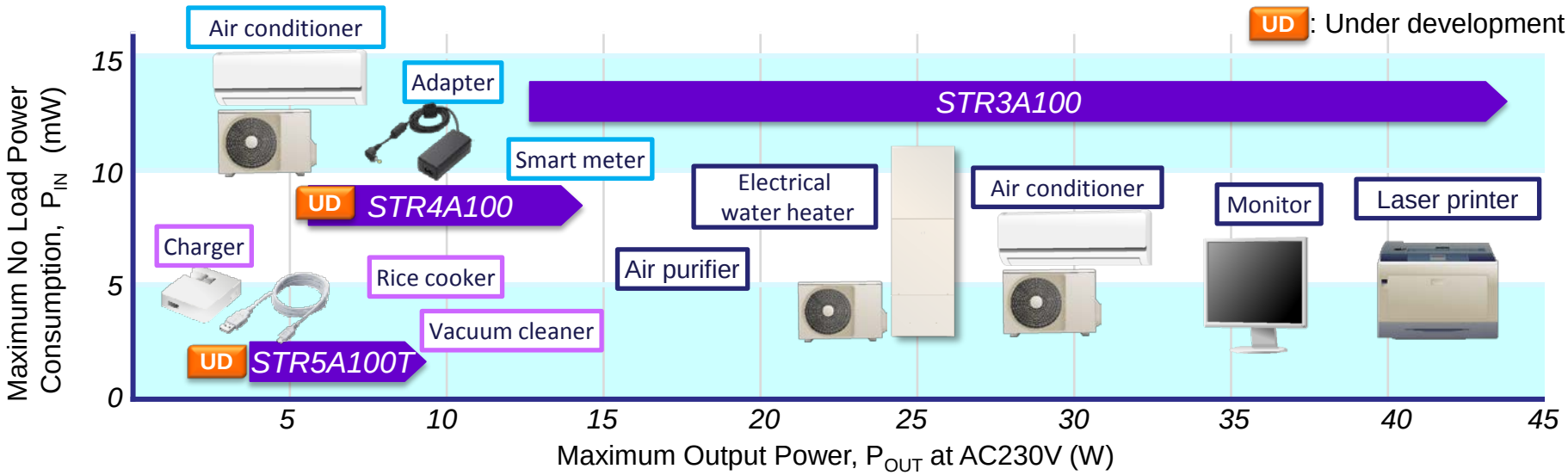
Application



Sanken Power Supply IC Series Lineup

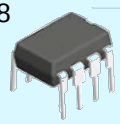


Low Standby Power IC New Lineup

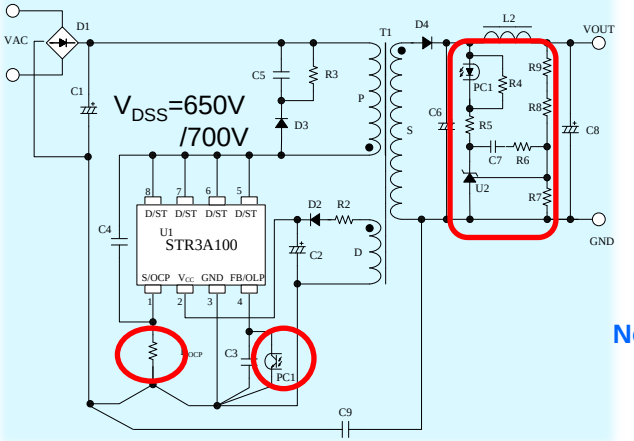


STR3A100

DIP8



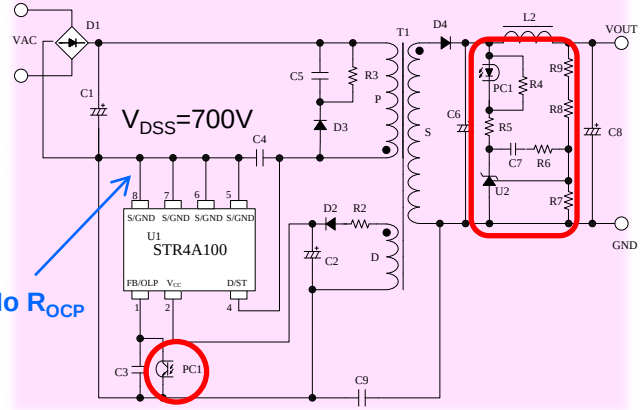
- P_{IN} < 15mW
- High heat release design



STR4A100

UD DIP8 SOIC

- P_{IN} < 10mW
- Sense MOSFET(One Chip)

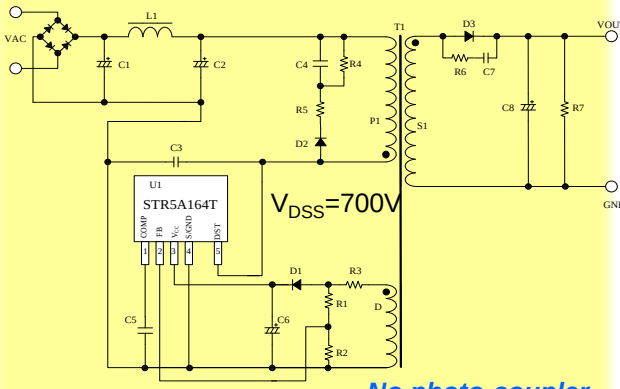


STR5A100T

UD Preliminary

TO-251(low profile)

- P_{IN} < zero (< 5mW)
- Primary Side Sensing
- Sense MOSFET(One Chip)



No photo-coupler

AC/DC PWM control IC

Back to ALL lineup

- For Low Standby Power and Small Circuit Application
- PWM is the Pulse Width Modulation, Fixed Frequency Control

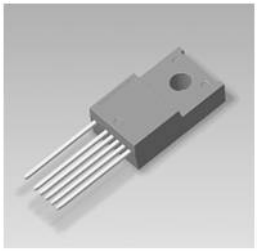
UD: Under development

	Series	Package	No Load Power Consumption (P_{IN})	Feature	Link
Hybrid IC	STR-W6000	TO-220F-6L	＜30mW	Brown in/out	Jump▸
	STR-A6000	DIP8	＜25mW	Brown in/out	Jump▸
	STR-V653	SIP8L		Brown in/out	Jump▸
	STR-W6000MX UD	TO-220F-6L		Brown in/out, HVP	—
	STR-W6000MV UD	TO-220F-6L		Selectable Standby Operation Point	—
	STR-A6000MX/HX UD	DIP8		Brown in/out, HVP	—
	STR2W100D	TO-220F-6L			Jump▸
	STR3A100	DIP8	＜10mW~15mW	High heat release package	Jump▸
	STR4A100 UD	DIP8/SOIC8	＜10mW	1chip solution	—
	STR5A100 UD	DIP8/SOIC8	Zero(＜5mW)	1chip solution Primary detection	—
Controller	SSC2S110	SOIC8	＜25mW		Jump▸
	SSC3S110 UD	SOIC8		Selectable Standby Operation Point	—
	SSC3S120 UD	SOIC8		Brown in/out, HVP	—

STR-W6000 Series

Back to PWM lineup

TO-220F-6L



- No Load Power Consumption (P_{IN}) < 30mW
- Protection Functions（OCP/OVP/OLP/TSD）
- Built-in Brown in/Brown out Function

Lineup

Part Number	f_{OSC}	MOSFET		Pout		Protective Function			
		V_{DSS}	$R_{DS(ON)}$	AC230V	Universal	OCP	OVP	OLP	TSD
STR-W6051S	67 kHz	650V	3.95Ω	24W	30W	Pulse by pulse	Auto Restart	Auto Restart	Auto Restart
STR-W6052S			2.8Ω	60W	40W				
STR-W6053S			1.9Ω	90W	60W				

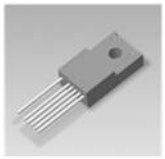
P_{IN} < 30 mW at no load, PWM Off-Line Switching Regulators

STR-W6000 Series

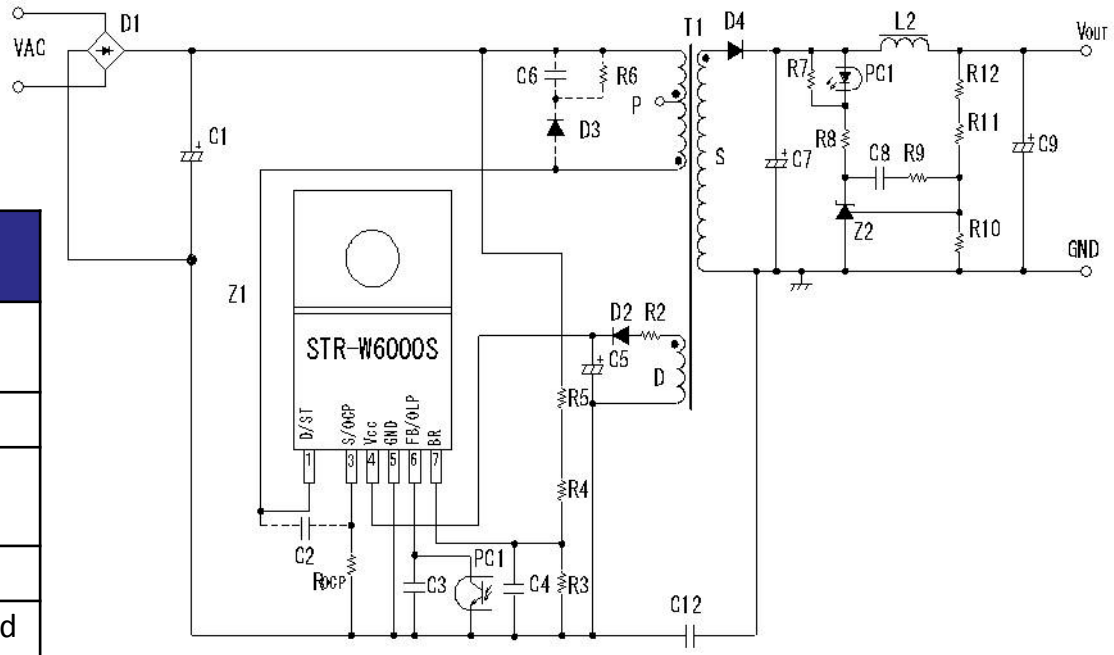
Back to PWM lineup

Package

TO-220F-6L



Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D/ST	MOSFET Drain / Startup current input
3	S/OCP	MOSFET Source/OCP
4	Vcc	Power supply input /Over Voltage Protection
5	GND	Ground
6	FB/OLP	Feedback control / Over Load Protection
7	BR	Brown-in/Brown-out control

Features

- ◆ No Load Power Consumption (P_{IN}< 30mW)
- ◆ Built-in Random Switching Function
- ◆ Built-in Startup Circuit
- ◆ Bias Assist function (to reduce V_{CC} voltage drop)
- ◆ Slope Compensation (to prevent Sub-Harmonic oscillations)
- ◆ OCP with Built-in Input Compensation Circuit
- ◆ Auto Standby function (to enable low standby power)
- ◆ Leading Edge Blanking
- ◆ Audible Noise Suppression Function for standby mode
- ◆ Brown-in/Brown-out function
- ◆ Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- ◆ Protection Functions
  OLP :Auto restart, built-in delay timer(external capacitor less)
  OCP: Pulse by pulse
  OVP/TSD: Auto restart

STR-A6000 Series

Back to PWM lineup

DIP8

- No Load Power Consumption (P_{IN}) < 25mW(HL<15mW)
- Protection Functions（OCP/OVP/OLP/TSD）
- Built-in Brown in/Brown out Function

