

FUJI Power Semiconductors

# Power Supply Control ICs Selection Guide



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

# FA1B10N/FA6C64N

Featured Product

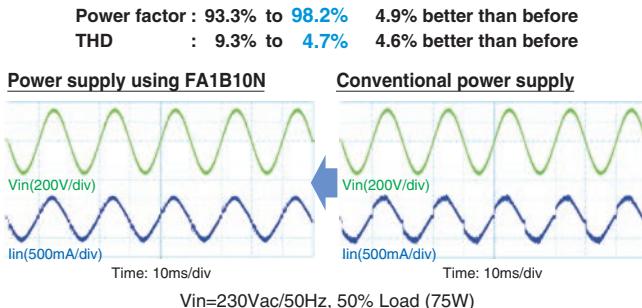
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The FA1B10N critical conduction mode PFC control IC and FA6C64N LLC current resonant control IC are suitable for LED driver power supplies. They achieve high power factor and low THD (Total Harmonic Distortion)\*1, and have a built-in auto burst function 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.

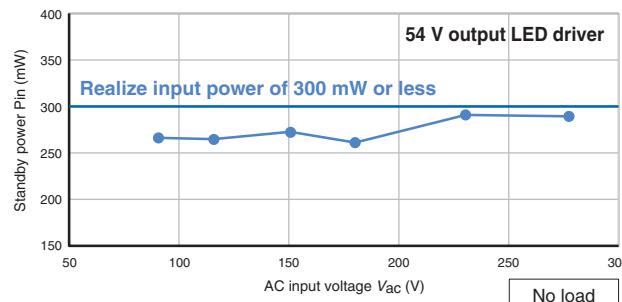
## 1 Improve power factor and THD

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.



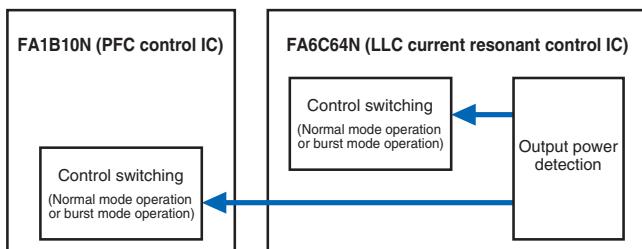
## 2 Low standby power

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.



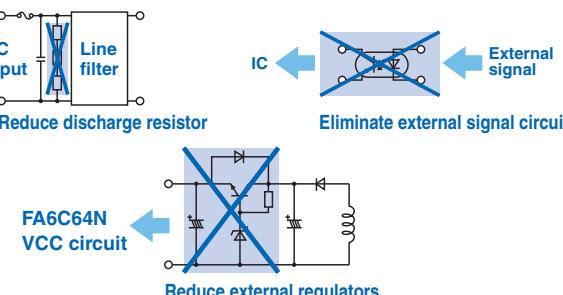
## 3 Auto burst function

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.



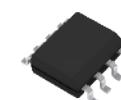
## 4 Reduce components in power supply

Reduce the number of components in power supply by built-in X-CAP discharge function, auto burst mode control function, and FET 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 $\pm 2\text{ kV}$
Operating ambient temperature	-60°C to +150°C
Package	SOP-8 (3.9 mm × 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 $\pm 2\text{ kV}$
Operating ambient temperature	-60°C to +150°C
Package	SOP-16(N) (3.9 mm × 10.0 mm)

1

# Critical mode PFC control IC and LLC current resonance control IC for high-efficiency power supplies FA1A60N/FA6B20N

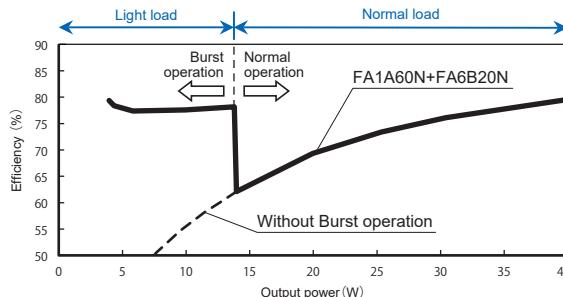
Featured Product

2

The critical mode PFC Control IC FA1A60N and LLC current resonance control IC FA6B20N 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.

