

FUJI Power Semiconductors

Power Supply Control ICs Selection Guide



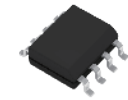
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The FA8C71N green-mode PWM control IC for AC/DC converters provides an optimal system for flyback converters. The ability to control burst operation helps improve the standby power and light load efficiency required of power supplies. The built-in FET drive circuit has a clamping function that eliminates the need for a gate protection circuit. The high withstand voltage of the start-up circuit enables a wide range of input voltage.

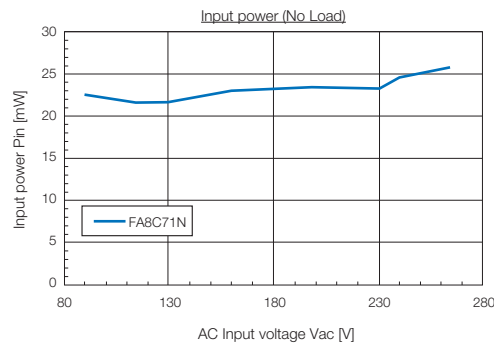
■ Application examples
OA equipment, AC adapters,
industrial power supplies,
LCD-TV, etc.



Package: SOP-8

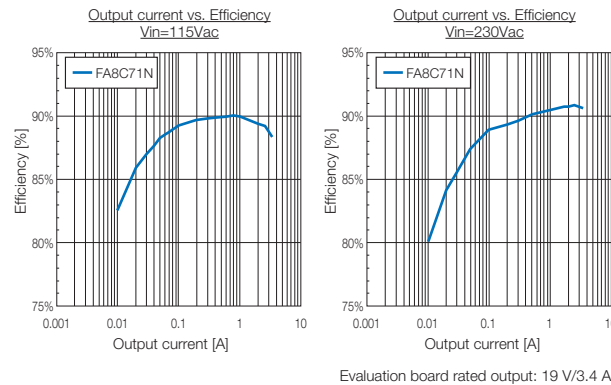
1 Low standby power

Fuji Electric's proprietary optimized burst control makes it possible to achieve a no-load standby power consumption of 30 mW or less.



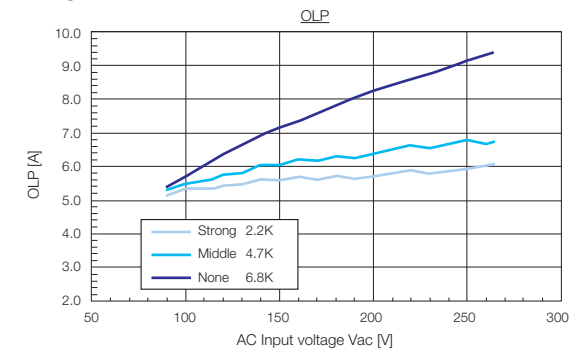
2 Improved efficiency at light load

Efficiency of over 90% is achievable at 25% load.



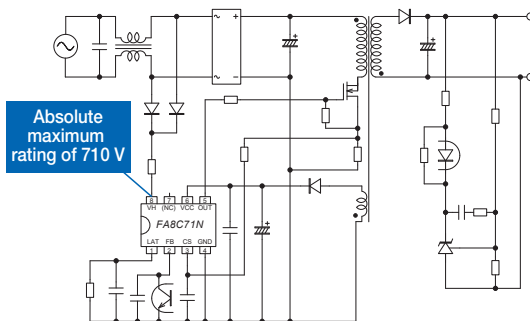
3 Line compensation for overload detection selectable from 3 patterns

Provide a new setting of “None” for line compensation. Overload protection is also available for power supplies with PFC.



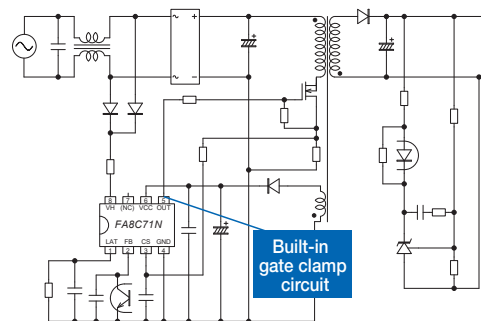
4 Support a wide range of input voltage

Its built-in 710 V start-up circuit supports a wide range of input voltage.



5 Built-in gate clamp circuit

The FET drive circuit incorporates a gate clamp circuit with 16 V limit to cope with Vcc fluctuations.



FA8C71N function table

Item	FA8C71N
Light load efficiency improvement function	Frequency reduction + burst mode
Burst operation point adjustment	Linearly adjustable*1
X-CAP discharge function	Built-in
Overload protection (OLP)	Latch
Delay time	200 ms
Line compensation	Selectable (3 patterns. One of them is “No line compensation”)
Vcc Overvoltage protection	36.0 V (latch)
Overheat protection	137°C (latch)*2
DSS(Dynamic self supply)	Built-in
Start-up circuit absolute maximum rating	710 V

*1 When the burst operation point adjustment function is selected

*2 Overheat protection is also possible using an external thermistor.

LLC Current Resonant Control IC

FA6C60N Series

Featured Product **2** → P15

The FA6C60N Series LLC current resonant control IC contributes to improving light-load efficiency and achieving lower standby power for various switching power supplies through automatic burst control. Depending on the system, users can select either IC-based protection mode auto restart or latch off*1. At light loads, users can select soft-start to reduce transformer audible noise during burst mode. Fuji Electric's proprietary control method stabilizes output voltage by responding quickly to sudden load change.

*1: When the IC is stopped by the latch mode protection, protective mode is maintained until the supply voltage of the IC drops.

Application examples
LCD-TV, OA equipment,
industrial power supplies

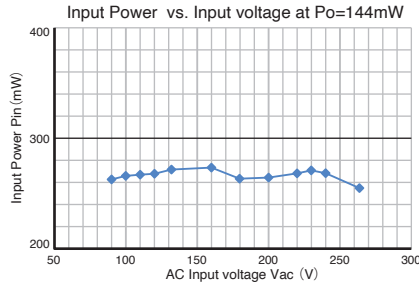


Package: SOP-16(N)



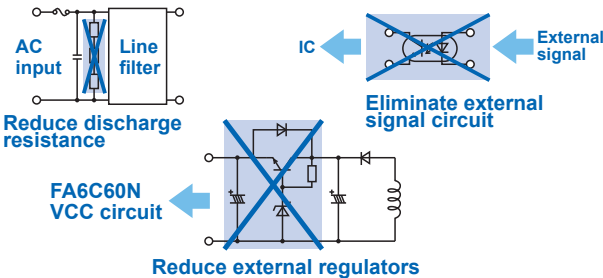
1 Low standby power

Depending on the selected product type and settings, it is possible to achieve an input power of 270 mW or less at 220 V AC input and 144 mW output power.



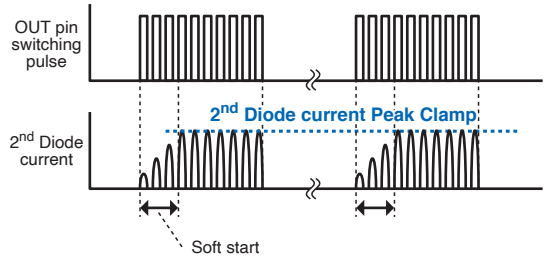
4 Reduce components in power supply

Reduce the number of components in power supply by built-in an X-CAP discharge function, auto burst mode control function, and Power MOSFET drive power supply.



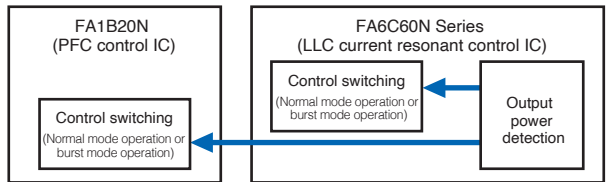
2 Transformer audible noise reduction

The FA6C60N Series can reduce transformer audible noise by selecting the product type and soft-start setting.



5 Auto burst mode function

The LLC IC detects output power. When PFC IC is FA1B20N, both PFC IC and LLC IC switch from normal mode operation to burst mode operation at light load. (For PFC control ICs other than FA1B20N, the power supply voltage of the PFC-IC is turned on and off by the LLC_IC signal.)

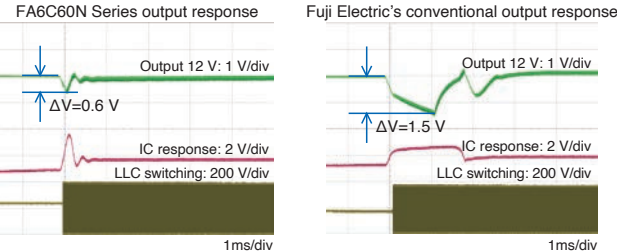


*The switchable output power is adjustable.

Representative example

3 High-speed response

The FA6C60N Series uses Fuji Electric's proprietary control method to enable high-speed response in LLC current resonant converters and to suppress output voltage fluctuations.