Lineup

UD: Under development

Part Number	f_{OSC}	MOSFET		Pout		Protective Function				P_{IN}
		V_{DSS}	$R_{DS(ON)}$	AC230V	Universal	OCP	OVP	OLP	TSD	
STR-A6051M	67 kHz	650V	3.95Ω	16W	12W	Pulse by pulse	Latched	Auto Restart	Latched	**<25mW**
STR-A6052M			2.8Ω	20W	16W					
STR-A6053M			1.9Ω	24W	20W					
STR-A6079M		800V	19.2Ω	8W	5W					
STR-A6059H	100 kHz	650V	6.0Ω	10W	8W	Pulse by pulse	Latched	Auto Restart	Latched	**<25mW**
STR-A6061H		700V	3.95Ω	13W	11W					
STR-A6062H			2.8Ω	15W	13W					
STR-A6069H			6.0Ω	10W	8W					
STR-A6069HD	100 kHz	700V	6.0Ω	10W	8W	Pulse by pulse	Latched	Auto Restart	Latched	**<25mW**
STR-A6061HD			3.95Ω	13W	11W					
STR-A6062HD			2.8Ω	15W	13W					
STR-A6063HD UD			1.9Ω	24W	20W					
STR-A6069HL UD	100kHz	700V	6.0Ω	10W	8W	Pulse by pulse	Latched	Auto Restart	Latched	**<15mW**

STR-A6000 Series

Back to PWM lineup

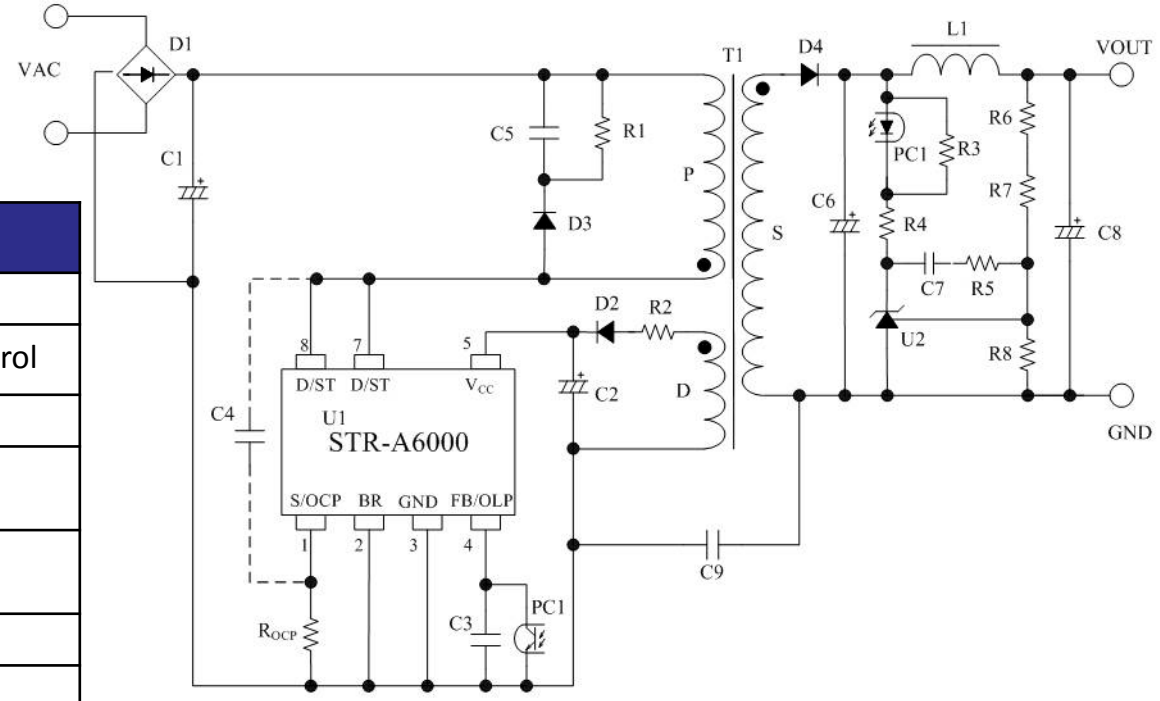
Package

DIP8

Pin Assignment

Pin No.	Symbol	Function
1	S/OCP	MOSFET Source/OCP
2	BR	Brown-in/Brown-out control
3	GND	Ground
4	FB／OLP	Feedback control Over Load Protection
5	Vcc	Power supply input /Over Voltage Protection
6	—	—
7	D/ST	MOSFET Drain Startup current input
8		

Circuit



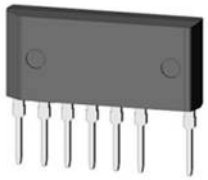
Features

- No Load Power Consumption (P_{IN}< 25mW)
- Built-in Random Switching Function
- Built-in Startup Circuit
- Bias Assist function (to reduce V_{CC} voltage drop)
- Slope Compensation (to prevent Sub-Harmonic oscillations)
- OCP with Built-in Input Compensation Circuit
- Auto Standby function (to enable low standby power)
- Leading Edge Blanking
- Audible Noise Suppression Function for standby mode
- Brown-in/Brown-out function
- Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- Protection Functions
  OLP: Auto restart, built-in delay timer (external capacitor less)
  OCP: Pulse by pulse
  OVP/TSD: Latch shutdown

STR-V653

Back to PWM lineup

SIP8L



- Low Profile Package
  (Height ≦ 12mm ,Pin pitch=2.54mm , terminal form is straight)
- No Load Power Consumption (P_{IN}) ＜ 25mW
- Protection Functions（OCP/OVP/OLP/TSD）
- Built-in Brown in/Brown out Function

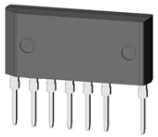
Part Number	f_{OSC}	MOSFET		Pout		Protective Function			
		V_{DSS}	$R_{DS(ON)}$	AC230V	Universal	OCP	OVP	OLP	TSD
STR-V653	67kHz	650V	1.9Ω	30W	23W	Pulse by pulse	Latched	Auto Restart	Latched

STR-V653

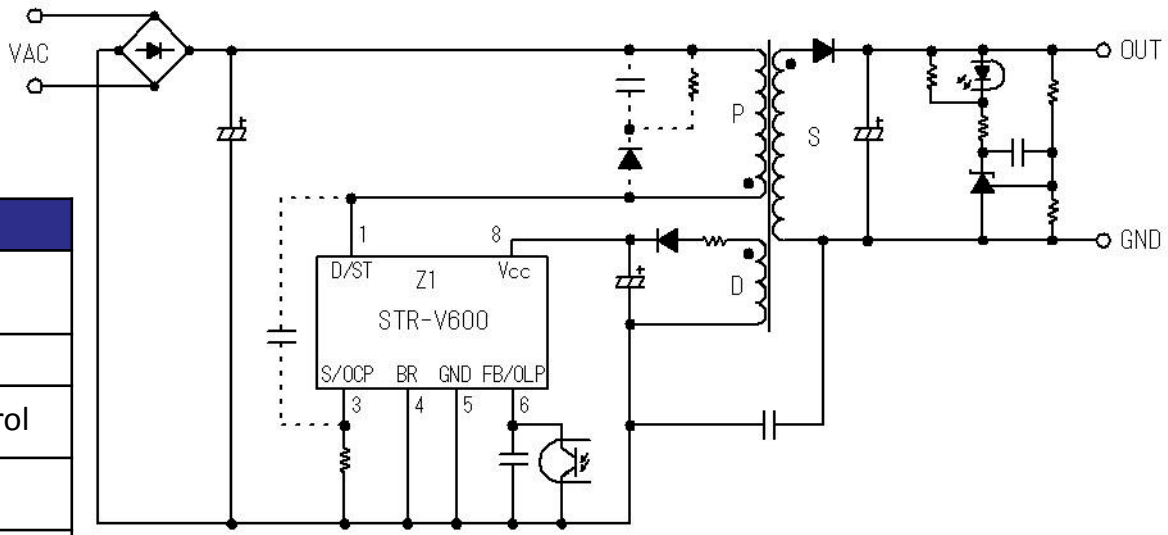
Back to PWM lineup

Package

SIP8L



Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D/ST	MOSFET Drain Startup current input
3	S/OCP	MOSFET Source/OCP
4	BR	Brown-in/Brown-out control
5	GND	Ground
6	FB/OLP	Feedback control /Over Load Protection
8	V_{CC}	Power supply input /Over Voltage Protection

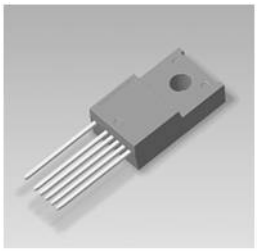
Features

- No Load Power Consumption (P_{IN}< 25mW)
- Built-in Random Switching Function
- Built-in Startup Circuit
- Bias Assist function (to reduce V_{CC} voltage drop)
- Slope Compensation (to prevent Sub-Harmonic oscillations)
- OCP with Built-in Input Compensation Circuit
- Auto Standby function (to enable low standby power)
- Leading Edge Blanking
- Audible Noise Suppression Function for standby mode
- Brown-in/Brown-out function
- Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- Protection Functions
  OLP : Auto restart, built-in delay timer(external capacitor less)
  OCP : Pulse by pulse
  OVP/TSD: Latch shutdown

STR2W100D Series

Back to PWM lineup

TO-220F-6L



- No Load Power Consumption (P_{IN}) ＜ 25mW
- Protection Functions（OCP/OVP/OLP/TSD）

Lineup

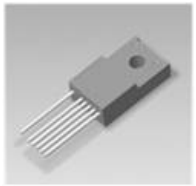
Part Number	f_{OSC}	MOSFET		Pout		Protective Function			
		V_{DSS}	$R_{DS(ON)}$	AC230V	Universal	OCP	OVP	OLP	TSD
STR2W152D	67 kHz	650V	3.0Ω	60W	40W	Pulse by pulse	Auto Restart	Auto Restart	Auto Restart
STR2W153D			1.9Ω	90W	60W				

STR2W100D Series

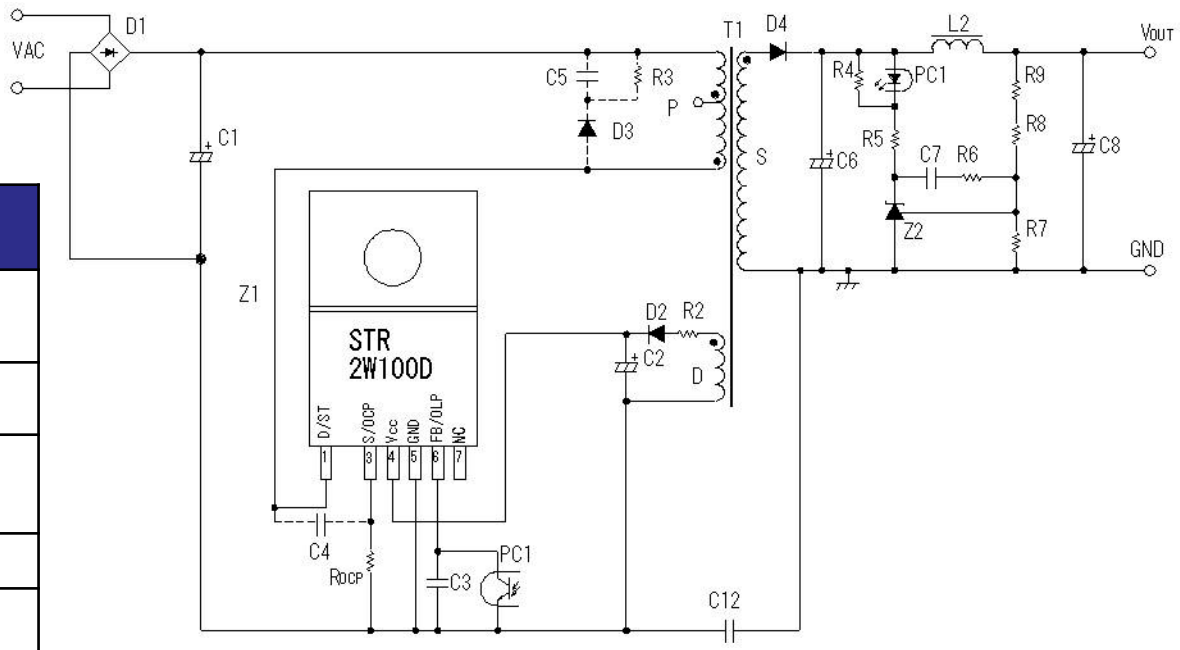
Back to PWM lineup

Package

TO-220F-6L



Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D/ST	MOSFET Drain / Startup current input
3	S/OCP	MOSFET Source/OCP
4	Vcc	Power supply input /Over Voltage Protection
5	GND	Ground
6	FB/OLP	Feedback control Over Load Protection
7	NC	—