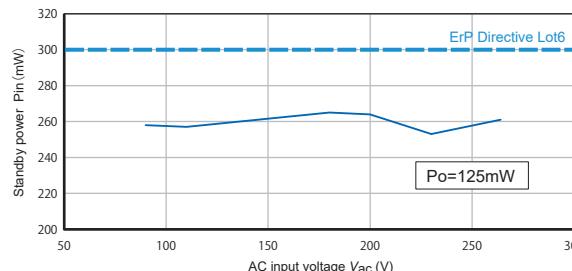
## 1 Improved efficiency at light load

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



## ■ Application examples

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



FA1A60N package  
:SOP-8



FA6B20N package  
:SOP-16 (N)

## PFC control IC "FA1A60N" function table

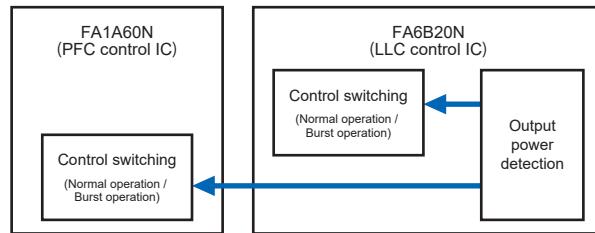
Item	FA1A60N
Function to improve efficiency at light load	Built-in
Auto standby function	Built-in
VCC consumption current (in standby)	0.25mA
Zero current detection auxiliary winding	Unnecessary
Over-current protection function	Built-in
Duplicated over-voltage protection	Built-in
ESD withstand voltage (HBM)	Total pins $\pm 2$ kV
Operating ambient temperature	-50°C to +105°C
Package	SOP-8 (3.9mm x 5.0mm)

## 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	450kHz
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 $\pm 2$ kV
Operating ambient temperature	-50°C to +105°C
Package	SOP-16(N) (3.9mm x 10.0mm)

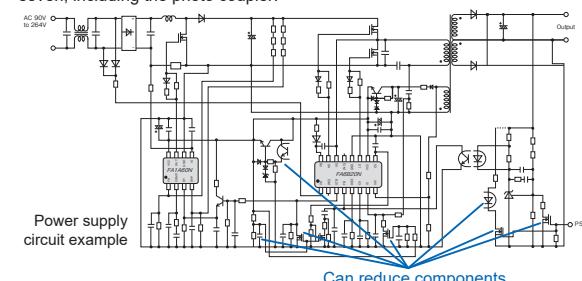
## 3 Auto standby function

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

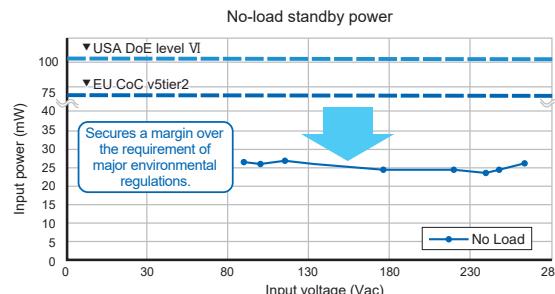
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# FA8A60N/70N/80N/90N Series

The PWM Control IC FA8A60N/70N/80N/90N Series for AC/DC power supplies offers the best system for flyback circuits. With a rich variety of functions integrated in the small-sized package of SOP-8, it makes excellent cost performance via a compact power supply design that leads to good energy saving at light loads.

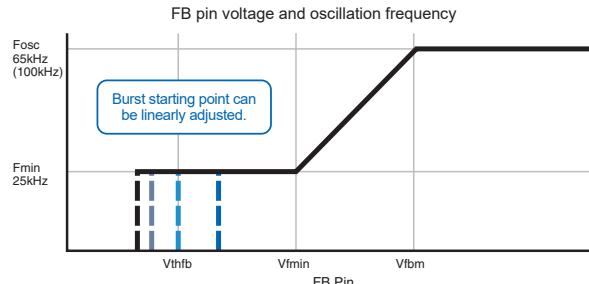
## 1 Low standby power (Burst operation function)

It achieves low standby power with its burst operation function. It is also capable of clearing the energy-saving standards for external power supplies such as DoE\*1 and CoC\*2 even securing some margin.