FA6C60N/61N/62N/63N Table of Common Functions

Item	FA6C60N/61N/62N/63N
Auto burst mode function	Built-in
X-CAP discharge function	Built-in
Startup circuit (VH pin)	Built-in, 650 V
High side driver	Built-in, 780 V
Gate driver power supply	Built-in
Automatically adjusted dead time	Built-in
Capacitive mode prevention function	Built-in
Brownout protection	Built-in
ESD (HBM)	All pins ± 2 kV
Operating junction temperature	-40°C to +150°C
Package	SOP16 (3.9 mmx10.0 mm)

CRM PFC control IC and LLC current resonant control IC for high power factor and low THD power supplies

FA1B10N/FA6C64N

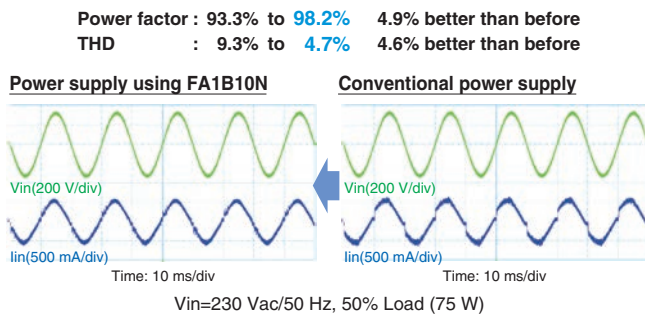
Featured Product **3** → P15,17

The FA1B10N CRM PFC (Critical conduction mode PFC) control IC and FA6C64N LLC current resonant control IC are suitable for LED driver power supplies. They achieve high power factor and low THD (Total Harmonic Distortion)*1, and have a built-in auto burst function that ensures high efficiency even at light loads. They are applicable to a variety of CVCC control power supplies.

*1: THD is a value that expresses the degree of voltage and current distortion; where the lower the value, the lower the distortion.

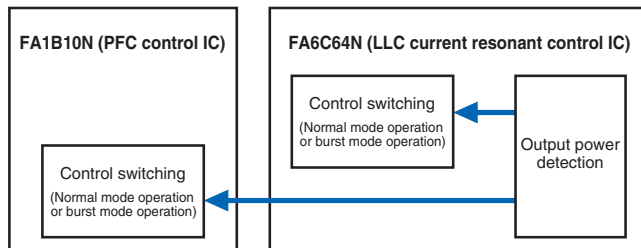
1 Improve power factor and THD

It enables high power factor and low THD even at high input voltages due to the PFC control IC's power factor and THD improvement function.



3 Support burst function

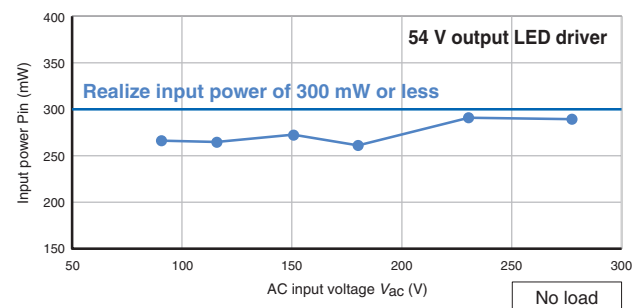
It detects output power using the FA6C64N, and can switch from normal mode operation to burst mode operation for both the FA1B10N and FA6C64N at light loads.



*The switchable output power is adjustable.

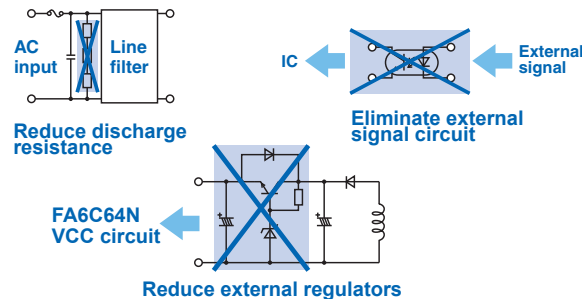
2 Low standby power

It is possible to achieve an input power of 300 mW or less at no load under worldwide input voltage without an auxiliary power supply.

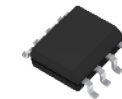


4 Reduce components in power supply

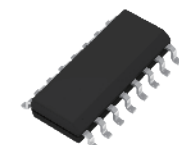
Reduce the number of components in power supply by built-in an X-CAP discharge function, auto burst mode control function, and Power MOSFET drive power supply.



Application examples
LED driver, power supplies, chargers,
industrial power supplies



FA1B10N
Package: SOP-8



FA6C64N
Package: SOP-16(N)

Table of FA1B10N PFC control IC functions

Item	FA1B10N
Power factor and THD improvement function	Built-in
Auto burst mode function	Built-in
X-CAP discharge function	Built-in
Startup circuit	Built-in, 650 V
Overcurrent protection	Built-in
PFC overvoltage protection	Built-in
ESD guaranteed operating voltage (HBM)	All pins ± 2 kV
Operating junction temperature	-60°C to +150°C
Package	SOP-8 (3.9 mm x 5.0 mm)

Table of FA6C64N LLC control IC functions

Item	FA6C64N
Auto burst mode function	Built-in
X-CAP discharge function	Built-in (selectable)
Startup circuit	Built-in, 650 V
High side driver	Built-in, 780 V
Gate driver power supply	Built-in
VCC pin voltage	40 V withstand voltage
Automatically adjusted dead time	Built-in
Capacitive mode prevention function	Built-in
Brownout protection	Built-in
Overcurrent protection	Built-in
Overload protection	Built-in
ESD guaranteed operating voltage (HBM)	All pins ± 2 kV
Operating junction temperature	-60°C to +150°C
Package	SOP-16(N) (3.9 mm x 10.0 mm)

FA1A60N/FA6B20N

The FA1A60N CRM PFC (Critical conduction mode PFC) Control IC and FA6B20N LLC current resonance control IC provide an optimum system for LLC converters with an input of 75W or higher. The auto standby function enables the products to be applied not only to internal power supplies for LCD TVs, etc but also to adapters that do not have external standby signals.

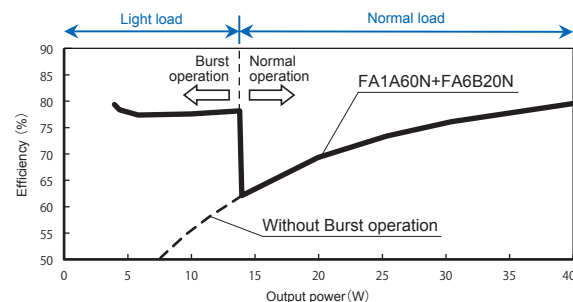
Application examples

LCD-TV, high power adapters, office automation (OA) equipment, communication power supplies and industrial power supplies



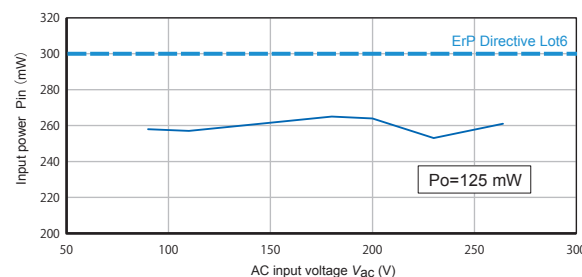
1 Improved efficiency at light load

Efficiency above 75% is achieved at 3% of rated power by providing burst control for both PFC control IC and LLC control IC at light load.



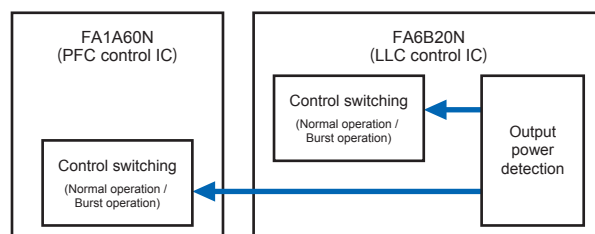
2 Low standby power

Standby power below 260 mW is achieved without standby power supply when input is 230 V AC and output power is 125 mW. (ErP Directive Lot6*1: 0.3 W or lower)



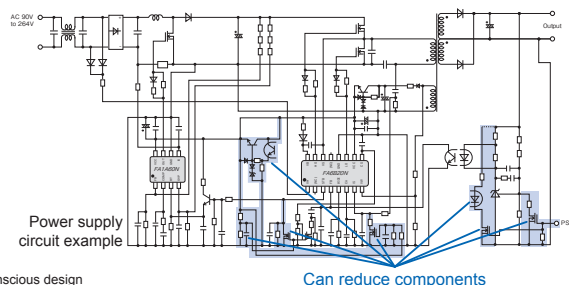
3 Auto standby function

Output power is detected by LLC control IC, and at light load condition, both PFC control IC and LLC control IC are switched from normal operation to burst operation.

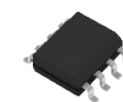


4 Reduced power supply components

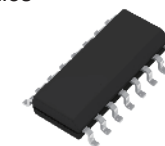
Because the auto standby function is integrated, an external standby signal is unnecessary. This makes it possible to reduce the number of components by seven, including the photo coupler.



*1 The ErP Directive is also called the Eco Design Directive, the EU regulation that obligates environmentally conscious design



FA1A60N
Package:SOP-8



FA6B20N
Package:SOP-16 (N)

PFC control IC "FA1A60N" function table

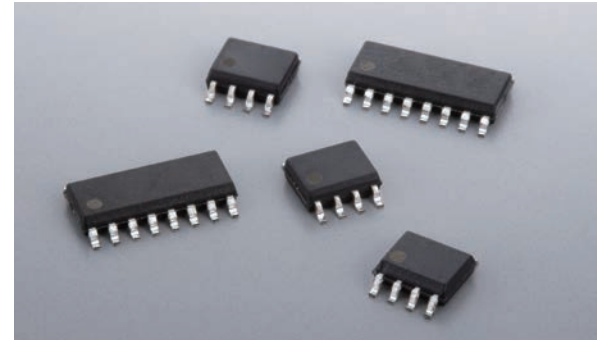
Item	FA1A60N
Function to improve efficiency at light load	Built-in
Auto standby function	Built-in
VCC consumption current (in standby)	0.25 mA
Zero current detection auxiliary winding	Unnecessary
Over-current protection function	Built-in
Duplicated over-voltage protection	Built-in
ESD withstand voltage (HBM)	Total pins ± 2 kV
Operating ambient temperature	-40°C to +105°C
Package	SOP-8 (3.9 mm $\times$ 5.0 mm)

LLC control IC "FA6B20N" function table

Item	FA6B20N
Function to improve efficiency at light load	Built-in
Auto standby function	Built-in
VCC consumption current (in standby)	0.8mA
Maximum oscillation frequency	450 kHz
Dead time automatic adjustment	Built-in
X-cap discharge function	Built-in
Capacitive-mode prevention function	Built-in
Brown-out protection function	Built-in
Over-current protection function	Built-in
Over-load protection function	Built-in
ESD withstand voltage (HBM)	All pins ± 2 kV
Operating ambient temperature	-40°C to +105°C
Package	SOP-16(N) (3.9 mm $\times$ 10.0 mm)

Power Supply Control ICs

Fuji Electric offers a lineup of power supply control ICs for AC/DC power supplies that support a variety of power supply configurations and specifications. These highly efficient, low-noise products with low standby power consumption are compatible with environmental regulations. Furthermore, many protection functions are built into the ICs themselves, allowing for smaller power circuits.