Features

- ◆No Load Power Consumption (P_{IN}< 25mW)
- ◆Built-in Random Switching Function
- ◆Built-in Startup Circuit
- ◆Bias Assist function
- ◆Slope Compensation (to prevent Sub-Harmonic oscillations)
- ◆OCP with Built-in Input Compensation Circuit
- ◆Auto Standby function (to enable low standby power)
- ◆Leading Edge Blanking
- ◆Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- ◆Protection Functions
  OLP : Auto restart, built-in delay timer(external capacitor less)
  OCP : Pulse by pulse
  OVP/TSD: Auto restart

STR3A100 Series

Back to PWM lineup
Back to New lineup

DIP8

- No Load Power Consumption (P_{IN}) < 10mW※ ~15mW
- High heat release design
- Protection Functions（OCP/OVP/OLP/TSD）

※When it was used the low consumption shunt regulator

Lineup

UD: Under development

Part Number	f_{OSC}	MOSFET		Pout		Protective Function			
		V_{DSS}	$R_{DS(ON)}$	AC230V	Universal	OCP	OVP	OLP	TSD
STR3A151	67 kHz	650V	4.0Ω	24W	16W	Pulse by pulse	Latched	Auto Restart	Latched
STR3A152			3.0Ω	30W	23W				
STR3A153			1.9Ω	36W	30W				
STR3A154			1.4Ω	40W	32W				
STR3A155			1.1Ω	43W	35W				
STR3A151D	67 kHz	650V	4.0Ω	24W	16W	Pulse by pulse	Auto Restart	Auto Restart	Auto Restart
STR3A152D			3.0Ω	30W	23W				
STR3A153D			1.9Ω	36W	30W				
STR3A154D UD			1.4Ω	40W	32W				
STR3A155D			1.1Ω	43W	35W				
STR3A161HD	100 kHz	700V	4.2Ω	26W	17W	Pulse by pulse	Auto Restart	Auto Restart	Auto Restart
STR3A162HD			3.2Ω	29W	20W				
STR3A163HD			2.2Ω	35W	29W				

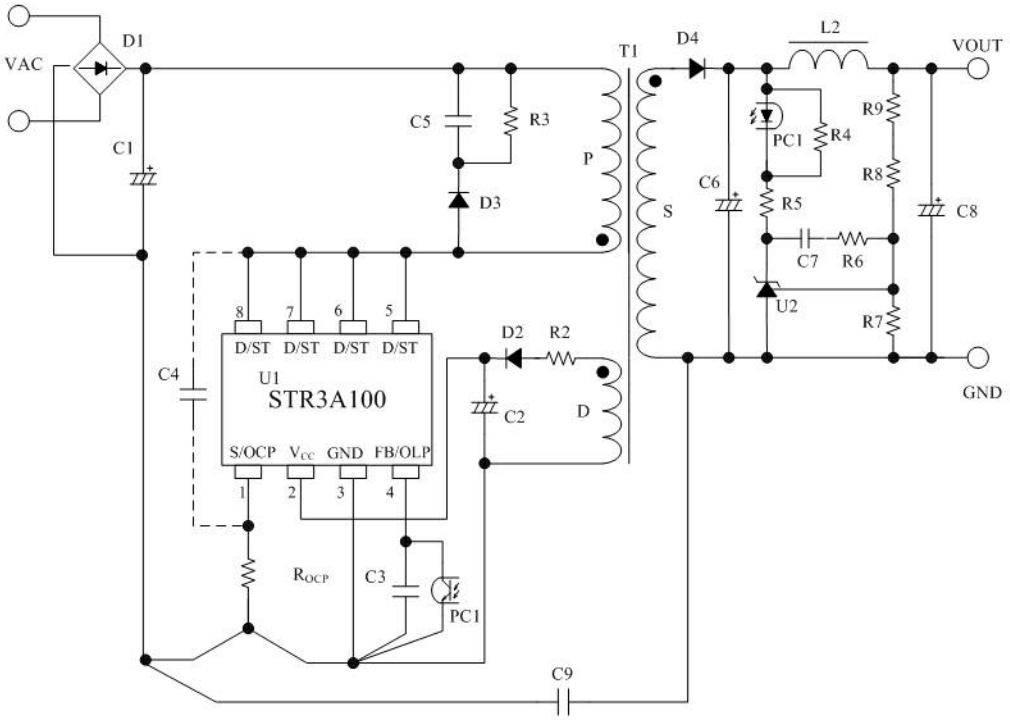
P_{IN} < 10~15 mW at no load, PWM Off-Line Switching Regulators

STR3A100 Series

Package

DIP8

Circuit



Pin Assignment

Pin No.	Symbol	Function
1	S/OCP	MOSFET Source/OCP
2	Vcc	Power supply input /Over Voltage Protection
3	GND	Ground
4	FB／OLP	Feedback control / Over Load Protection
5	D/ST	MOSFET Drain Startup current input
6		
7		
8		

Features

- ◆No Load Power Consumption (P_{IN}< 10mW※～15mW)
- ◆Built-in Random Switching Function
- ◆Built-in Startup Circuit
- ◆Bias Assist function (to reduce Vcc voltage drop)
- ◆Slope Compensation (to prevent Sub-Harmonic oscillations)
- ◆OCP with Built-in Input Compensation Circuit
- ◆Auto Standby function (to enable low standby power)
- ◆Leading Edge Blanking
- ◆Audible Noise Suppression Function for standby mode
- ◆Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- ◆Protection Functions
  OLP : Auto restart, built-in delay timer(external capacitor less)
  OCP : Pulse by pulse
  OVP/ TSD : Latch shutdown/Auto restart

※When it was used the low consumption shunt regulator

SSC2S110 （Controller）

Back to PWM lineup

Package

SOIC8

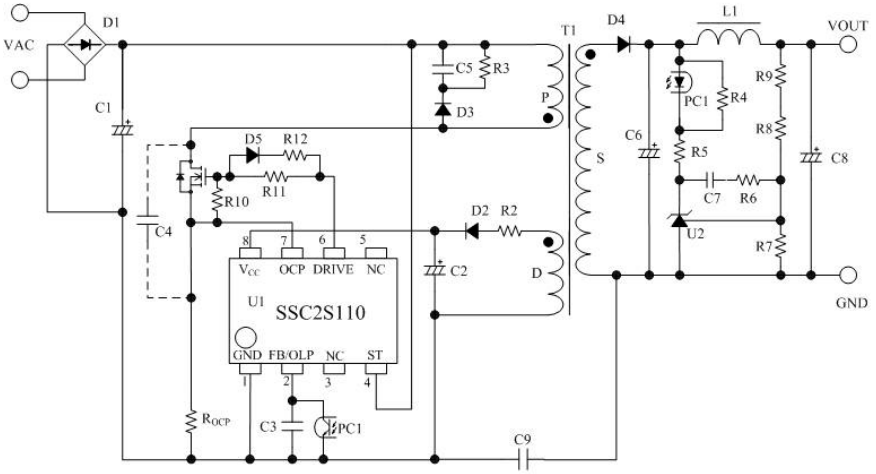
- No Load Power Consumption (P_{IN}) ＜ 25mW
- This IC is the controller of STR2W100D

Part Number	f_{OSC}	ST terminal voltage	Protective Function				
			OCP	OCP2	OVP	OLP	TSD
SSC2S110	67kHz	600V(MAX)	Pulse by pulse	Pulse by pulse	Auto Restart	Auto Restart	Auto Restart

Pin Assignment

Pin No.	Symbol	Function
1	GND	Ground
2	FB/OLP	Feedback control Over Load Protection
3	NC	—
4	ST	Startup current input
5	NC	—
6	DRIVE	Gate drive output
7	OCP	OCP signal input
8	V_{CC}	Power supply input /Over Voltage Protection

Circuit



Features

- No Load Power Consumption (P_{IN}< 25mW)
- Built-in Random Switching Function
- Built-in Startup Circuit
- Bias Assist function
- Slope Compensation (to prevent Sub-Harmonic oscillations)
- OCP with Built-in Input Compensation Circuit
- Auto Standby function (to enable low standby power)
- Leading Edge Blanking
- Protection Functions
  OLP : Auto restart, built-in delay timer(external capacitor less)
  OCP: Pulse by pulse
  OVP/TSD: Auto restart

AC/DC PRC control IC

Back to ALL lineup

- For Low Noise Application
- PRC is the Pulse Ratio Control (Controlling ON-time under fixed OFF-time)

Hybrid Power IC

Series	Package	No Load Power Consumption (P_{IN})	Link
STR-A6100	DIP8	＜40mW	Jump▸
STR-V100	SIP8L	＜40mW	Jump▸

STR-A6100 Series

Back to PRC lineup

DIP8

- No Load Power Consumption (P_{IN}) is ＜ 40mW
- Protection Functions（OCP/OVP/OLP/TSD）

Lineup

Part Number	MOSFET		$t_{(OFF)}$	P_{OUT}		Protective Function				
	V_{DSS}	$R_{DS(ON)}$		AC220V	Universal	Auto Bias	OCP	OVP	OLP	TSD
STR-A6131	500V	3.95Ω	8μs	AC100V 13W	AC120V 15W	Yes	Pulse by pulse	Latched	Auto Restart	Latched
STR-A6132		2.62Ω		AC100V 16W	AC120V 18W					
STR-A6159	650V	6Ω		13W	10W					
STR-A6151		3.95Ω		15W	13W					
STR-A6169	800V	19.2Ω	8μs	8W	5W					
STR-A6131M	500V	3.95Ω	11.5μs	13W	AC120V 15W	No	Pulse by pulse	Latched	Auto Restart	Latched
STR-A6159M	650V	6Ω		13W	10W					
STR-A6151M		3.95Ω		15W	13W					
STR-A6153E	650V	1.9Ω	11.5μs	22W	18W	No	Pulse by pulse	Latched	Auto Restart	Latched

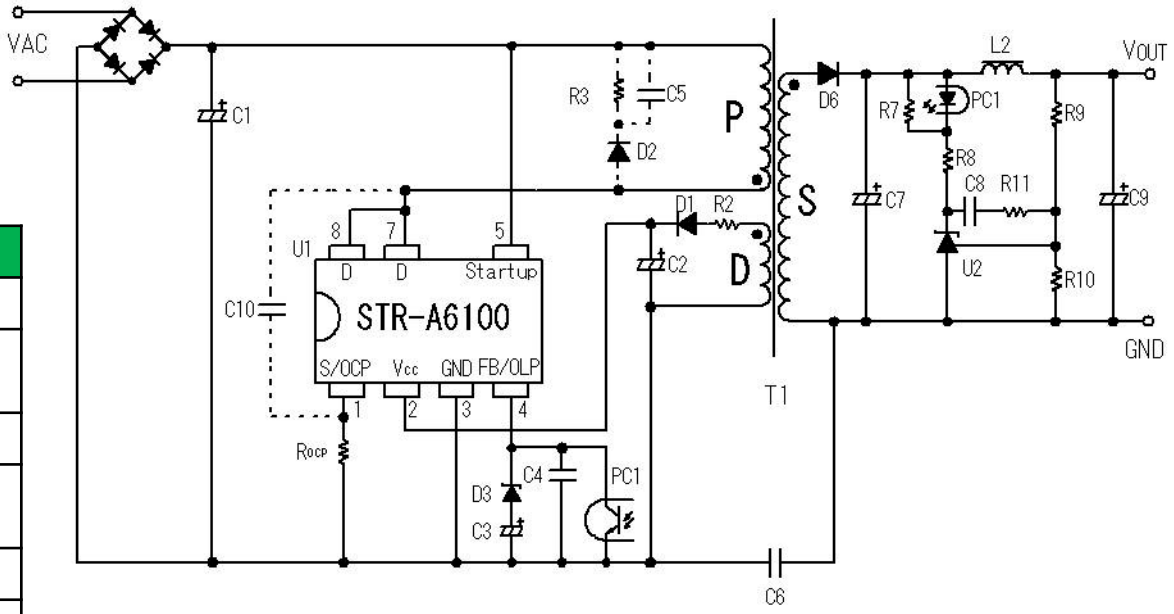
STR-A6100 Series

Back to PRC lineup

Package

DIP8

Circuit



Pin Assignment

Pin No.	Symbol	Function
1	S/OCP	MOSFET Source/OCP
2	V_{CC}	Feedback control /Over Load Protection
3	GND	Ground
4	FB /OLP	Feedback control /Over Load Protection
5	Startup	Startup current input
6	NC	—
7	D	MOSFET Drain
8		