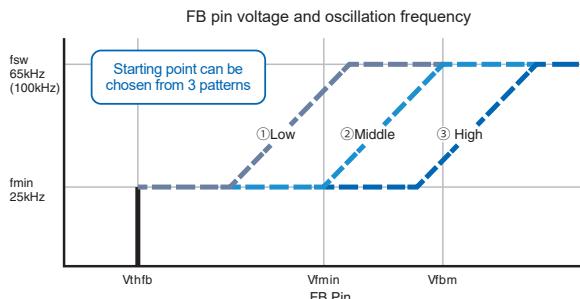
## 3 Burst starting point can be adjusted

The burst starting point can be continuously adjusted, which makes it easy to improve efficiency at light loads and implement measures for acoustic noise reduction.



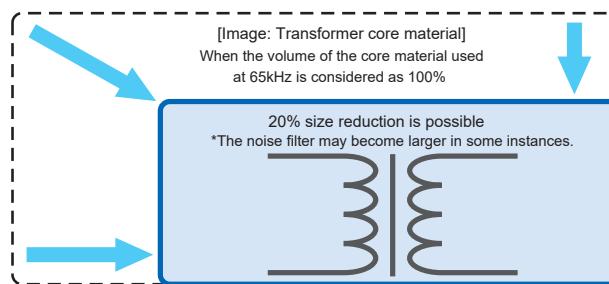
## 2 Capable of adjusting the switching frequency reduction region

The frequency reduction starting point can be chosen from three patterns, which makes it possible to improve efficiency for each power supply.

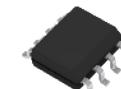


## 4 Reduced size of the power supply (100kHz type)

In addition to the 65kHz type, a 100kHz type is also available. The high frequency has made it possible to reduce the size of the power supply transformer.



- Applications (for flyback circuits)  
Office automation equipment, AC adapters, external power supplies, LCD TVs, etc.



Package: SOP-8

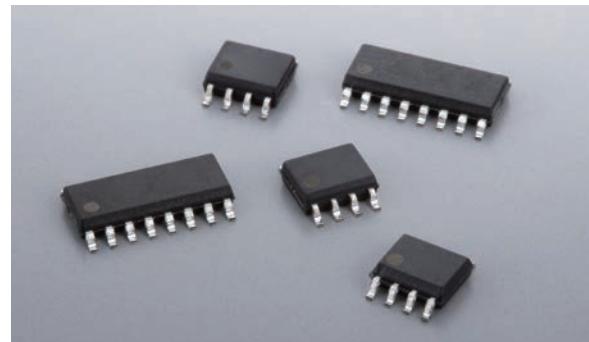
## ■ Product Line-up

Type	500V Starting circuit	65kHz	FA8A60N	FA8A61N	FA8A70N	FA8A71N
	fsw 65kHz (100kHz)	100kHz	FA8A64N	FA8A65N	FA8A74N	FA8A75N
	fmin 25kHz	65kHz	FA8A80N	FA8A81N	FA8A90N	FA8A91N
		100kHz	FA8A84N	FA8A85N	FA8A94N	FA8A95N
Overload protection (OLP)	Auto-Recovery	Latch	Auto-Recovery	Latch		
Delay time	200ms	200ms	200ms	200ms		
Line compensation	Built-in	Built-in	Built-in	Built-in		
Detection level	1 Stage	1 Stage	1 Stage	1 Stage		
X-Cap discharge function	None		Built-in			
Frequency reduction function		Selectable (3 patterns)				
Burst operation point adjustment		Linearly adjustable				
Power-off mode		Built-in				
DSS (Dynamic self supply)		Built-in				
Overvoltage protection		25.5V (latch)				
Over temperature protection		140°C (latch)				

\*1 DoE (United States Department of Energy): The energy-saving regulations in the United States that stand in for the Energy Star program promoted by the United States Department of Energy.  
\*2 CoC (Code of Conduct): Abbreviation for the EU Code of Conduct. Tier 2 became effective in January 2016 as a replacement of the EuP directive.

# 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 ..... P8

#### ■ Features

- Built-in 500/650/710/750V 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 ..... P10

#### ■ Features

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

### Green Mode Quasi-resonant ICs ..... P12

#### ■ Features

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

### Current Resonant ICs ..... P14

#### ■ Features

- Built-in 600/650V 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 ..... P16

#### ■ Features

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

### High and Low side driver ICs ..... P18

#### ■ Features

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

## ■ Contents

No.	Title	Page	Applicable circuit					
			Flyback	Forward	Full-bridge	Half-bridge Current Resonant	Boost	Buck
1	Product map	6						
2	AC/DC Power Supply Control ICs	8	✓					
3	General PWM-ICs	10	✓	✓			(✓)*1	
4	Green Mode Quasi-resonant ICs (Current Mode)	12	✓					
5	Current Resonant ICs	14				✓		
6	Power Factor Correction ICs	16	✓				✓	
7	Driver ICs	18			✓	✓	✓	
8	Application circuit examples	20						
9	Package outlines	22						

\*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*
				6	LLC
				8	PWM
				...	