Features of Power Supply Control ICs

Green Mode PWM-ICs P9

■ Features

- Built-in 500/650/710/750 V withstand voltage start up circuit
- Green mode functions (Intermittent Switching/ Linearly reduced switching frequency)
- Protect functions (Over voltage/Brown out/ 2 stage Over power etc.)
- Low EMI noise by jittering of frequency

General PWM-ICs P11

■ Features

- Built-in error amplifier
- Adjustable switching frequency
- 5 V reference voltage output

Green Mode Quasi-resonant ICs P13

■ Features

- Built-in 500 V withstand voltage start up circuit
- Green mode functions (Intermittent Switching/ Linearly reduced switching frequency)
- Protect functions (Over voltage/Over load etc.)

Current Resonant ICs P15

■ Features

- Built-in 600/650 V withstand voltage start up circuit
- Built-in High side driver
- Preventing capacitive region operation, Self-adjusting dead time function
- Protect functions (Over current/Over voltage/ Over load/Over heat/Brown out)
- Green mode function (Intermittent switching)
- Realize 1 convertor circuit structure at worldwide input power

Power Factor Correction ICs P17

■ Features

- Wide electric power range (From 75 W to 1 kW)
- Power factor ≥ 0.99
- Protect functions (FB Pin open short/Over voltage etc.)
- Improved efficiency at light load by frequency reduction

High and Low side driver IC P19

■ Features

- High robustness of negative transient voltage on VS pin
- Wide range supply voltage up to 30 V
- 3.3 V logic compatible
- Built-in under voltage lockout
- Allowable offset supply voltage transient dV_s/dt up to 50 kV/us
- High speed response: Turn on/off delay time 125 ns (typ.)

Contents

No.	Title	Page	Applicable circuit					
			Flyback	Forward	Full-bridge	Half-bridge Current Resonant	Boost	Buck
1	Product map	7						
2	AC/DC Power Supply Control ICs	Green Mode PWM-ICs (Current Mode)	9	✓				
3		General PWM-ICs	11	✓	✓		(✓) *1	(✓) *1
4		Green Mode Quasi-resonant ICs (Current Mode)	13	✓				
5		Current Resonant ICs	15			✓		
6		Power Factor Correction ICs	17	✓			✓	
7	Driver IC	19			✓	✓		✓
8	Application circuit examples	21						
9	Package outlines	23						

*1: Some products can be utilized depending on the applicable circuit

Type nomenclature

Example: FA8A00N

F		A		8		A	00	N	
Company symbol		Control system		Series		Generation	Number	Package code	
F	Fuji	A	Analog	1	CRM PFC*	A	Two-digit integer	N	SOP
				6	LLC	B			
				8	PWM	C			
					...				

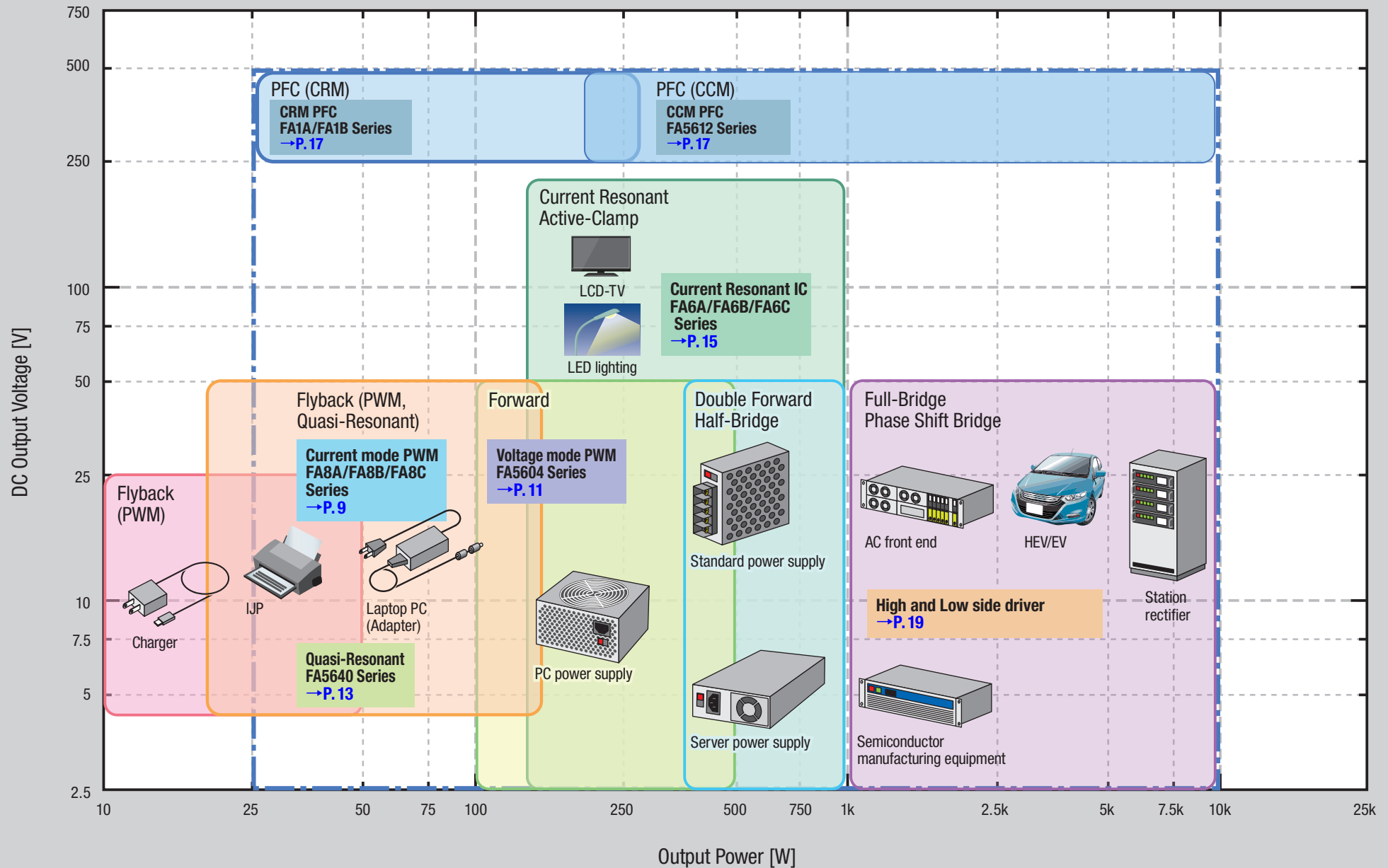
*CRM PFC: Critical Conduction Mode PFC

Example: FA5590N

F		A		55		90	N	
Company symbol		Control system		Series		Number	Package code	
F	Fuji	A	Analog	3X	AC/DC	Two-digit integer	N	SOP
				5X				
				13X				

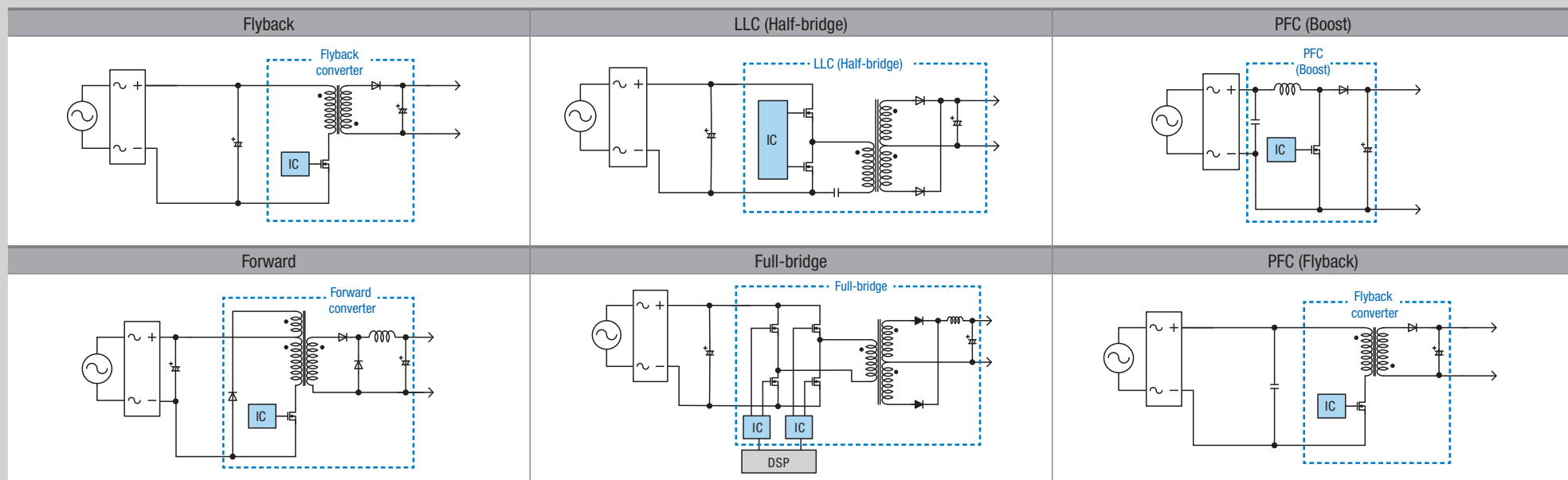
Product Map

Application specific output power/output voltage and applicable ICs



Circuit type (AC/DC)