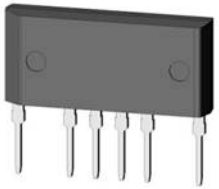
Features

- ◆ No Load Power Consumption (P_{IN}< 40mW)
- ◆ PRC Control (Current mode)
- ◆ Built-in Startup Circuit
- ◆ Bias Assist function (to reduce Vcc voltage drop)
- ◆ Auto Standby function (to enable low standby power)
- ◆ Leading Edge Blanking
- ◆ Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- ◆ Protection Functions
  - OLP: Auto restart
  - OCP: Pulse by pulse
  - OVP/TSD: Latch shutdown

STR-V100 Series

Back to PRC lineup

SIP8L



- Low Profile Package
  (Height ≦ 12mm, Pin pitch=2.54mm, terminal form is straight)
- No Load Power Consumption (P_{IN}) ＜ 40mW
- Protection Functions（OCP/OVP/OLP/TSD）

Lineup

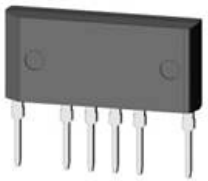
Part Number	MOSFET		$t_{(OFF)}$	P_{OUT}		Protective Function				
	V_{DSS}	$R_{DS(ON)}$		AC220V	Universal	Auto Bias	OCP	OVP	OLP	TSD
STR-V152	650V	2.8Ω	8μs	22W	17W	Yes	Pulse by pulse	Latched	Auto Restart	Latched
STR-V153		2.0Ω	11.5μs	30W	23W	No				

STR-V100 Series

Back to PRC lineup

Package

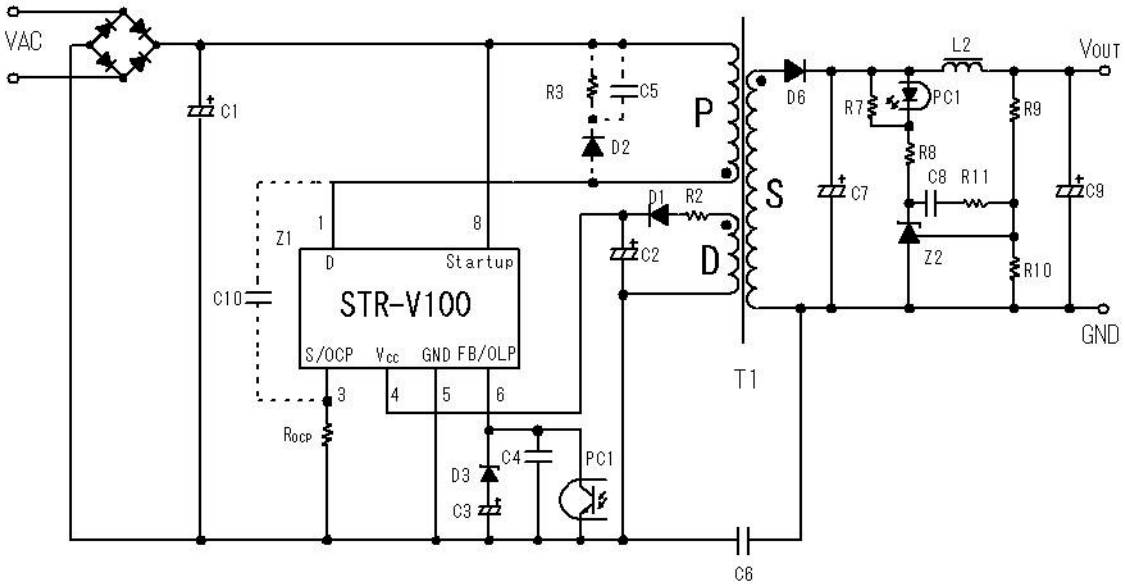
SIP8L



Pin Assignment

Pin No.	Symbol	Function
1	D	MOSFET Drain
2	—	—
3	S/OCP	MOSFET Source/OCP
4	V_{CC}	Feedback control Over Load Protection
5	GND	Ground
6	FB/OLP	Power supply input /Over Voltage Protection
7	—	—
8	Startup	Startup current input

Circuit



Features

- No Load Power Consumption (P_{IN}< 40mW)
- PRC Control (Current mode)
- Built-in Startup Circuit
- Bias Assist function (to reduce Vcc voltage drop)
- Slope Compensation (to prevent Sub-Harmonic oscillations)
- Auto Standby function (to enable low standby power)
- Leading Edge Blanking
- Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- Protection Functions
  OLP: Auto restart
  OCP: Pulse by pulse
  OVP/TSD: Latch shutdown

AC/DC QR control IC

Back to ALL lineup

- For Low Noise and High Power Application
- QR is the Quasi-Resonant Mode, Bottom ON Switching

Hybrid Power IC

Series	Package	No Load Power Consumption (P_{IN})	Link
STR-G5600	TO-220F-5L	—	Jump▸
STR-L400	SIP10L	—	Jump▸
STR-Y6400	TO-220F-7L	＜0.1W	Jump▸
STR-Y6700	TO-220F-7L	＜0.3W(AC100V) ＜0.5W(AC240V)	Jump▸
STR-L6400	SIP10L	＜0.1W	Jump▸
STR-X6700	TO-3PF-7L	—	Jump▸

Controller

Series	Package	No Load Power Consumption (P_{IN})	Link
SSC1S310	SOIC8	＜30mW(AC100V) ＜50mW(AC240V)	Jump▸

STR-G5600 Series

Back to QR lineup

TO-220F-5L

- Light load action is QR
- Protection Functions（OCP/OVP/OLP/TSD）

Lineup

Part Number	MOSFET		P_{OUT}		Protective Function			
	V_{DSS}	$R_{DS(ON)}$	AC100V	AC120V	OCP	OVP	OLP	TSD
STR-G5623	450V	1.3Ω	72W	96W	Pulse by pulse	Latched	—	Latched
STR-G5624		1Ω	90W	120W				
STR-G5653	650V	1.9Ω	125W	Universal 60W				

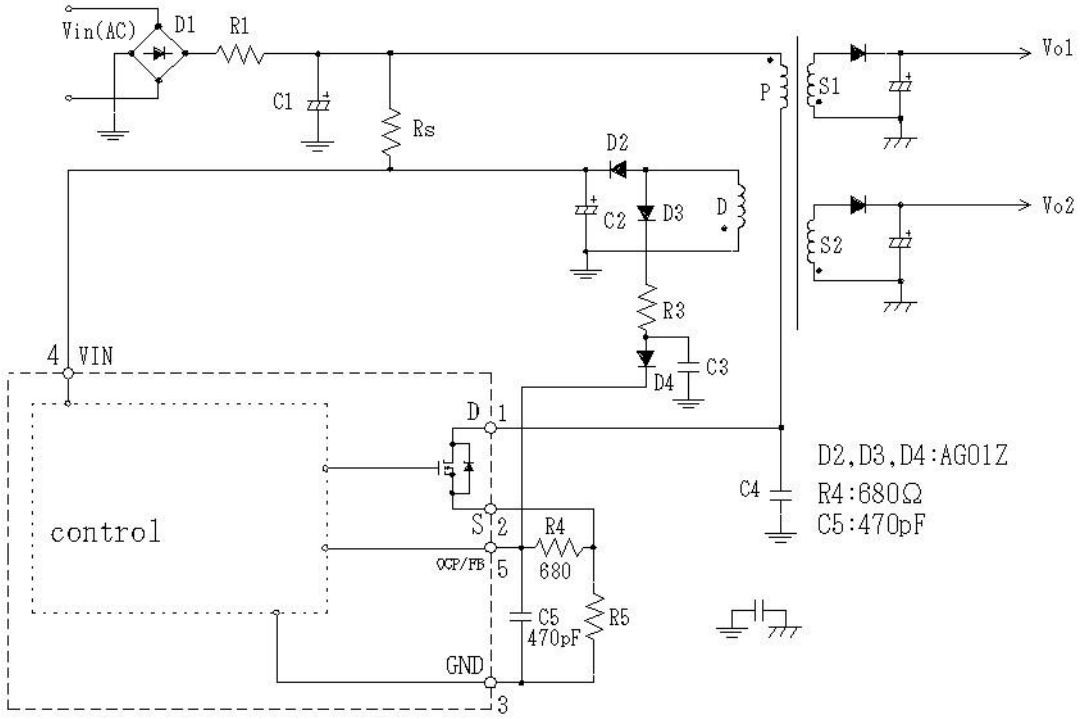
STR-G5600 Series

Back to QR lineup

Package

TO-220F-5L

Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D	MOSFET Drain
2	S	MOSFET Source
3	GND	Ground
4	V_{IN}	Feedback control Over Load Protection
5	OCP/FB	OCP/Feedback control

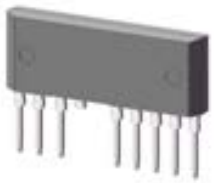
Features

- ◆Light Load action is PRC Control
- ◆Built-in Startup Circuit
- ◆Built-in Step drive circuit
- ◆Built-in Constant voltage drive circuit
- ◆Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- ◆Protection Functions
  OCP: Pulse by pulse
  OVP/TSD: Latch shutdown

STR-L400 Series

Back to QR lineup

SIP10L



- Light load action is QR
- Protection Functions（OCP/OVP/OLP/TSD）
- Low Profile Package
  (Height ≦ 12mm ,Pin pitch=2.54mm , terminal form is straight)

Lineup

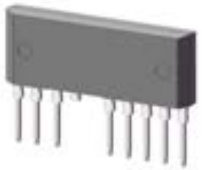
Part Number	MOSFET		P_{OUT}		Protective Function			
	V_{DSS}	$R_{DS(ON)}$	AC100V	AC230V	OCP	OVP	OLP	TSD
STR-L451	650V	3.95Ω	30W	74W	Pulse by pulse	Latched	—	Latched
STR-L472	900V	7.7Ω	—	35W				

STR-L400 Series

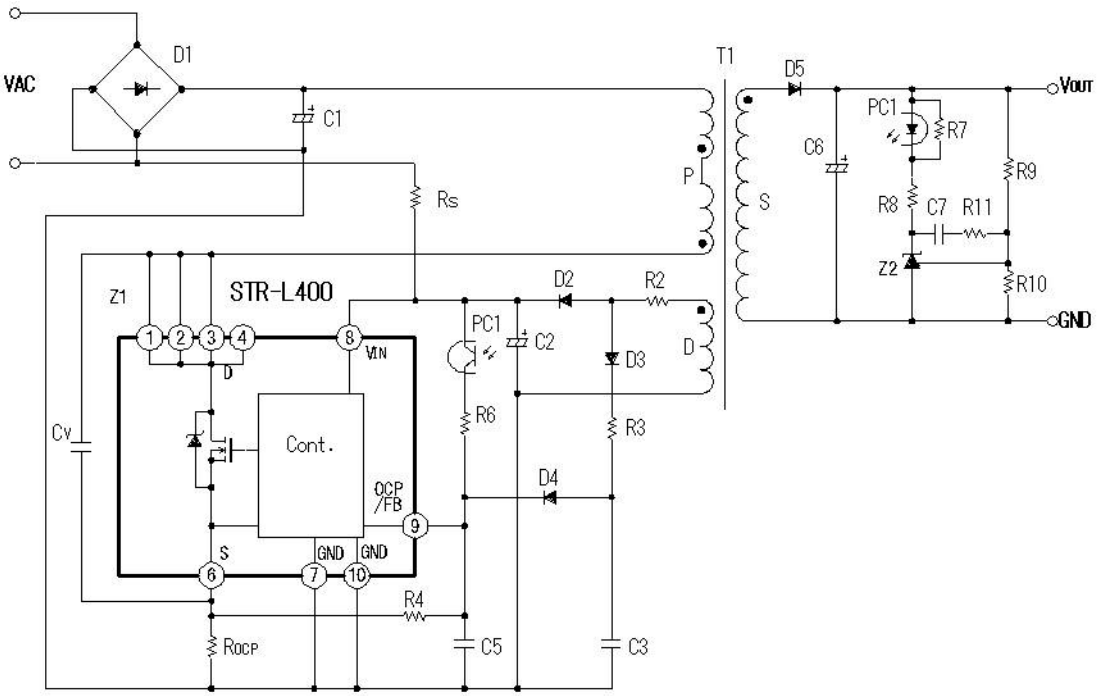
Back to QR lineup

Package

SIP10L



Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D	MOSFET Drain
2		
3		
4		
5	—	—
6	S	MOSFET Source
7	GND	Ground
8	V_{IN}	Feedback control Over Load Protection
9	OCP/FB	OCP/Feedback control
10	GND	GND