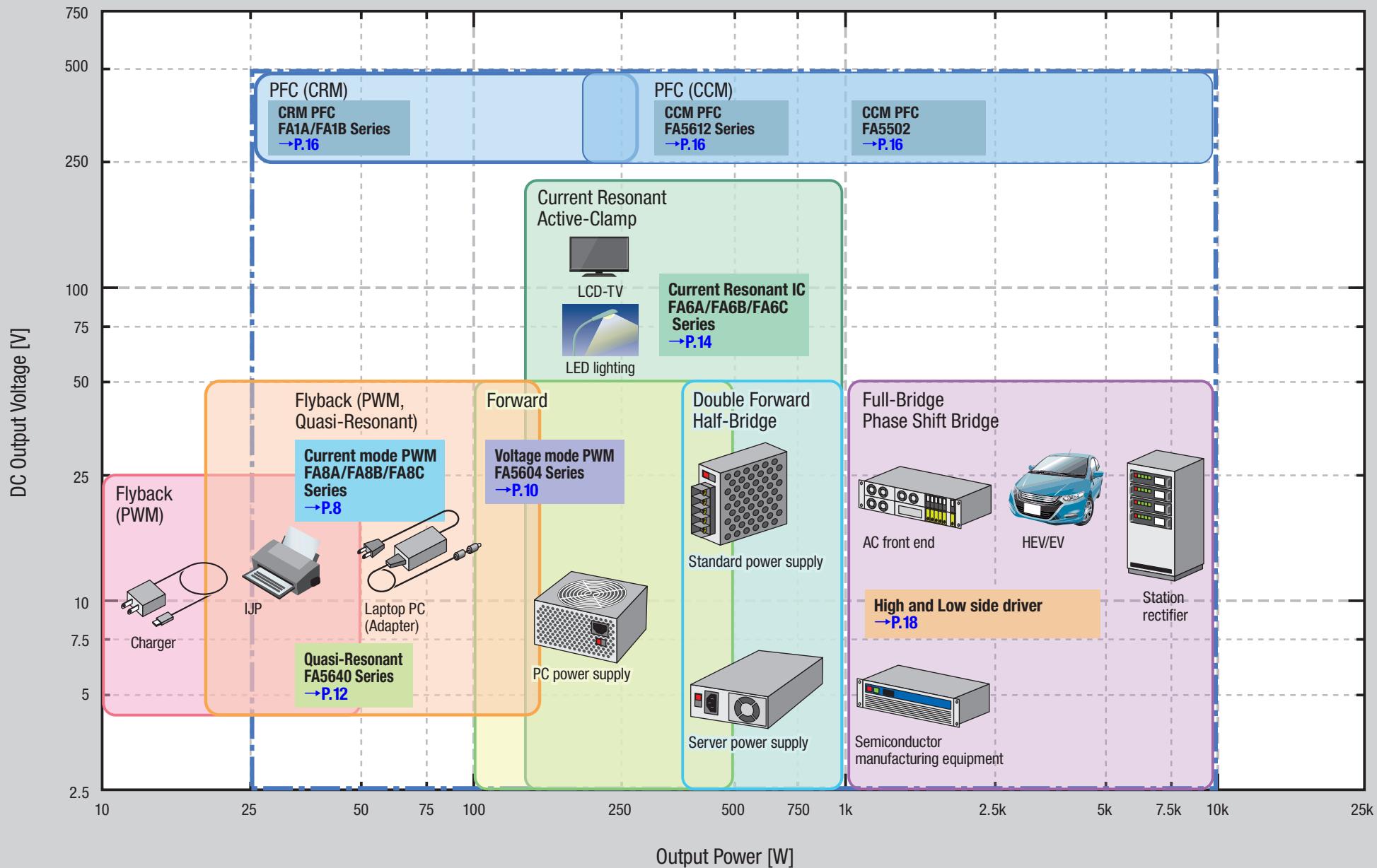
\*CRM PFC: Critical Conduction Mode PFC

Example: FA5590N

F	A	55	90	N
Company symbol	Control system	Series	Number	Package code
F	Fuji	A	Analog	3X
				5X
				13X