Circuit type	Product category	Page	Output power							
			10W	50W	100W	150W	200W	300W	500W	1kW -
Flyback	Green Mode PWM-ICs (Current Mode)	9								
	General PWM-ICs	11								
	Green Mode Quasi-resonant ICs (Current Mode)	13								
Forward	General PWM-ICs	11								
LLC (Half-bridge)	Current Resonant ICs	15								
Full-bridge	Driver IC	19								
PFC (Boost)	Power Factor Correction ICs (Critical Conduction Mode)	17								
	Power Factor Correction ICs (Continuous Conduction Mode)	17								
PFC (Flyback)	Power Factor Correction ICs (FA1B00N, FA1A21N)	17								



Green Mode PWM-ICs (Current Mode)

★: Featured Product ⇨ P1

Generation	Series	Type name	Control mode	Applied circuit	Built-in start up circuit	X-Cap discharge function	Brown out function	Max Duty	Frequency fsw	Overcurrent detection	Protection mode			Light-load switching	Power supply voltage Vcc	Vcc threshold voltage		Package	Remarks	
											Over load	Over power	Overvoltage			ON	OFF			
7th generation	FA8Cxx Series	★FA8C71N NEW	Current mode	Flyback	✓ 710 V	✓	—	85%	65 kHz	+ detection	Timer-latch	1 Stage	Latch Vcc detection	Linearly frequency reduction + Intermittent operation	10-33 V	12.5 V	7.5 V	SOP-8		
6th generation	FA8A00 Series (Basic functions version)	FA8A00N			✓ 500 V	✓	Fixed	83%	65 kHz	+ detection	Auto-Recovery	2 Stage (OPP ratio 1:1.4)*	Latch Vcc detection	Linearly frequency reduction + Intermittent operation	12-24 V	13 V	6.5 V			
		FA8A01N									Timer-latch Delay 70 ms									
		FA8A40N									Auto-Recovery									
		FA8A41N									Timer-latch Delay 70 ms									
		FA8A27N							Timer-latch Delay 860 ms		2 Stage (OPP ratio 1:1.8)*	10-28 V								
		FA8A37N							Timer-latch Delay 1.6 s											
		FA8A39N							Timer-latch Delay 2.5 s											
		FA8A12N							Auto-Recovery						2 Stage (OPP ratio 1:1.4)*					12-24 V
	FA8A60 Series (Advanced functions version)	FA8A60N			✓ 500 V	—	—	83%	65kHz	+ detection	Auto-Recovery	1 Stage	Latch Vcc detection	Linearly frequency reduction + Intermittent operation (Frequency reduction/burst point adjustable)	10-24 V	12.5 V	6.5 V			
		FA8A61N									Timer-latch									
		FA8A64N									Auto-Recovery									
		FA8A65N									Timer-latch									
		FA8A70N			Auto-Recovery															
		FA8A71N			Timer-latch															
		FA8A74N			Auto-Recovery															
		FA8A75N			Timer-latch															
	FA8A80 Series (Advanced functions, VH high withstand-voltage version)	FA8A80N			✓ 650 V	—	—	83%	65 kHz	+ detection	Auto-Recovery	1 Stage	Latch Vcc detection	Linearly frequency reduction + Intermittent operation (Frequency reduction/burst point adjustable)	10-24 V	12.5 V	6.5 V			
		FA8A81N				✓	Fixed				Timer-latch									
		FA8A83N				—	—				Auto-Recovery									
		FA8A84N				—	—				Timer-latch									
		FA8A85N			—	Fixed	Auto-Recovery													
		FA8A86N			—	—	Auto-Recovery													
		FA8A87N			✓	—	65 kHz	Timer-latch	Latch Vcc detection											
		FA8A90N						Auto-Recovery												
		FA8A91N						Timer-latch												
		FA8A94N						Auto-Recovery												
		FA8A95N						Timer-latch												
		FA8A95N						Timer-latch												
FA8Bxx Series	FA8B16N	✓ 500 V			✓	Fixed	83%	65 kHz	+ detection	Auto-Recovery	2 Stage (OPP ratio 1:1.5)*	Latch Vcc detection	Linearly frequency reduction + Intermittent operation	12-24 V	12.5 V	8 V				
5th generation	FA5680 Series	FA5680N	✓ 750 V	—	—	85%	65 kHz	— detection	Auto-Recovery	1 Stage	Latch Vcc detection	Linearly frequency reduction + Intermittent operation	11-24 V	18 V	8 V	OCP,OLP correction by external circuit				
	FA5681N	Timer-latch																		

*OPP ratio = Over Load Protection (OLP) : Over Current Protection (OCP)

Green Mode PWM-ICs (Current Mode)

★: Featured Product ⇨ P1

Features

- With 500 V/650 V/710 V/750 V withstand voltage start up circuit
- Green mode functions (Intermittent Switching/Linearly reduced switching frequency)
- Protect functions (Over voltage/Brown out/2 stage Over power, etc.)
- Low EMI noise by jittering of frequency

Green mode PWM-ICs with Brown Out function

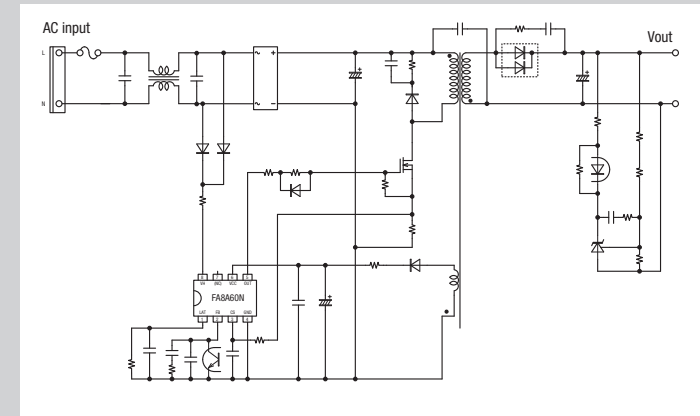
	Green Mode PWM IC											
Brown out function	With											
Current sense	Positive											
Over power protection	2 Stage OPP ratio 1:1.4*				2 Stage OPP ratio 1:1.8*			2 Stage OPP ratio 1:1.5*		1 Stage		
Frequency (kHz)	65		100		65		65		65		100	
Overload protection	Auto-Recovery		Timer-latch		Auto-Recovery		Timer-latch		Auto-Recovery		Timer-latch	
OLP delay time (ms)	70		70		70		70		860		1600	
X-Cap discharge function	With										Without	
Start up circuit 500 V	FA8A00N		FA8A01N		FA8A40N		FA8A41N		FA8A27N		FA8A37N	
Start up circuit 650 V											FA8A39N	
											FA8B16N	
											FA8A83N	
											FA8A86N	

*OPP ratio = Overload threshold (OLP): Overcurrent threshold (OCP)

Green mode PWM-ICs without Brown Out function

	Green Mode PWM IC																					
Brown out	Without																					
Over power protection	1 Stage																					
Current sense	Negative					Positive					2 Stage											
Overload protection	Auto-recovery		Timer-latch		Auto-recovery		Timer-latch			Auto-recovery												
Frequency (kHz)	65		65		65		100		65		100		65									
X-Cap discharge					With		With		With		With		With									
OCP OLP Line compensation					With								With									
Type (start up circuit 500 V)					FA8A60N		FA8A70N		FA8A64N		FA8A74N		FA8A61N		FA8A71N		FA8A65N		FA8A75N		FA8A12N	
Type (start up circuit 650 V)					FA8A80N		FA8A90N		FA8A84N		FA8A94N		FA8A81N		FA8A91N		FA8A87N		FA8A85N		FA8A95N	
Type (start up circuit 710 V)															FA8C71N★							
Type (start up circuit 750 V)	FA5680N		FA5681N																			