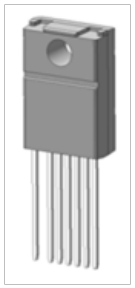
Features

- ◆Light Load action is PRC Control
- ◆Built-in Startup Circuit
- ◆Built-in Step drive circuit
- ◆Built-in Constant voltage drive circuit
- ◆Two Chip Structure(MOSFET guaranteed Avalanche Energy)
- ◆Protection Functions
  OCP: Pulse by pulse
  OVP/TSD: Latch shutdown

STR-Y6400 Series

Back to QR lineup

TO-220F-7L



- Auto Standby function
- No Load Power Consumption (P_{IN}) is ＜ 0.1W
- Auto Burst Function(1 or 2skip)
- Protection Functions（OCP/OVP/OLP/TSD）
  How to stop OLP can be chosen by Latch or Auto restart

Lineup

Part Number	MOSFET		P_{OUT}		Protective Function			
	V_{DSS}	$R_{DS(ON)}$	AC100V	AC240V	OCP	OVP	OLP	TSD
STR-Y6453	650V	1.8Ω	58W	110W	Pulse by pulse	Latched	Latched or Auto Restart	Latched
STR-Y6456		0.73Ω	140W	220W				—
STR-Y6473	850V	3.6Ω	32W	60W				Latched
STR-Y6476		1.3Ω	68W	130W				—

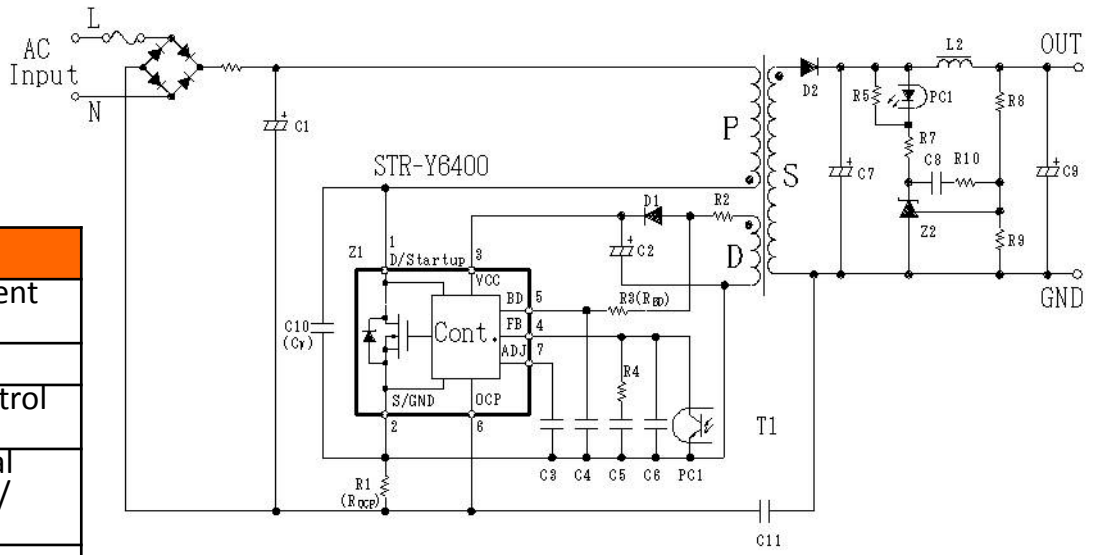
STR-Y6400 Series

Back to QR lineup

Package

TO-220F-7L

Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D/Startup	MOSFET Drain / Start-up current input
2	S/GND	MOSFET Source / Ground
3	V_{CC}	Input of power supply for control circuit
4	FB	Constant voltage control signal input / Standby control input / OLP signal input
5	BD	QR signal input / Over current compensation input
6	OCP	OCP pulse input / Bottom-skip signal input
7	ADJ	Soft start control / Bottom-skip delay time control / Remote ON/OFF signal input

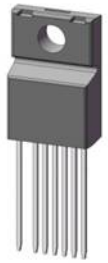
Features

- No Load Power Consumption (P_{IN}< 0.1W)
- Multi-mode control
- Built-in Auto burst Function(Bottom skip:1 or 2skip)
- Built-in Startup Circuit
- OCP with Built-in Input Compensation Circuit
- Auto Standby function (to enable low standby power)
- Leading Edge Blanking
- ON/OFF control by remote signal
- Protection Functions
  OLP: Latch shutdown or Auto restart
  OCP: Pulse by pulse
  OVP/TSD: Latch shutdown

STR-Y6700 Series

Back to QR lineup

TO-220F-7L



- Auto Standby function
- No Load Power Consumption (P_{IN}) is < 30mW(AC100V)
- Auto Burst Function(1skip)
- Protection Functions（OCP/OVP/OLP/TSD）
  How to stop OLP can be chosen by Latch or Auto restart

Lineup

Part Number	MOSFET		P_{OUT}		Protective Function			
	V_{DSS}	$R_{DS(ON)}$	DC380V	Universal	OCP	OVP	OLP	TSD
STR-Y6735	500V	0.8Ω	AC100V 120W	—	Pulse by pulse	Latched	Latched/ Auto Restart	Latched
STR-Y6753	650V	1.9Ω	100W	60W				
STR-Y6754		1.4Ω	120W	67W				
STR-Y6763	800V	3.5Ω	80W	50W				
STR-Y6765		2.2Ω	120W	70W				
STR-Y6766		1.7Ω	140W	80W				

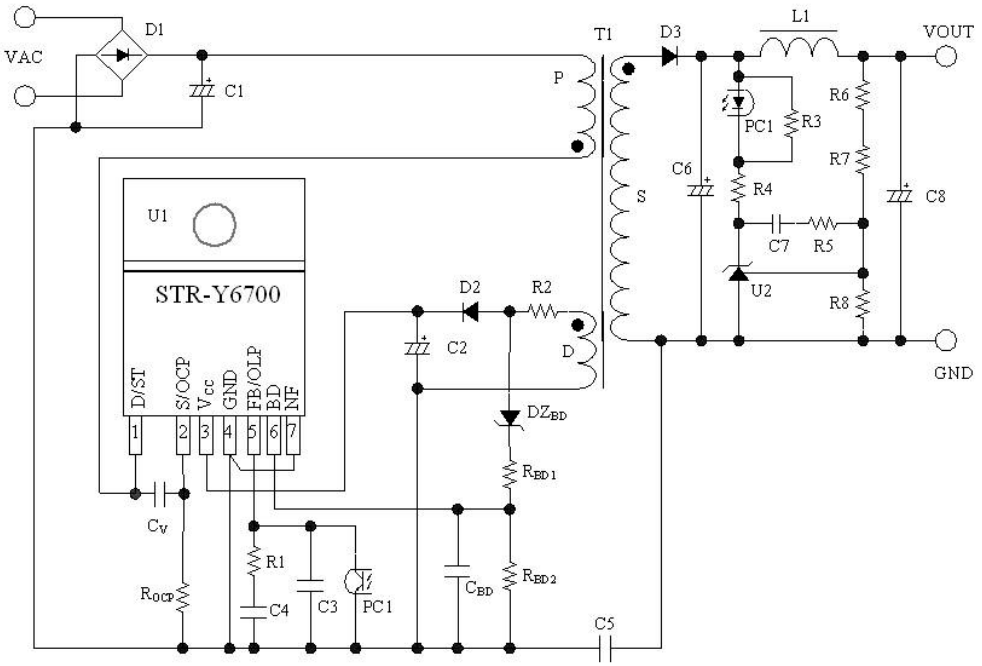
STR-Y6700 Series

Back to QR lineup

Package

TO-220F-7L

Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D/ST	MOSFET Drain / Start-up current input
2	S/OCP	MOSFET Source / OCP pulse input
3	V_{CC}	Power supply input /Over Voltage Protection
4	GND	Ground
5	FB/OLP	Feedback control /Over Load Protection
6	BD	Bottom Detection Signal Input / Input Compensation Detection Signal Input
7	NF	—

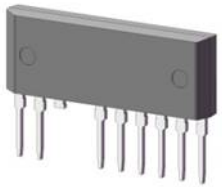
Features

- No Load Power Consumption
  P_{IN}<30mW(AC100V),<50mW(AC230V)
- Multi-mode control
- Built-in Auto burst Function(Bottom skip:1skip)
- Auto Standby function (to enable low standby power)
- Built-in Startup Circuit
- OCP with Built-in Input Compensation Circuit
- Leading Edge Blanking
- Protection Functions
  OLP : Latch shutdown or Auto restart
  OCP : Pulse by pulse
  OVP/TSD : Latch shutdown

STR-L6400 Series

Back to QR lineup

SIP10L



- QR Control IC
- Auto Standby function
- No Load Power Consumption (P_{IN}) is ＜ 0.1W
- Auto Burst Function(1 or 2skip)
- Protection Functions（OCP/OVP/OLP/TSD）
  How to stop OLP can be chosen by Latch or Auto restart
- Low Profile Package
  (Height ≦ 12mm ,Pin pitch=2.54mm , terminal form is straight)

Lineup

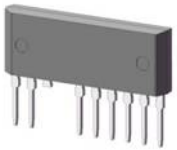
Part Number	MOSFET		P_{OUT}		Protective Function			
	V_{DSS}	$R_{DS(ON)}$	AC100V	AC240V	OCP	OVP	OLP	TSD
STR-L6472	850V	6.5Ω	15W	25W	Pulse by pulse	Latched	Latched/ Auto Restart	Latched

Low noise, Low Profile Package
Quasi-resonant (QR) Off-Line Switching Regulators
STR-L6400 Series

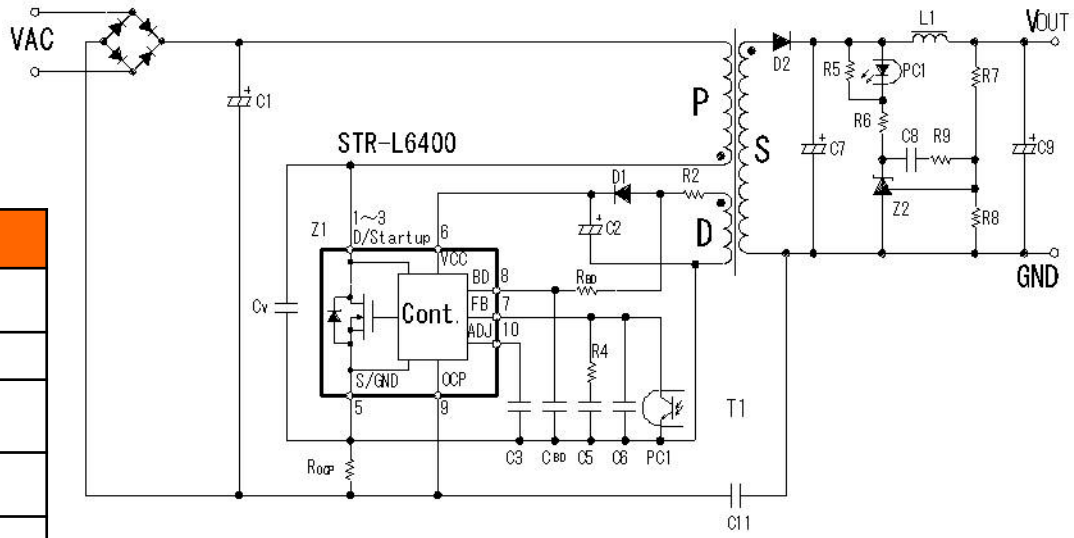
Back to QR lineup

Package

SIP10L



Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D/Startup	MOSFET Drain / Start-up current input
2	S/GND	MOSFET Source / Ground
3	V_{CC}	Power supply input /Over Voltage Protection
4	FB	Feedback control /Over Load Protection
5	BD	Bottom Detection Signal Input / Input Compensation Detection Signal Input
6	OCP	OCP pulse input / Bottom-skip signal input
7	ADJ	Soft start control / Bottom-skip delay time control / Remote ON/OFF signal input