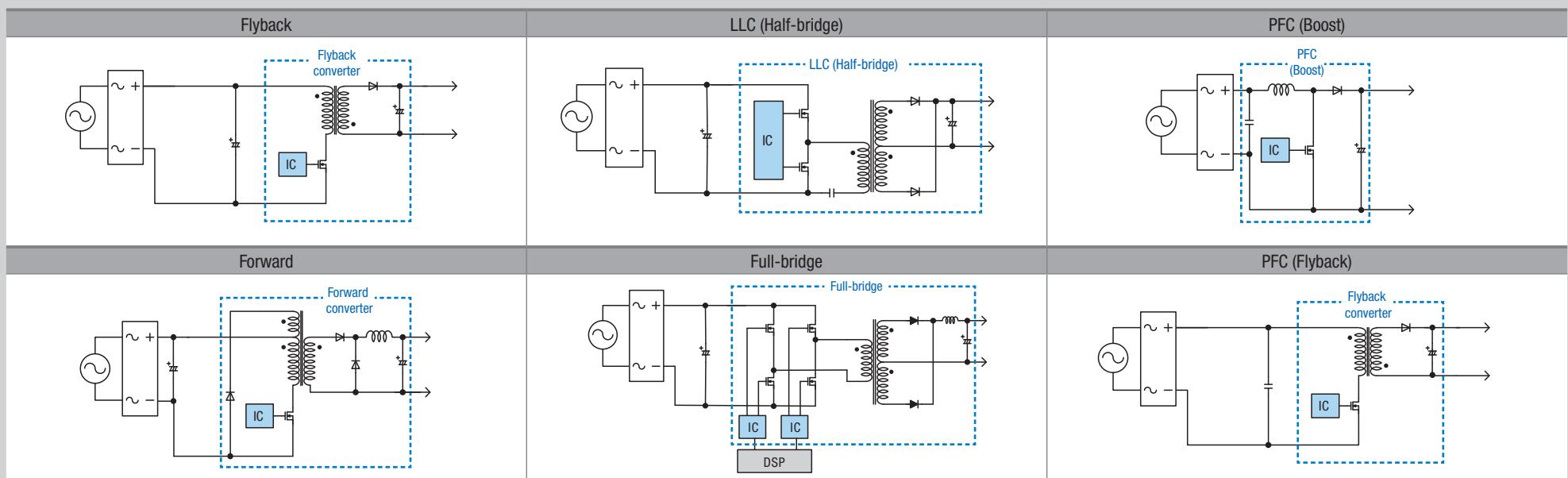
## Product Map

### 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)	8									
	General PWM-ICs	10									
	Green Mode Quasi-resonant ICs (Current Mode)	12									
Forward	General PWM-ICs	10									
LLC (Half-bridge)	Current Resonant ICs	14									
Full-bridge	Driver ICs	18									
PFC (Boost)	Power Factor Correction ICs (Critical Conduction Mode)	16									
	Power Factor Correction ICs (Continuous Conduction Mode)	16									
PFC (Flyback)	Power Factor Correction ICs (FA1B00N, FA1A21N)	16									