Circuit example (Flyback) : FA8A60N



General PWM-ICs

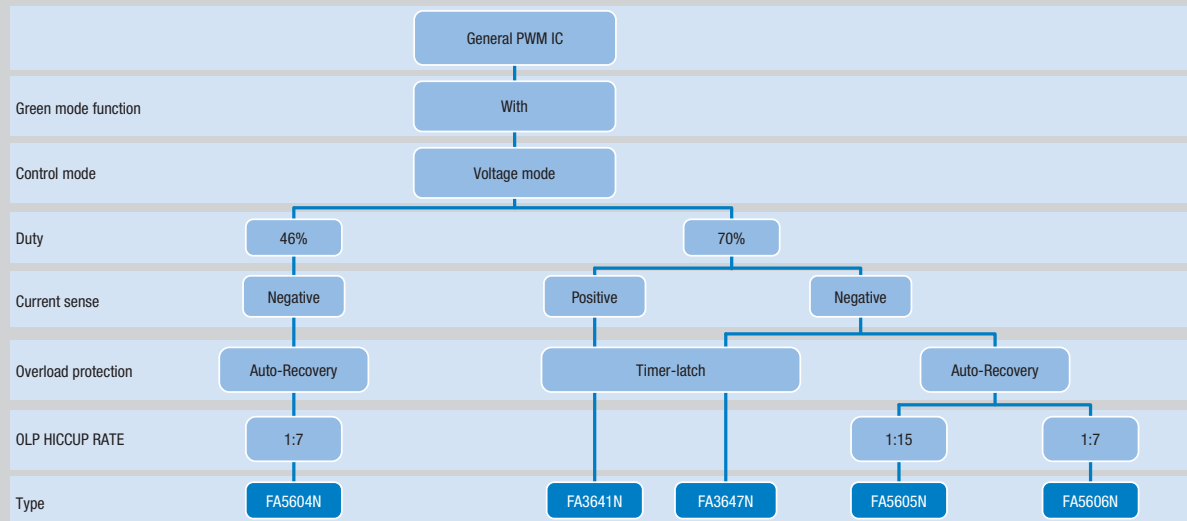
Series	Type name	Control mode	Applied circuit	Max Duty	Frequency fsw	Overcurrent detection	Protection mode		Light-load switch operation	Power supply voltage Vcc	Vcc threshold voltage		Package	Features
							Overload	Overvoltage			ON	OFF		
FA1384× Series	FA13842N	Current mode	Flyback	96%	External settings 10-500 kHz	+ detection	—	—	—	10-25 V	16.5 V	9.0 V	SOP-8	· 384 Series pin compatible · 5 V reference voltage output · With error amplifier
	FA13843N										9.6 V			
	FA13844N		Forward	48%	External settings 5-250 kHz						16.5 V			
	FA13845N										9.6 V			
FA5504 Series	FA5504N	Forward	46%	External settings 10-500 kHz	+ detection	Timer-latch	CS latch Vcc voltage detection	—	10-28 V	16.5 V	9.0 V	· With error amplifier · 5 V reference voltage output		
FA551× Series	FA5510N	Forward	46%	External settings 10-500 kHz	+ detection	Timer-latch	CS latch Vcc voltage detection	—	10-28 V	16.5 V	9.0 V	· 5 V reference voltage output		
	FA5511N	Flyback	70%		— detection									
	FA5515N	Flyback	70%		— detection									
FA364× Series	FA3641N	Voltage mode	Flyback	70%	External settings 30-500 kHz	+ detection	Timer-latch	CS latch Vcc voltage detection	Frequency reduction	10-28 V	16.5 V	9.0 V		· 5 V reference voltage output · Frequency-reduction function added to FA5511/15
	FA3647N					— detection								
FA5604 Series	FA5604N		Forward	46%	External settings 100-300 kHz	— detection	Auto-Recovery	CS latch (External detection)	Frequency reduction Start/stop FB voltage 1.8 V/1.95 V	10-30 V	17.5 V	9.7 V		· Overload current drooping frequency reduction
	FA5605N		Flyback	70%					Frequency reduction Start/stop FB voltage 1.55 V/1.65 V					
	FA5606N								—					
	FA5607N								—					

General PWM-ICs

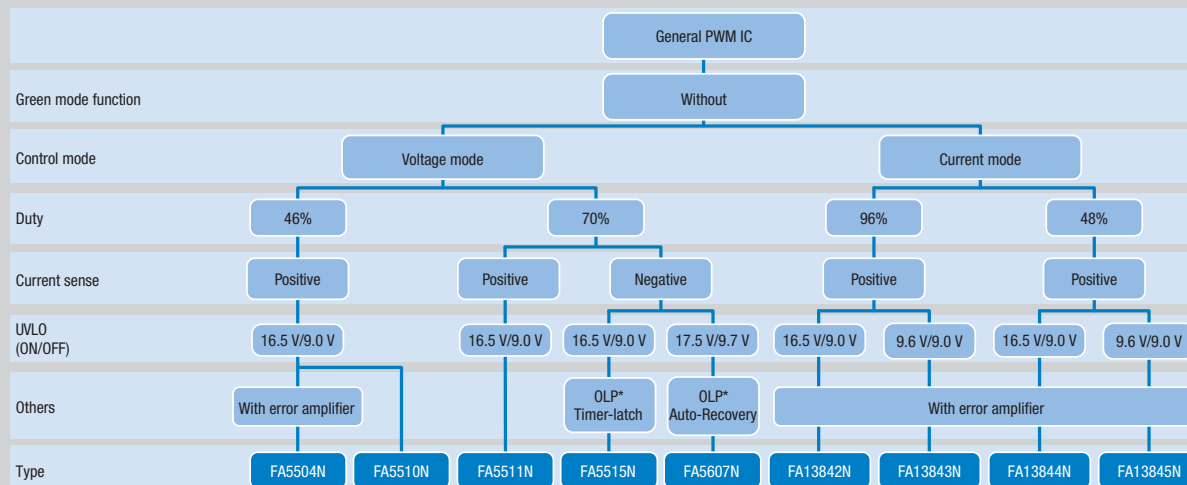
Features

- Built-in error amplifier
- Adjustable switching frequency
- 5 V reference voltage output

General PWM Control IC Series with Green Mode Function

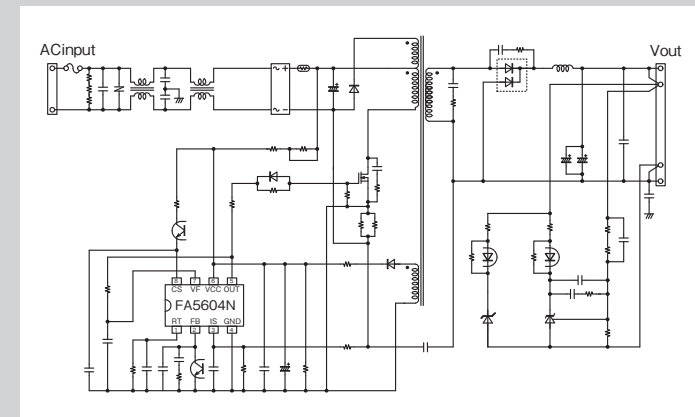


General PWM Control IC Series without Green Mode Function



* OLP : Over Load Protection

Circuit example (Forward) : FA5604N



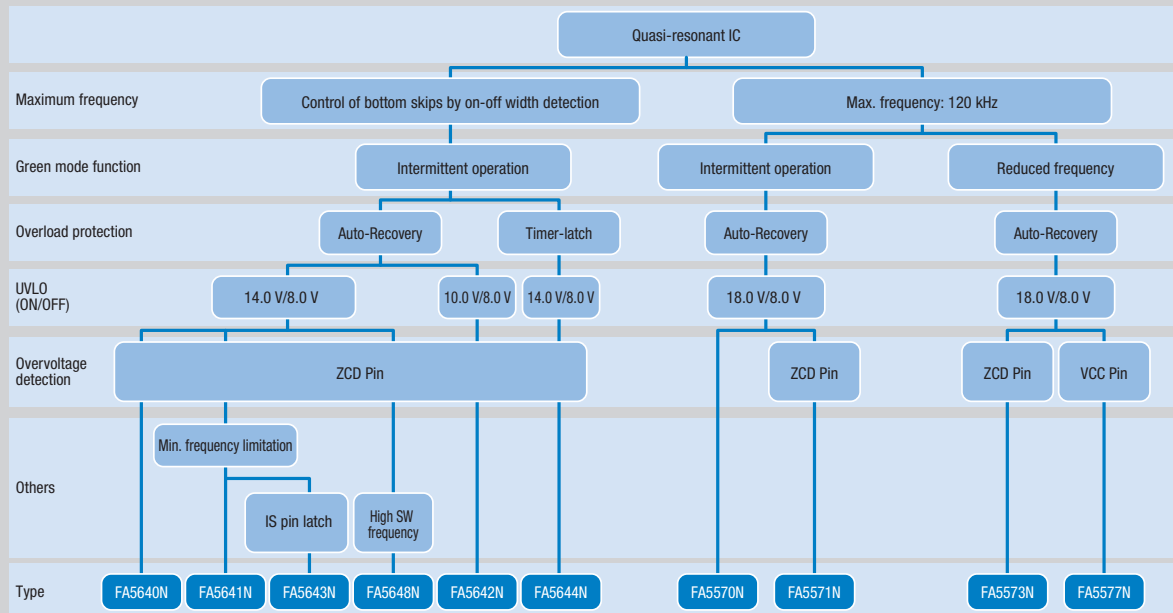
■ Green Mode Quasi-resonant ICs (Current Mode)

Generation	Series	Type name	Control mode	Applied circuit	Built-in start up circuit	Frequency fsw	Overcurrent detection	Protection mode		Light-load switch operation	Power supply voltage Vcc	Vcc threshold voltage		Package	Features					
								Overload	Overvoltage			ON	OFF							
4th generation	FA5640 Series	FA5640N	Current mode	Flyback	✓ 500 V	Bottom skip count control via self-excited on-off width detection, estimated frequency switching from 1st to 2nd bottom 110 kHz (FA5648 is 260 kHz)	+ detection +0.5 V (AC100 V) +0.45 V (AC230 V)	Auto-Recovery	Latch ZCD voltage detection	Intermittent operation	11-26 V	14.0 V	8.0 V	SOP-8	—					
		FA5641N										· Minimum frequency (25kHz)								
		FA5642N										—								
		FA5643N						Timer-latch				14.0 V			· Min. frequency limitation · Latch stop function (IS pin)					
		FA5644N													—					
		FA5648N						Auto-Recovery							· For High SW frequency					
3rd generation	FA5571 Series	FA5570N			✓ 500 V	Self-oscillation Maximum 120 kHz	+ detection +1.0 V	Auto-Recovery	—	Intermittent operation	10-28 V	18.0 V	8.0 V		—					
		FA5571N							Latch ZCD voltage detection						· Overvoltage ZCD detection					
		FA5573N					+ detection +0.5 V		Latch Vcc voltage detection	Linearly frequency reduction					—					
		FA5577N													—					

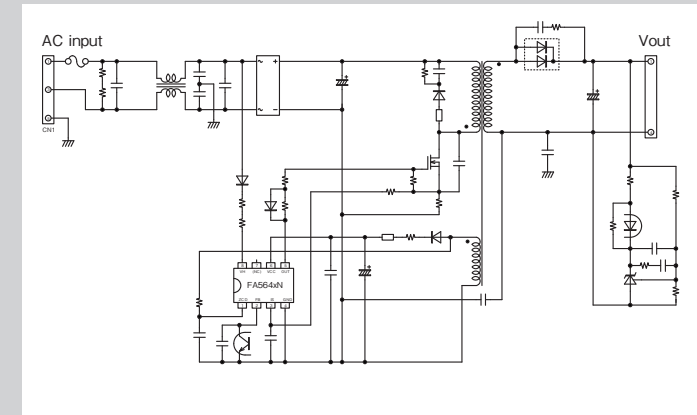
■ Green Mode Quasi-resonant ICs (Current Mode)

● Features

- Built-in 500 V withstand voltage start up circuit
- Green mode functions (Intermittent Switching/Linearly reduced switching frequency)
- Protect functions (overvoltage/overload, etc.)