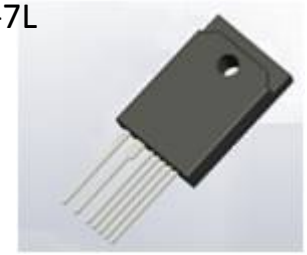
Features

- No Load Power Consumption P_{IN}<0.1W
- Multi-mode control
- Built-in Auto burst Function(Bottom skip:1 or 2skip)
- Auto Standby function (to enable low standby power)
- Built-in Startup Circuit
- OCP with Built-in Input Compensation Circuit
- Leading Edge Blanking
- Protection Functions
  OLP : Latch shutdown or Auto restart
  OCP : Pulse by pulse
  OVP/TSD : Latch shutdown

STR-X6700 Series

Back to QR lineup

TO-3P-7L



- QR Control IC
- Have a wide choice of variations
- Protection Functions（OCP/OVP/OLP）
  How to stop OLP can be chosen by Latch or Auto restart

Lineup

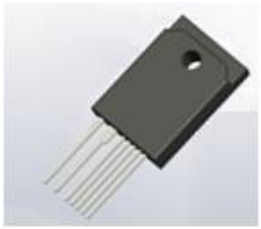
Part Number	MOSFET		P_{OUT}		Auto Burst	Bottom Skip	Protective Function			
	V_{DSS}	$R_{DS(ON)}$	AC220V	Universal			OCP	OVP	OLP	TSD
STR-X6729	450V	0.189Ω	AC100V /280W	AC120V /360W	No	No	Pulse by pulse	Latched	Latched / Auto Restart	—
STR-X6737	500V	0.36Ω	AC100V /220W	AC120V /290W	Yes	1Skip				
STR-X6756	650V	0.73Ω	300W	150W						
STR-X6757		0.62Ω	260W	120W						
STR-X6769	800V	0.66Ω	250W	110W						
STR-X6757N	650V	0.62Ω	260W	120W	No	1Skip				
STR-X6759N		0.385Ω								
STR-X6768N	800V	1.0Ω								
STR-X6750B	650V	0.62Ω			No	No				
STR-X6759B	650V	0.385Ω								
STR-X6769B	800V	0.66Ω	250W							
STR-X6750F	650V	0.62Ω			Yes	No				
STR-X6759F		0.385Ω								

STR-X6700 Series

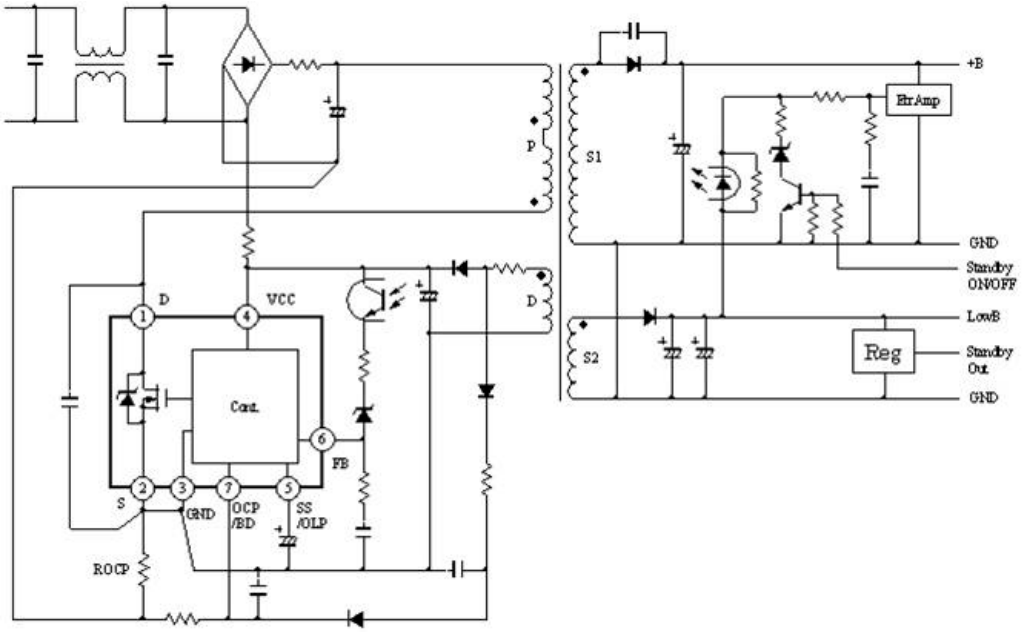
Back to QR lineup

Package

TO-3PF-7L



Circuit



Pin Assignment

Pin No.	Symbol	Function
1	D	MOSFET Drain
2	S	MOSFET Source / Ground
3	GND	Ground
4	V_{CC}	Power supply input /Over Voltage Protection
5	SS/OLP	Soft start control / Over Load Protection
6	FB	Feedback control
7	OCP/BD	OCP pulse input / Bottom-skip signal input

Features

- OCP with Input Compensation Circuit
- Protection Functions
  - OLP : Latch shutdown or Auto restart
  - OCP : Pulse by pulse
  - OVP : Latch shutdown

SSC1S310 Series (Controller)

Back to QR lineup

SOIC8

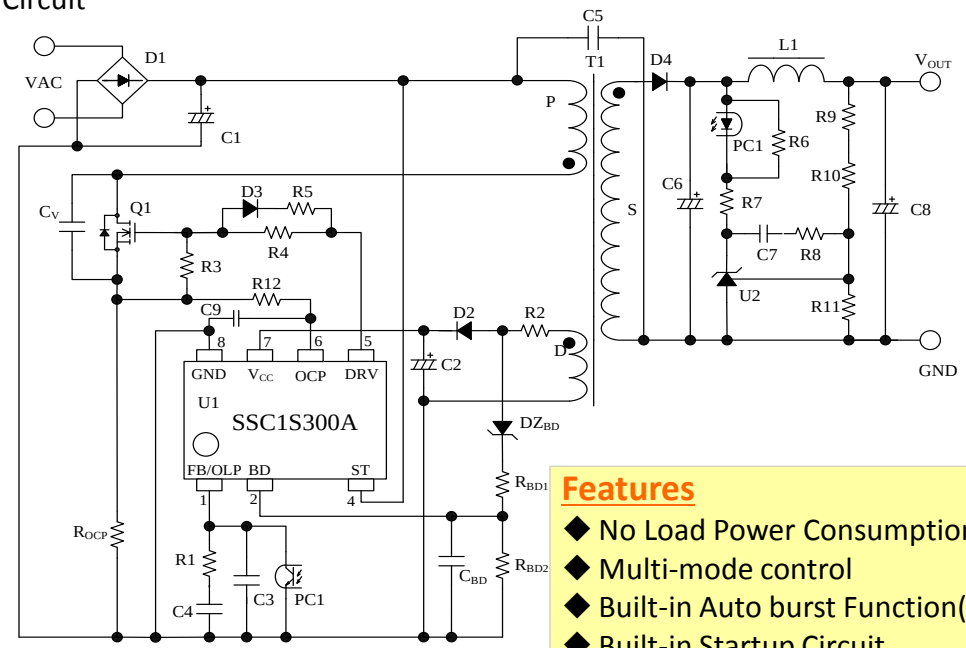
7pin type

8pin type

- Auto Standby function
- No Load Power Consumption (P_{IN}) is ＜ 30mW (at AC100V)
- Auto Burst Function(1skip)
- Absolute maximum ratings of V_{CC} is 35V
- Protection Functions（OCP/OVP/OLP/TSD）

Part Number	Package	V_{CC} input voltage	$V_{CC(ON)}$	PWM f_{OSC}	Maximum ON time	Protective Function			
						OCP	OVP	OLP	TSD
SSC1S311A	7pin type	35V (Max)	15.1V (TYP)	21.0kHz (TYP)	40.0μs (TYP)	Pulse by pulse	Auto Restart	Auto Restart	Auto Restart
SSC1S311	8pin type								

Circuit



Pin Assignment

Pin No.	Symbol	Function
1	FB/OLP	Constant voltage control / Standby control / Overload detection signal input
2	BD	Bottom detection / Input compensation signal input
3	—	SSC1S300A is pin removed SSC1S300 is No connection
4	ST	Startup current input
5	DRV	Gate drive output
6	OCP	Overcurrent detection signal input
7	V_{CC}	Supply voltage input / Overvoltage detection signal input
8	GND	Ground

Features

- ◆ No Load Power Consumption (P_{IN}< 30mW)
- ◆ Multi-mode control
- ◆ Built-in Auto burst Function(1 Bottom skip)
- ◆ Built-in Startup Circuit
- ◆ OCP with Built-in Input Compensation Circuit
- ◆ Auto Standby function (to enable low standby power)
- ◆ Leading Edge Blanking
- ◆ Protection Functions
  - OLP: Auto restart
  - OCP: Pulse by pulse
  - OVP: Auto restart
  - TSD: Auto restart

AC/DC LLC control IC

Back to ALL lineup

➢For Low Noise and High Power Application

Controller

Series	PKG	Function								Link
		Brown in/out	DT control	f_{MAX} /f_{MIN}	Auto Burst	Reset Detect	$F_{MAX(SS)}$ (3)	RC Latch	External Latch	
SSC9522S	SOP18	○	Auto	300kHz /28.3kHz	○	×	×	○	○	Jump▸
SSC9526S	SOP18	○	Auto(1)	340kHz /30.5kHz	×	○	○	×	○	Jump▸
SSC9527S	SOP18	○	Fix	300kHz /28.3kHz(2)	×	○	○	○	×	Jump▸

Notes;
(1) In heavy load, dead time fixed 350ns(TYP)
(2) Adjustable minimum frequency
(3) Soft start maximum frequency

SSC9522S Controller

Back to LLC lineup

Package

SOP18

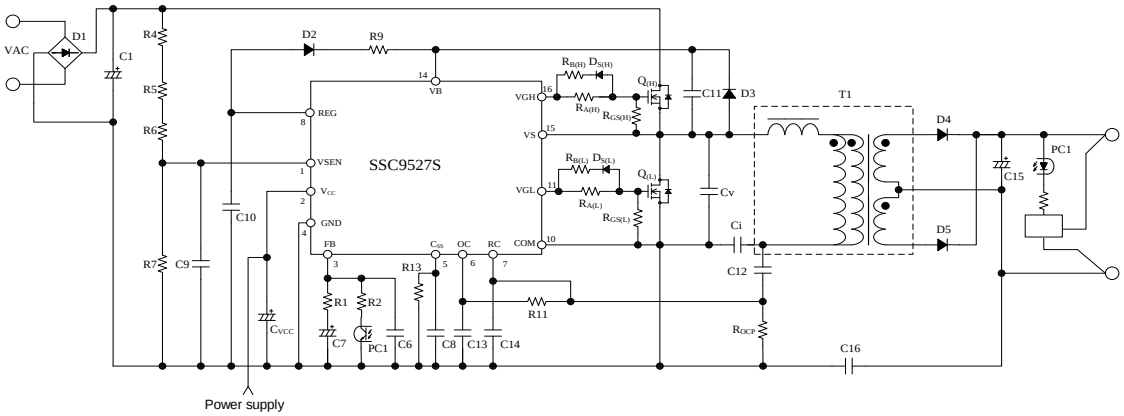
- Brown-in/out Function
- Auto Dead-time control
- Auto Burst Function
- Uncontrollable Operation Detection Function
- Protection Functions(OCP/OVP/OLP/TSD)