## ■ Green Mode PWM-ICs (Current Mode)

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	Oversupply			ON	OFF									
7th generation	FA8Cxx Series	FA8C71N			✓ 710V	✓	–	85%	65kHz	+ detection	Timer-latch	1 Stage	Latch Vcc detection	Linearly frequency reduction + Intermittent operation	10-33V	12.5V	7.5V	SOP-8								
		FA8A00N							65kHz	+ detection	Auto-Recovery	2 Stage (OPP ratio 1:1.4)*	Latch Vcc detection	Linearly frequency reduction + Intermittent operation	12-24V	13V	6.5V									
		FA8A01N							100kHz		Timer-latch Delay 70 ms															
		FA8A40N									Auto-Recovery															
		FA8A41N									Timer-latch Delay 70 ms															
		FA8A27N			✓ 500V	✓	✓ Fixed	83%	65kHz		Timer-latch Delay 860 ms	2 Stage (OPP ratio 1:1.8)*														
		FA8A37N									Timer-latch Delay 1.6 s															
		FA8A39N									Timer-latch Delay 2.5 s															
		FA8A12N				–					Auto-Recovery	2 Stage (OPP ratio 1:1.4)*														
6th generation	FA8A60 Series (Advanced functions version)	FA8A60N		Flyback	500V	–		83%	65kHz	+ detection	Auto-Recovery	1 Stage	Latch Vcc detection	Linearly frequency reduction + Intermittent operation (Frequency reduction/burst point adjustable)	10-24V	12.5V	6.5V	SOP-8								
		FA8A61N							100kHz		Timer-latch															
		FA8A64N							65kHz		Auto-Recovery															
		FA8A65N							100kHz		Timer-latch															
		FA8A70N									Auto-Recovery															
		FA8A71N									Timer-latch															
		FA8A74N									Auto-Recovery															
		FA8A75N									Timer-latch															
FA8A80 Series (Advanced functions, VH high withstand-voltage version)	FA8A80N	FA8A80N		650V	–	–		83%	65kHz	+ detection	Auto-Recovery	1 Stage	Latch Vcc detection	Linearly frequency reduction + Intermittent operation (Frequency reduction/burst point adjustable)	10-24V	12.5V	6.5V	SOP-8								
		FA8A81N			✓	✓ Fixed			Timer-latch																	
		FA8A83N			–	–	100kHz		Auto-Recovery																	
		FA8A84N			–	✓ Fixed			Timer-latch																	
		FA8A85N			–	–			Auto-Recovery																	
		FA8A86N			–	✓ Fixed			Timer-latch																	
		FA8A87N			✓	–			Auto-Recovery																	
		FA8A90N			–				Timer-latch																	
5th generation	FA8Bxx Series	FA8B16N		500V	✓ 500V	✓	✓ Fixed	83%	65kHz	+ detection	Auto-Recovery	2 Stage (OPP ratio 1:1.5)*	Latch Vcc detection	Linearly frequency reduction + Intermittent operation	12-24V	12.5V	8V	SOP-8								
		FA5680N			✓ 750V	–	85%		65kHz		1 Stage		Latch Vcc detection	Linearly frequency reduction + Intermittent operation	11-24V	18V	8V		OCP,OLP No correction							
		FA5681N			–	–			– detection																	

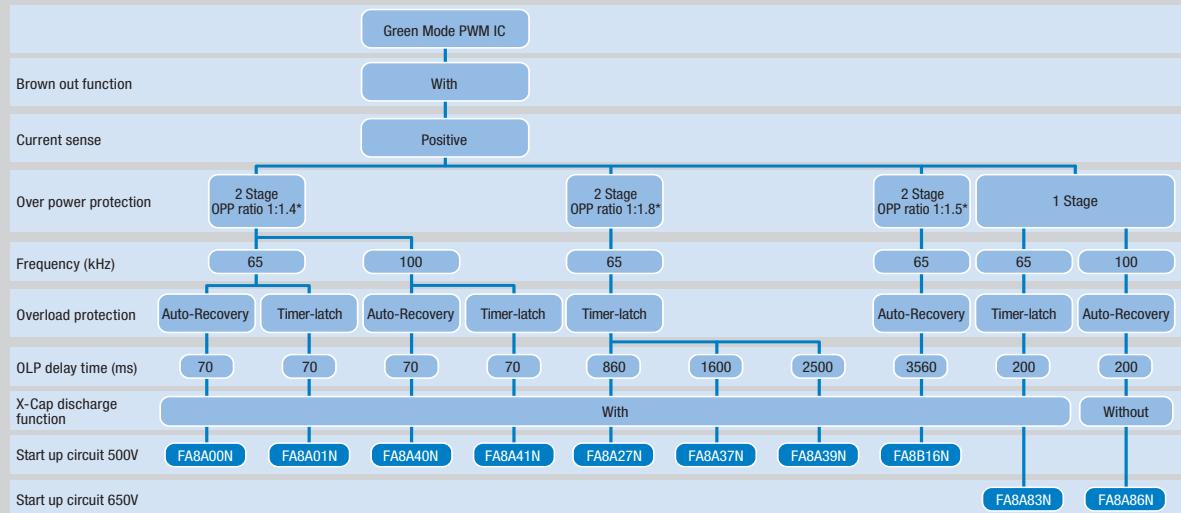
\*OPP ratio = Over Load Protection (OLP) : Over Current Protection (OCP)