● Circuit example (Flyback) : FA5640N



Current Resonant ICs

★: Featured Product ⇨ P2, 3, 4

Generation	Series	Type name	Applied circuit	Built-in start up circuit	High side floating voltage	X-Cap discharge function	Brown out function	Low standby mode switching	Duty	Current sense	Frequency fsw	Protection mode			Light-load switching	Power supply voltage Vcc	Vcc threshold voltage		Package	Features	
												Overcurrent	Overload	Overvoltage			ON	OFF			
4th generation	FA6Cxx Series	★FA6C60N NEW	Current resonant LLC (Half bridge)	✓ 650 V		✓ “None” can be selected using the state setting	100 V/200 V system switching	CA Pin detection Auto switching	50%	Positive-Negative	24.4-639 kHz	Auto-recovery	Auto-recovery	Auto-Recovery	Burst operation FB pin control	14-27 V	14.0 V	9.0 V	SOP-16 (N)	· Soft start function during burst operation · X-Cap. discharge function · Auto standby function · State setting function · Built-in FET drive power supply	
		FA6C61N NEW										Latch	Latch								
		FA6C62N NEW										Auto-recovery	Auto-recovery								
		FA6C63N NEW										Latch	Latch								
		★FA6C64N NEW					Auto-recovery					Auto-recovery	14-36 V			16.0 V	9.0 V	· X-Cap. discharge function · Auto standby function · State setting function · Built-in FET drive power supply			
3rd generation	FA6Bxx Series	FA6B19N		✓ 600 V	600 V	—	✓ Fixed	CA Pin detection Auto switching/ external switching	50%	Positive-Negative	25-450 kHz	Auto-recovery	Auto-Recovery	Auto-Recovery	Burst operation FB pin control	14-29 V	14.0 V			9.0 V	· Auto standby function · State setting function · Transient response improvement · Auto standby function · BO detection delay extension type · Auto standby function
		★FA6B20N			750 V																
		FA6B21N			600 V																
		FA6B22N*																			
2nd generation	FA6Axx Series	FA6A00AN		✓ 600 V	600 V	✓	✓ Fixed	Adjustable	External switching STB pin	50%	Positive-Negative	38-350 kHz	Timer-latch	Auto-Recovery	Timer-latch	Burst operation Vcc pin control	14-27 V	12.0 V		9.0 V	· Power good signal output · State setting function · Supports W/W input voltage · Brown out detection level adjustment · State setting function · Supports W/W input voltage · State setting function · Brown out detection level adjustment · Supports W/W input voltage
		FA6A10N					Auto-recovery						Auto-Recovery								
		FA6A11N					Timer-latch						Timer-latch								
		FA6A30N					Auto-recovery						Auto-Recovery	Burst operation FB pin control		13.0 V					
		FA6A31N					Timer-latch						Timer-latch								

*: B0 detection delay time extension type

Current Resonant ICs

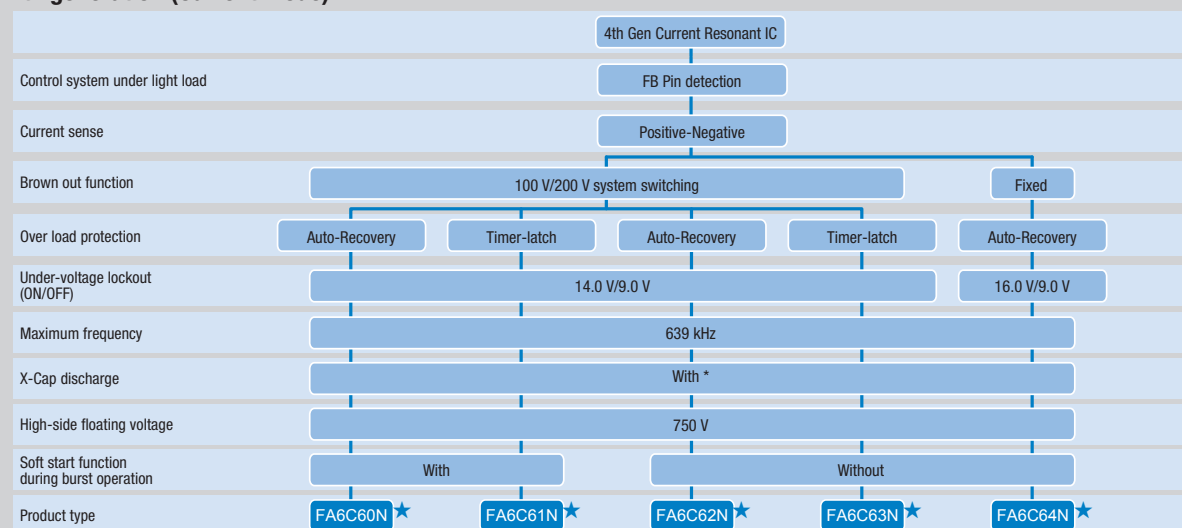
★: Featured Product ⇒ P2, 3, 4

● Features

- Realize 1 convertor circuit structure at worldwide input power
- Built-in High side driver

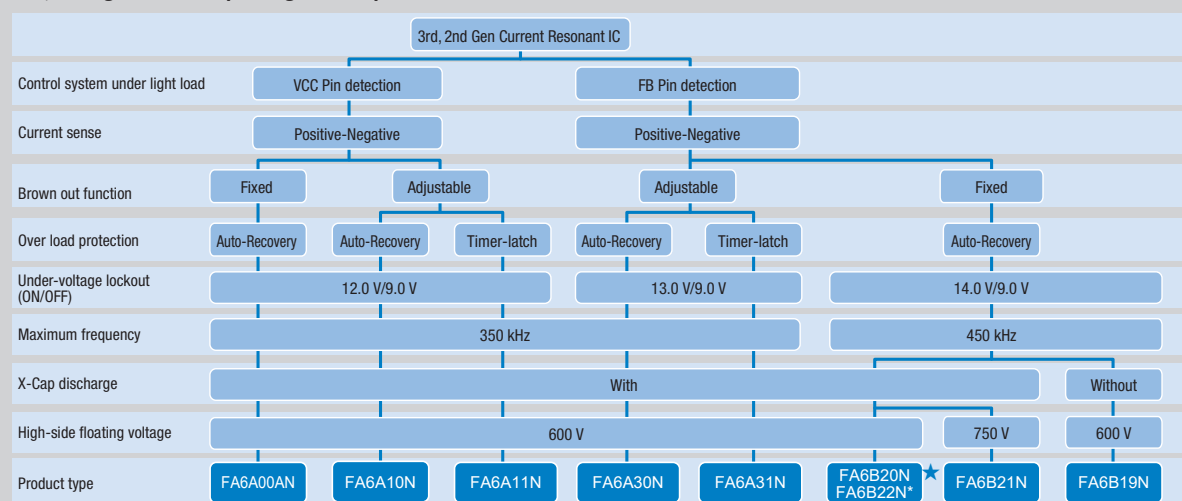
- Preventing capacitive region operation
- Protect functions (Over current/Over voltage/Over load/Over heat/Brown out)
- Green mode function (Intermittent switching)

4th generation (Current mode)



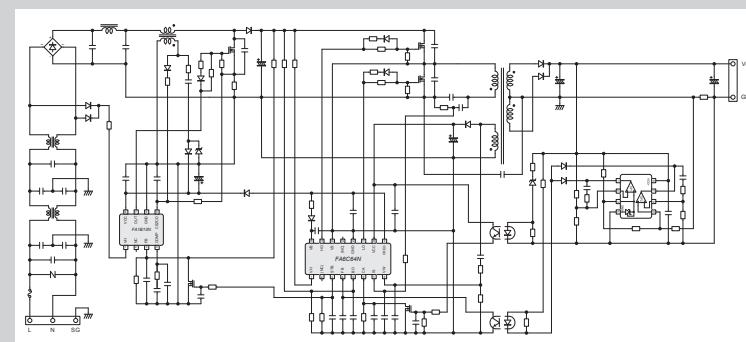
* "No X-Cap. Discharge" can be selected using the state setting.