Part Number	V_S pin voltage	V_{CC} input voltage	F(MAX)	Protective Function			
				OCP	OVP	OLP	TSD
SSC9522S	600V	35V(Max)	300kHz	Pulse by pulse	Latched	Latched	Latched

Pin Assignment

Pin No.	Symbol	Pin No.	Symbol
1	VSEN	10	COM
2	V_{CC}	11	VGL
3	FB	12	(NC)
4	GND	13	(NC)
5	C_{SS}	14	VB
6	OC	15	VS
7	RC	16	VGH
8	Reg	17	(NC)
9	RV	18	(NC)

Circuit



Features

- Built-in floating drive circuit for High-side MOSFET
- Built-in Soft Start Function
- Uncontrollable Operation Detection Function on pulse-by-pulse basis
- Automatic Dead Time Adjustment Function
- Auto Burst Function
- Built-in Brown-In／Brown-Out Function
- External Latch Function
- Protection Functions
  OCP : Three steps protection corresponding to over current levels
  OLP /OVP/TSD: Latch shutdown

SSC9526S Controller

NEW Products

Back to LLC lineup

Package

SOP18

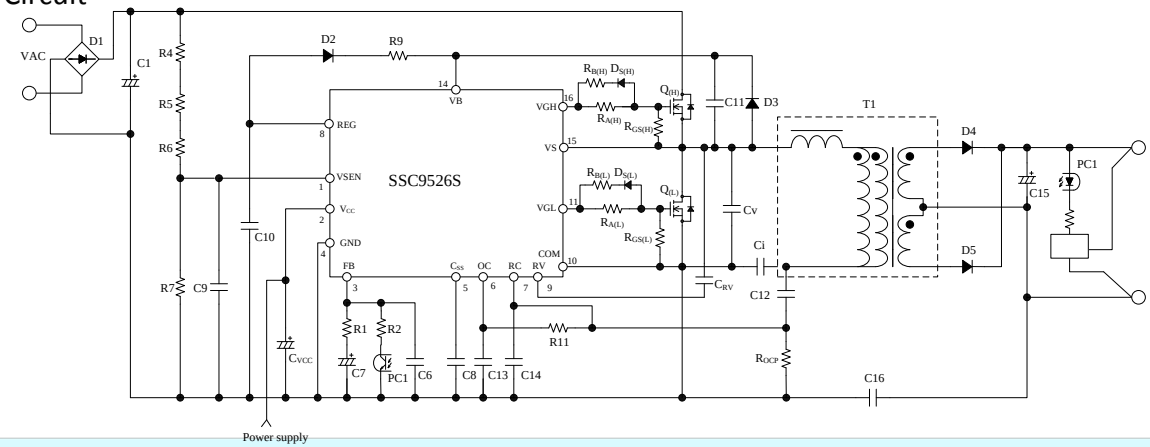
- Brown-in/out Function
- Automatic Dead-time control (in heavy load, dead time fixed 350ns(TYP))
- Reset Detect Function
- Soft start maximum frequency, $F_{(MAX)SS}$= 520kHz
- Uncontrollable Operation Detection Function
- Protection Functions(OCP/OVP/OLP/TSD)

Part Number	V_S pin voltage	V_{CC} input voltage	F(MAX)	Protective Function			
				OCP	OVP	OLP	TSD
SSC9526S	600V	35V(Max)	340kHz	Pulse by pulse	Latched	Latched	Latched

Pin Assignment

Pin No.	Symbol	Pin No.	Symbol
1	VSEN	10	COM
2	V_{CC}	11	VGL
3	FB	12	(NC)
4	GND	13	(NC)
5	C_{SS}	14	VB
6	OC	15	VS
7	RC	16	VGH
8	Reg	17	(NC)
9	RV	18	(NC)

Circuit



Features

- ◆ Built-in floating drive circuit for High-side MOSFET
- ◆ Built-in Soft Start Function
- ◆ Uncontrollable Operation Detection Function on pulse-by-pulse basis
- ◆ Automatic Dead Time control Function
  (In heavy loads, fixed 350ns(TYP))
- ◆ Built-in Brown-In／Brown-Out Function
- ◆ Reset detect function
- ◆ External Latch Function
- ◆ Protection Functions
  OCP : Three steps protection corresponding to over current levels
  OLP/OVP/TSD : Latch shutdown

SSC9527S Controller

NEW Products

Back to LLC lineup

Package

SOP18

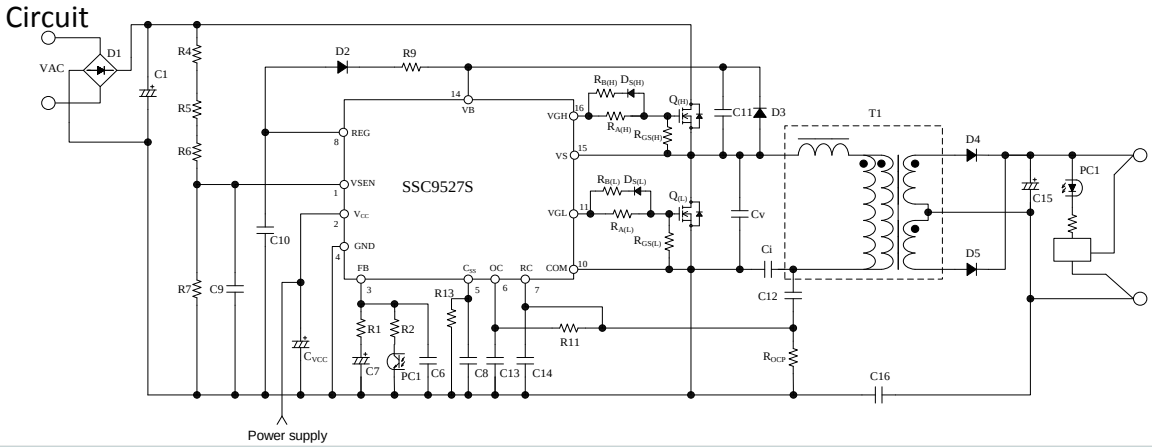
- Brown-in/out Function
- Fixed dead-time 0.3µs(TYP)
- Adjustable minimum frequency
- Reset Detect Function
- Soft start maximum frequency, $F_{(MAX)SS}$= 520kHz
- Uncontrollable Operation Detection Function
- Protection Functions(OCP/OVP/OLP/TSD)

Part Number	V_S pin voltage	V_{CC} input voltage	F(MAX)	Protective Function			
				OCP	OVP	OLP	TSD
SSC9527S	600V	35V(Max)	300kHz	Pulse by pulse	Latched	Latched	Latched

Pin Assignment

Pin No.	Symbol	Pin No.	Symbol
1	VSEN	10	COM
2	V_{CC}	11	VGL
3	FB	12	(NC)
4	GND	13	(NC)
5	C_{SS}	14	VB
6	OC	15	VS
7	RC	16	VGH
8	Reg	17	(NC)
9	(NC)	18	(NC)

Circuit



Features

- Built-in floating drive circuit for High-side MOSFET
- Built-in Soft Start Function
- Uncontrollable Operation Detection Function on pulse-by-pulse basis
- Fixed dead-time 0.3µs(TYP)
- Adjustable minimum frequency
- Built-in Brown-In／Brown-Out Function
- Reset detect function
- Protection Functions
  OCP : Three steps protection corresponding to over current levels
  OLP/OVP/TSD : Latch shutdown

PFC control IC

Back to ALL lineup

Controller

UD : Under development

Series	Package	Type	Link
SSC2100S	SOP8	DCM(Discontinuous Conduction Mode) (Two-phase interleaved)	Jump▸
SSC2001S	SOP8	CCM(Continuous Conduction Mode)	Jump▸
SSC2005 UD	SOIC8	CRM(Critical Conduction Mode)	—
SSC2006 UD	SOIC8		—

SSC2100S Controller

Back to PFC lineup

Package

SOP8

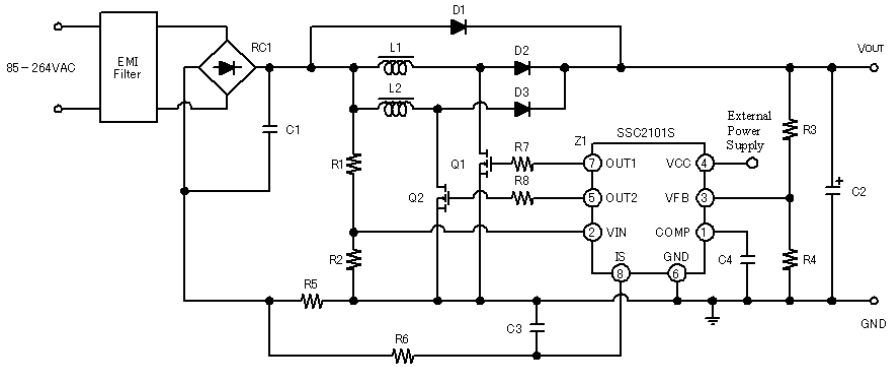
- Interleaved DCM Operation
- Low Peak Current
- Low Ripple Current
- Low Noise
- Maximum ON Time: 15μs/20.7μs (TYP)

Part Number	$V_{CC(ON)}$	Maximum ON Time	$V_{FB(REF)}$	Protective Function		
				OCP	OVP	TSD
SSC2101S	11.6V	15μs	3.5V	Pulse-by-pulse	Auto-restart	Auto-restart
SSC2102S		20.7μs				

Pin Assignment

Pin No.	Symbol	Functions
1	COMP	Error amplifier output
2	VIN	Rectified input voltage detection
3	VFB	Feedback control
4	VCC	Power supply for IC
5	OUT2	2nd Gate driver output
6	GND	Ground
7	OUT1	1st Gate driver output
8	IS	Peak current detection signal input

Circuit



Features

- Interleaved Discontinuous Conduction Mode (DCM) Operation
- Voltage Mode Control
- Built-in Soft Start Function
- Built-in High Speed Response (HSR)

- Protection Functions

Soft Overvoltage Protection (SOVP) : Output voltage decrease
Output Overvoltage Protection (OVP) : Pulse-by-pulse
Over current Protection (OCP) : Dual level OCP, Auto-restart
Output Open Loop Detection (OLD) :
Switching operation stop and transition to standby mode
Open Terminal Protection (OTP) : Shift to standby mode .Auto-restart.
Thermal Shutdown (TSD) : Auto-restart with hysteresis

SSC2001S Controller

Back to PFC lineup

Package

SOP8

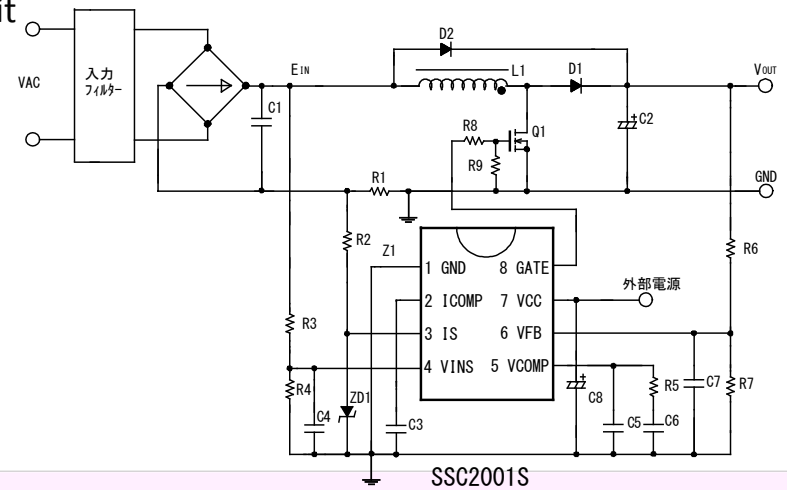
- CCM Operation
- Low Peak Current
- Maximum ON Duty: 94%(TYP)
- Error Amplifier Reference Voltage: 3.5V(TYP)
- Brown-in/out Function