## ■ Green Mode PWM-ICs (Current Mode)

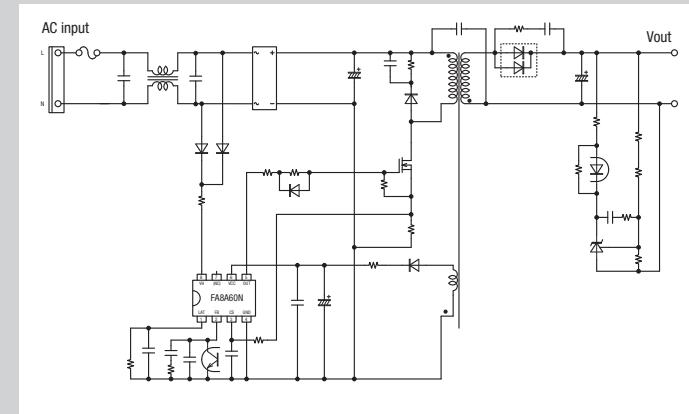
### ● Features

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

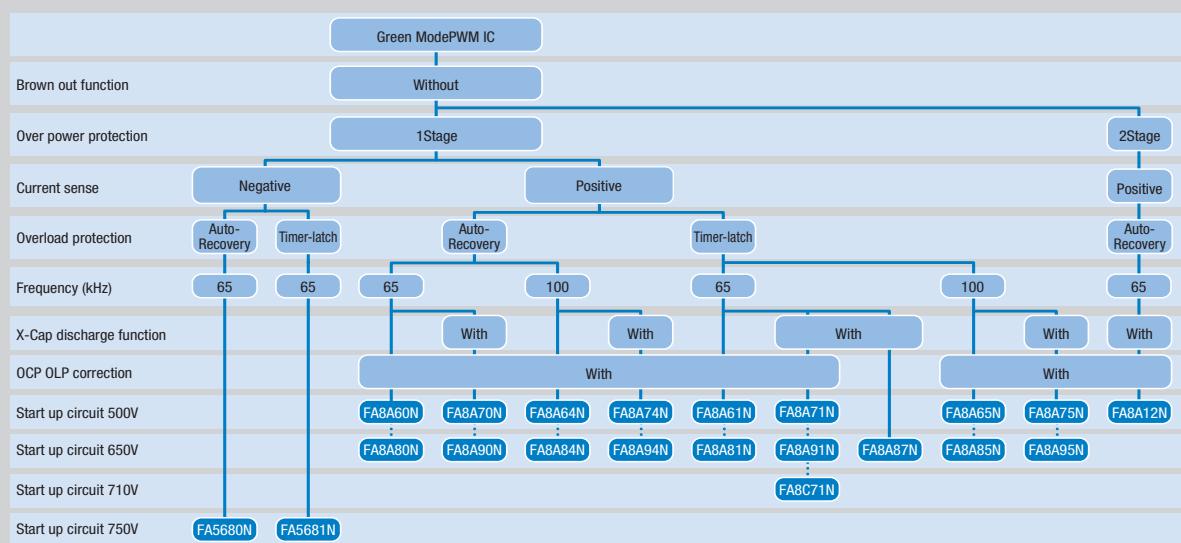
### ● Green mode PWM-ICs with Brown Out function