3rd, 2nd generation (Voltage mode)



*: BO detection delay time extension type

● Circuit example (PFC + LLC) : FA1B10N, FA6C64N



Power Factor Correction ICs

Critical Conduction Mode PFC Control IC

★: Featured Product ⇨ P3, 4

Series	Type name	Control mode	Applied circuit	OVP pin	Zero current detection	Overcurrent detection	Frequency fsw	Protection mode		FB open/short circuit protection	Light-load switching	Power supply voltage Vcc	Vcc threshold voltage		Package	Features
								Overcurrent (pulse-by-pulse)	Overvoltage				ON	OFF		
FA1Bxx Series	FA1B00N	Voltage mode	PFC (Boost/ Flyback)	–	ZCD pin (Winding)	+ detection	Self-oscillation	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	Frequency limiting (Bottom skip operation)	10-24 V	10-24 V	9.0 V	SOP-8	· PFC flyback support · THD improvement function
	★FA1B10N NEW		PFC (Boost)								Intermittent operation (burst operation)					· THD improvement function · X-Cap. discharge function · 650 V startup circuit · Operates in conjunction with FA6C64N
	FA1B20N			✓	– detection	Frequency limiting (Bottom skip operation) + Intermittent operation (burst operation)					12.5 V		7.5 V	· Coordinated operation with FA6C6X		
FA1Axx Series	FA1A00N		PFC (Boost)	✓	CS pin (Resistance)	– detection	Self-oscillation	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	Frequency limiting (Bottom skip operation)	10-26 V	9.6 V	8.8 V		· Light-load bottom skip function · Output overvoltage double protection
	FA1A01N												12.4 V			
	FA1A10N												9.6 V			
	FA1A11N												12.4 V			
	FA1A50N			✓						Frequency limiting (Bottom skip operation) + Intermittent operation (burst operation)	9.6 V		8.8 V	· Light-load bottom skip function · FA1A00N enhanced version		
	★FA1A60N										12.5 V		7.5 V	· Light-load intermittent switching coordinated operation with FA6B19N/20N/22N		
	FA1A61N										12.5 V		7.5 V	· Light-load intermittent operation coordinated operation with FA6B21N		
	FA1A21N	PFC (Flyback)									–		ZCD pin (Winding)	+ detection	Self-oscillation	Input current limitation (Auto-recovery)
FA5590 Series	FA5590N	PFC (Boost)	–	IS pin (Resistance)	– detection	Self-oscillation	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	Frequency limiting (Bottom skip operation)	10-26 V	9.6 V	9.0 V	· Max. frequency setting (100 k to 800 kHz) · Max. frequency setting · Output overvoltage double protection		
	FA5591N											13.0 V				
	FA5696N		✓									9.6 V				

Continuous Conduction Mode PFC Control IC

Series	Type name	Control mode	Applied circuit	OVP pin	Max Duty	Overcurrent detection	Frequency fsw	Protection mode		FB open/short circuit protection	Light-load switching	Power supply voltage Vcc	Vcc threshold voltage		Package	Features
								Overcurrent (pulse-by-pulse)	Overvoltage				ON	OFF		
FA5612 Series	FA5612N	Average current	PFC (Boost)	–	94%	– detection -0.5 V (AC100 V) -0.4 V (AC230 V)	External selection (50-70 kHz jitter, 60 kHz, 65 kHz)	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	–	10-26 V	9.6 V	9.0 V	SOP-8	- Overcurrent detection level switching - Fixed frequency, jitter switching
	FA5613N										–		13.0 V			

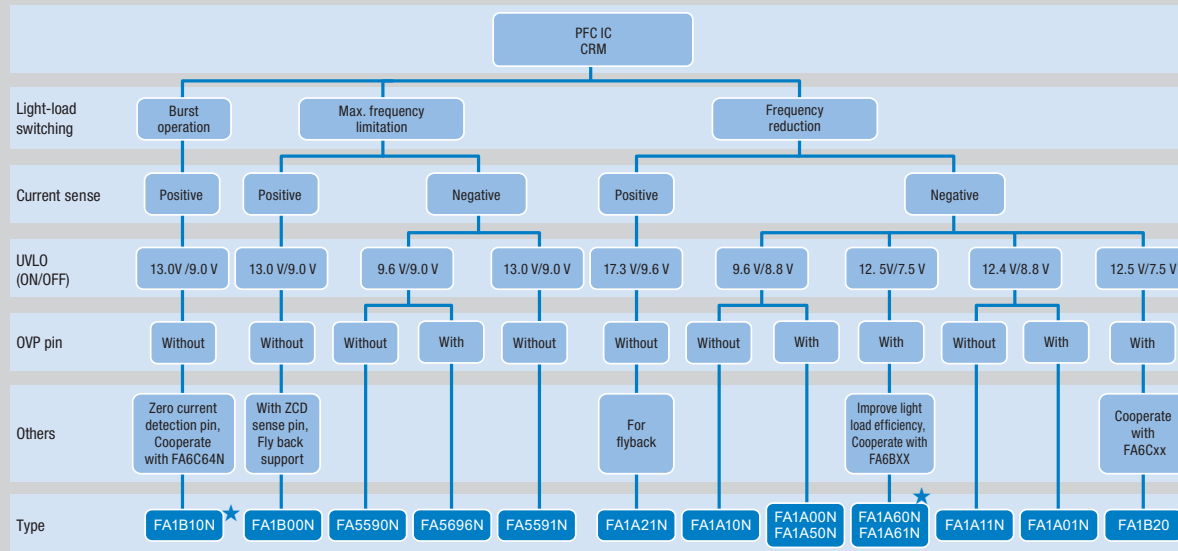
Power Factor Correction ICs

★: Featured Product ⇒ P3, 4

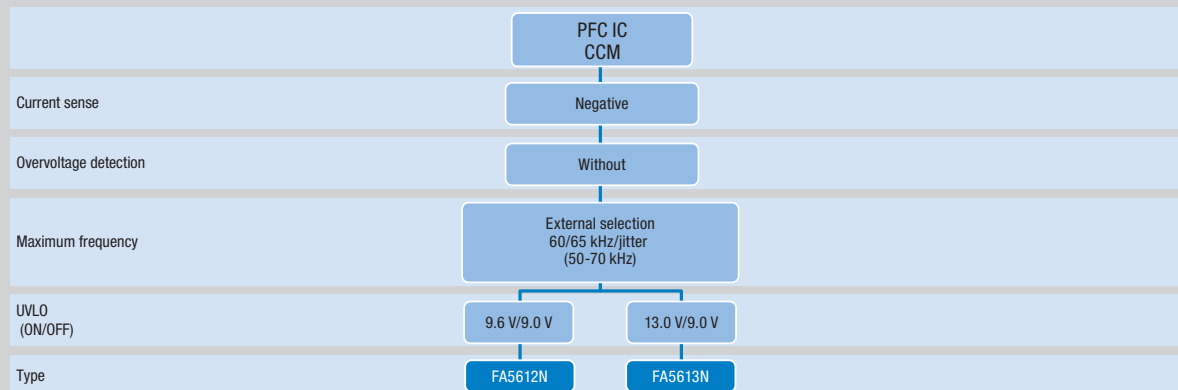
Features

- Wide electric power range (From 25 W to 10 kW)
- Power factor ≥ 0.99
- Protect functions (FB pin open short/Over voltage, etc.)

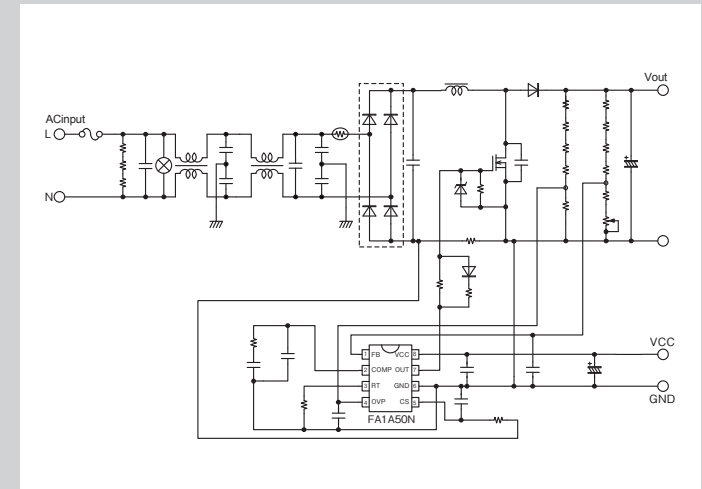
Critical Conduction Mode PFC Control IC



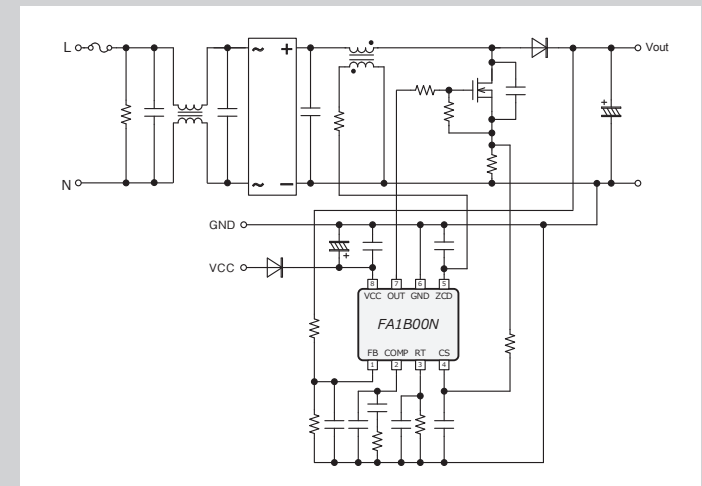
Continuous Conduction Mode PFC Control IC



Circuit example (PFC boost) : FA1A50N



Circuit example (PFC boost) : FA1B00N



■ Driver IC

High and Low side driver IC

Series	Type name	Number of input/output pin	Absolute maximum ratings				Input threshold voltage	Turn-on/off propagation delay	Recommended power supply voltage VCC, VBS	VCC, VBS threshold voltage		Package	Features
			High side floating supply voltage	Output current	Power supply voltage	Maximum frequency				ON	OFF		
FA5650 Series	FA5650N	2	800 V	-1.4/1.8 A	30 V	500kHz	Logic "1" 2.1 V Logic "0" 1.1V	125 ns	12-18 V	8.9 V	8.2 V	SOP-8	· High-side and low-side delay time difference 30 ns (max) · High-side dVs/dt withstand 50 kV/μs · Input 3.3 V logic compatible

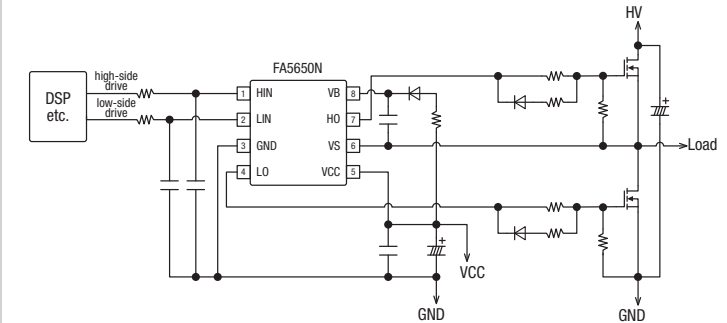
Driver IC

Features

- High negative transient voltage on VS pin
- Wide range supply voltage up to 30 V
- 3.3 V logic compatible
- Built-in under voltage lockout
- Allowable high slew rate of VS pin: dV_s/dt up to 50 kV/ μ s
- High speed response: Turn on/off delay time 125 ns (Typ.)