Part Number	$V_{CC(ON)}$	f_{OSC}	Maximum On Duty	$V_{FB(REF)}$	Protective Function		
					OCP	OVP	TSD
SSC2001S	11.3V	65kHz	94%	3.5V	Pulse by pulse	Auto-restart	—

Pin Assignment

Pin No.	Symbol	Functions
1	GND	Ground
2	ICOMP	Current amplifier output
3	IS	Over current detection signal input
4	VINS	Low VIN detection signal input
5	VCOMP	Error amplifier out put
6	VFB	Feedback control
7	V_{CC}	Power supply for IC
8	GATE	Gate driver output

Circuit



Features

- ◆ **C**ontinuous **C**onduction **M**ode(CCM) Operation
- ◆ Average Current Control Method
- ◆ PWM Control (Built-in Random Switching Function)
- ◆ Built-in High Speed Response (HSR)
- ◆ Brown-In / Brown-Out Function

◆ Protection Functions

Over current Protection (OCP) : Auto Restart

Input Current Limitation (OCPL)

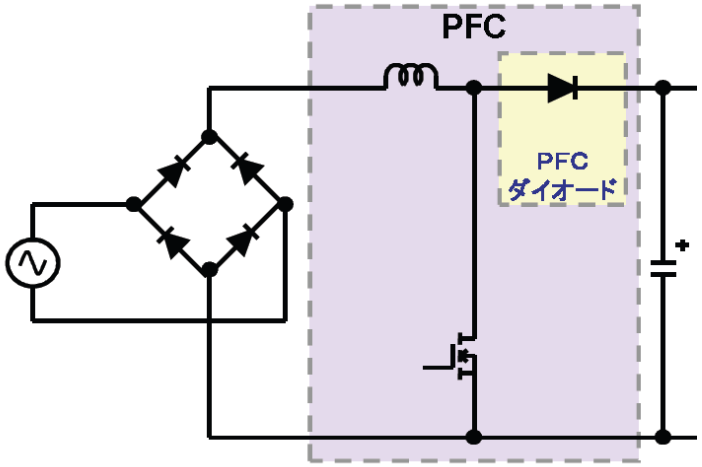
Peak Current Limitation (OCPH)

Overvoltage Protection (OVP) : Pulse-by-pulse

Output Open Loop Detection (OLD) : Auto Restart

Diode for PFC

Type	Series	Feature	Link
DCM Mode CRM Mode	FMN series FMS series	Low V_F, V_F=1.3Vmax	Jump▸
CCM Mode	FMD series FMX series FMXA series FMXK series	Fast Recovery Diode	Jump▸

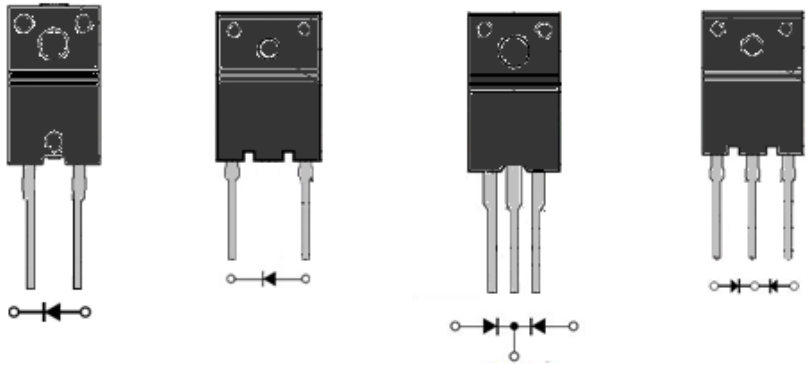


FMN / FMNS Series

Back to PFC lineup

Package

TO-220F-2L TO-3P-2L TO-220F-3L TO-3P-3L



- Low V_F Diode
- V_F = 1.30V(max)
- V_{RM} = 600V
- trr ≦ 200ns

UD : Under development

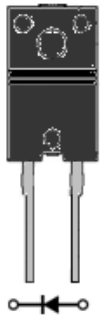
V_{RM} (V)	I_F (AVG) (A)	Part Number	I_{FSM}(A) 10ms Half-wave	PKG.	V_F		I_R(μA)/ H.I_R(mA) (V_R=V_{RM})	trr (ns) I_F:I_R=1:1
					V_F(MAX) (V)	IF(A)		
600	5	FMN-1056S	60	TO-220F -2L	1.30	5	50／5	100
	10	FMNS-1106S	100		1.30	10	100／10	100
	20	FMN-1206S UD	150		1.30	20	200／20	150
	30	FMN-3306S UD	150	TO-3PF -2L	1.30	30	200／20	200
	10 × 2	FMN-2206S	150	TO-220F -3L	1.30	10	100／10	100
	15 × 2	FMN-4306S	150	TO-3PF -3L	1.30	15	150／10	150

FMX / FMD Series

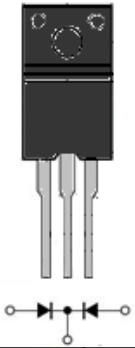
Back to PFC lineup

Package

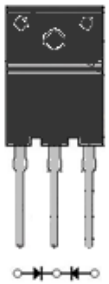
TO-220F-2L



TO-220F-3L



TO-3P-3L



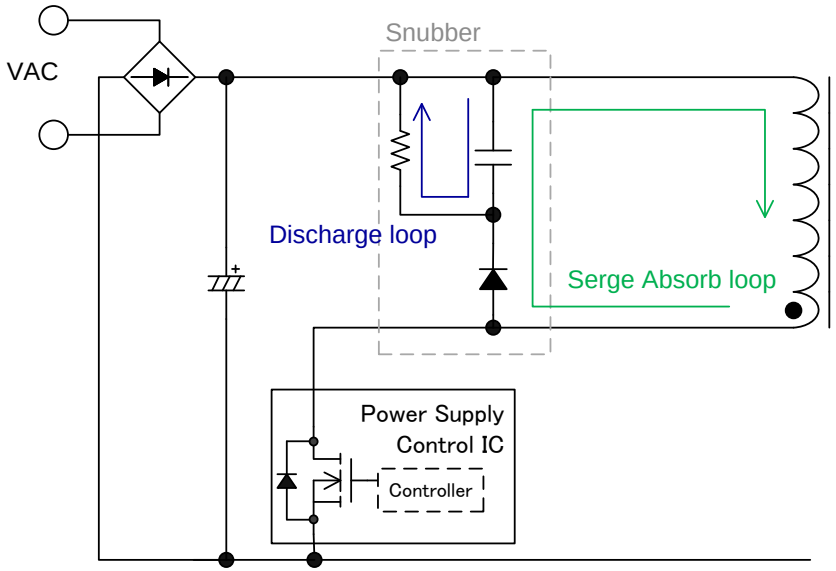
- Fast Recovery Diode
- V_{RM} = 600V
- trr ≦ 50ns

UD: Under development

V_{RM} (V)	I_F (AVG) (A)	Part Number	I_{FSM}(A) 10ms Half-wave	PKG.	V_F		I_R(μA)/ H.I_R(mA) (V_R=V_{RM})	trr (ns) I_F:I_R=1:1
					V_F(MAX) (V)	I_F(A)		
600	5	FMX-G16S	50	TO-220F -2L	1.5	5	50／15	30
	8	FMXK-1086S	100		1.75	8	30／6	27
	10	FMXA-1106S	100		1.98	10	100／30	28
		FMX-1106S	100		1.60	10	50／15	30
	10 × 2	FMXK-2206S	100	TO-220F -3L	1.75	10	100／10	27
		FMXS-2206S	100		1.60	10	50／15	30
		FMXA-4206S UD	100	TO-3PF -3L	1.98	10	100／30	28
		FMX-4206S UD	100		1.50	10	100／20	30
		FMD-4206S	100		1.70	10	100／**0.3**	50

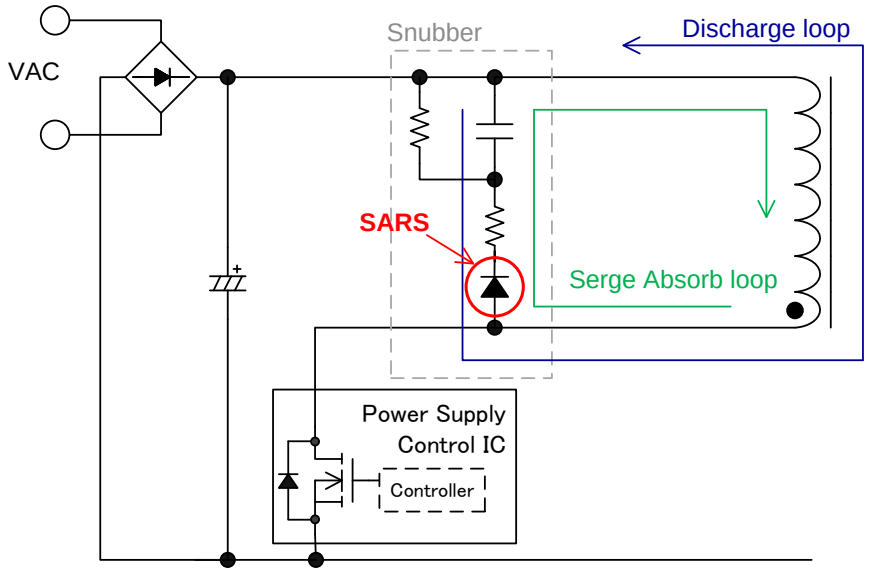
SARS, Diode for Snubber

Using FLR Diode



When MOSFET turns off, the serge current is through “Serge Absorb loop” . It is absorbed by capacitor.
The electrical charge of capacitor is discharged through ”Discharge loop” . The power is not transferred to the secondary side. Thus it become the loss.
When this capacitor is discharged, the recovery current of diode is flowing into the MOSFET. FLR (Fast Recovery Diode) is used in order to achieve the damage control of MOSFET .

Using SARS



When MOSFET turns off, the serge current is through “Serge Absorb loop” . It is absorbed by capacitor.
When SARS is used, the electrical charge of capacitor is discharged through ”Discharge loop” in recovery period of SARS. This power is transferred to the secondary side.
When this capacitor is discharged, the recovery current of diode is flowing into the MOSFET. Include the inductance in series with SARS in order to achieve the damage control of MOSFET. (Patented circuit)

SARS, Diode for Adjunct Switch

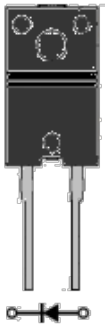
Buck to PFC lineup

Package

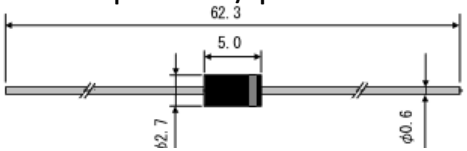
SJP

X / Y / Z
= 4.5 : 2.6 : 2.15
Unit : mm

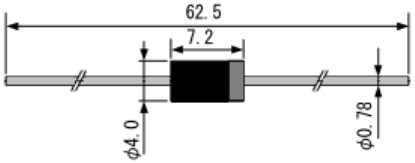
TO-220F-2L



Axial-ϕ2.7mm/ϕ0.60mm



Axial-ϕ4.0mm/ϕ0.78mm



- Improve Circuit Efficiency Snubber System
- V_{RM}=800V

Type	Part Number	V_{RM}	I_F (AVG)	I_{FSM} 50Hz Half-wave	V_F		trr $I_F:I_R=1:1$	Package
					V_F (max)	I_F		
External resistance	SARS01	800V	1.2A	110A	0.92V	1.2A	2 to18	Axial-φ2.7/φ0.60
	SARS02	800V	1.5A	100A	0.92V	1.5A	2 to18	Axial-φ4.0/φ0.78
	SARS05	800V	1A	30A	1.05V	1A	2 to 18	SJP(SMA:4.5×2.6)
Built-in resistance(22Ω)	SARS10	800	0.3A	1.5A	13V	0.5A	1 to 9	TO220F-2L