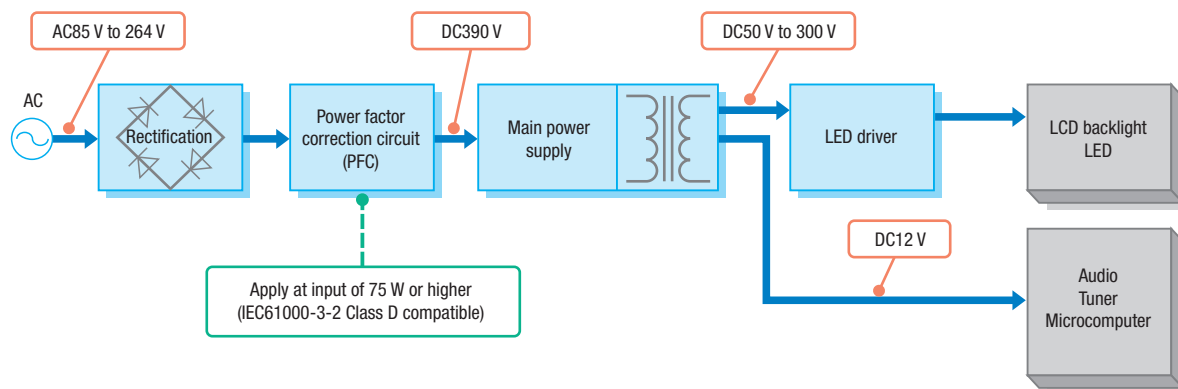
High and Low side driver IC	
High side floating supply voltage	800 V
Output current	-1.4 A/1.8 A
Turn-on/off propagation delay time	125 ns
Package	SOP-8
Type	FA5650N

Circuit example : FA5650N



Application circuit examples

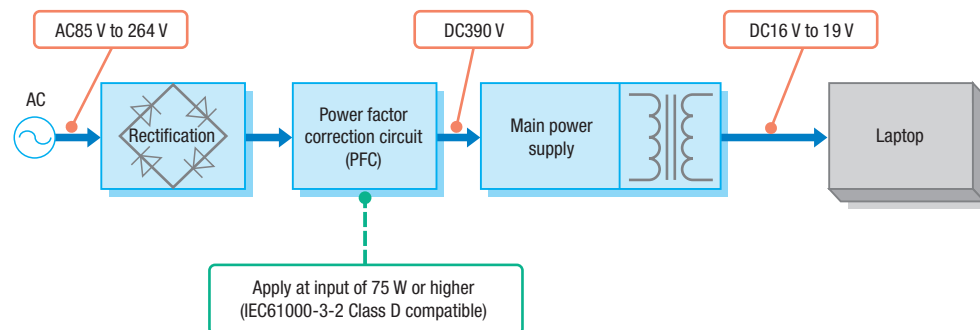
1. LCD TV power supply



Recommended IC

Circuit	Type	Recommended IC	Page
Power factor correction	PFC (75 W-200 W)	FA1Axx Series	17
		FA1Bxx Series	17
	PFC (more than 200 W)	FA561x Series	17
Main power supply	PWM	FA8Axx Series	9
		FA8Cxx Series	9
	Quasi-resonant	FA564x Series	13
	LLC	FA6Axx Series	15
		FA6Bxx Series	15
		FA6Cxx Series	15

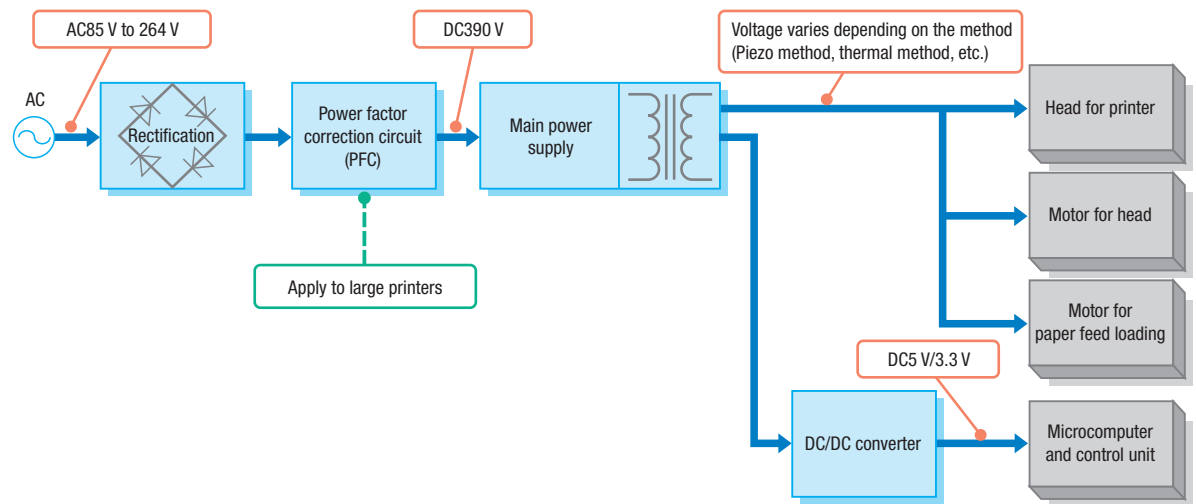
2. Laptop (AC Adapter) Power Supply



Recommended IC

Circuit	Type	Recommended IC	Page
Power factor correction	PFC (75 W-200 W)	FA1Axx Series	17
		FA1Bxx Series	17
	PFC (more than 200 W)	FA561x Series	17
Main power supply	PWM	FA8Axx Series	9
		FA8Cxx Series	9
	Quasi-resonant	FA564x Series	13
	LLC	FA6Bxx Series	15
		FA6Cxx Series	15

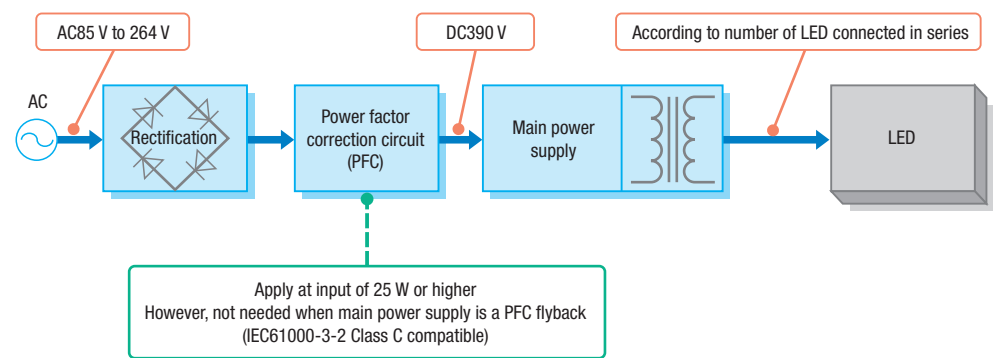
3. Printer (IJP) Power Supply



Recommended IC

Circuit	Type	Recommended IC	Page
Power factor correction	PFC (75 W-200W)	FA1Axx Series	17
		FA1Bxx Series	17
	PFC (more than 200 W)	FA561x Series	17
Main power supply	PWM	FA8Axx Series	9
		FA8Cxx Series	9
	Quasi-resonant	FA564x Series	13

4. LED lighting Power Supply

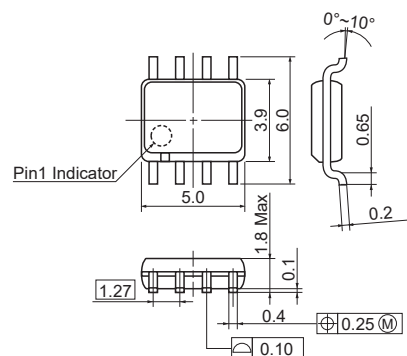


Recommended IC

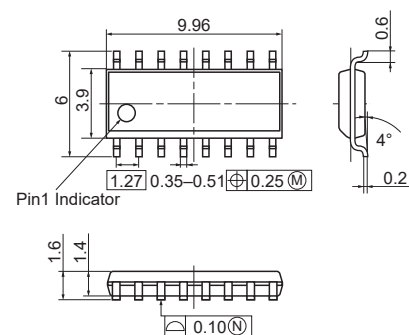
Circuit	Type	Recommended IC	Page
Power factor correction	PFC (25 W-200 W)	FA1Axx Series	17
		FA1Bxx Series	17
	PFC (more than 200 W)	FA561x Series	17
Main power supply	PWM	FA8Axx Series	9
		FA8Cxx Series	9
	Quasi-resonant	FA564x Series	13
	LLC	FA6Cxx Series	15
		FA1A21N	17
	PFC Flyback	FA1B00N	17

Package Outlines, mm

SOP-8 *1



SOP-16(N)



*1) This is the package size for the representative device type (FA8AxxN). For other ICs, please refer to the separate data sheet (specifications).

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