### ● Circuit example (Flyback) : FA8A60N



### ● Green mode PWM-ICs without Brown Out function



## ■ General PWM-ICs

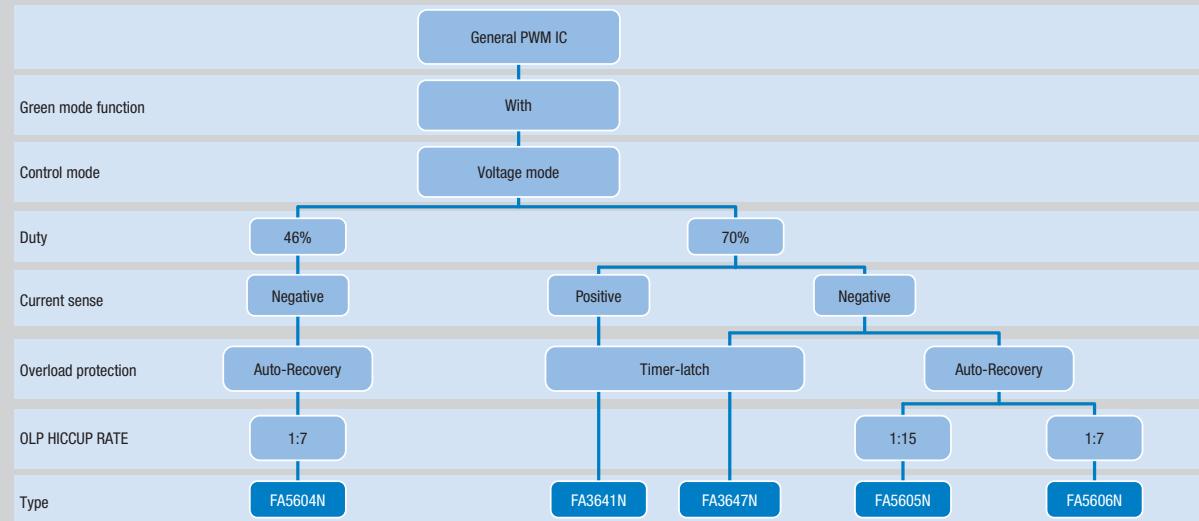
Series	Type name	Control mode	Applied circuit	Max Duty	Frequency fsw	Overcurrent detection	Protection mode		Light-load switch operation	Power supply voltage Vcc	Vcc threshold voltage		Package	Features									
							Overload	Overvoltage			ON	OFF											
FA1384× Series	FA13842N	Current mode	Flyback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

## ■ General PWM-ICs

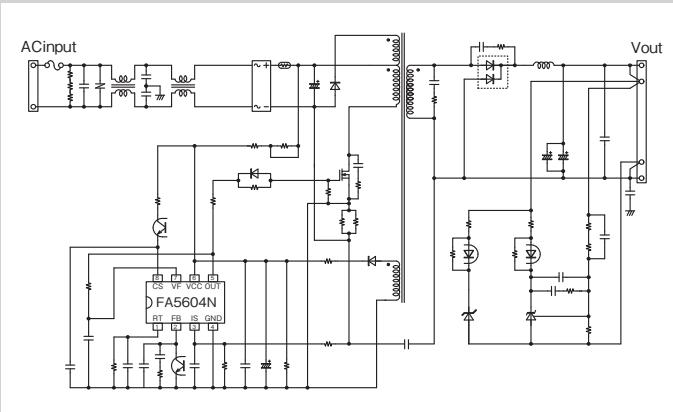
### ● Features

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

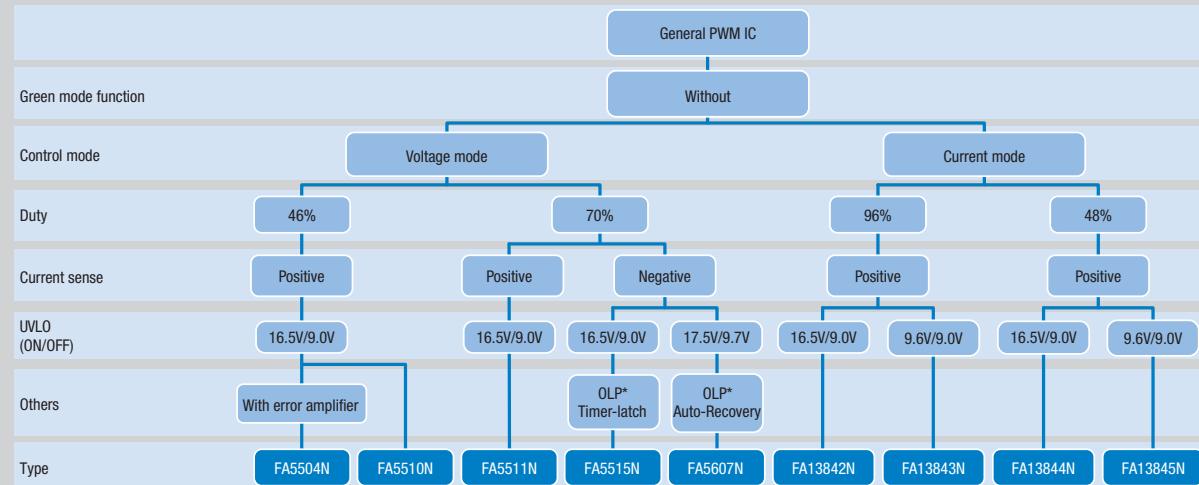
### General PWM Control IC Series with Green Mode Function



### ● Circuit example (Forward) : FA5604N



### General PWM Control IC Series without Green Mode Function



\* OLP : Over Load Protection

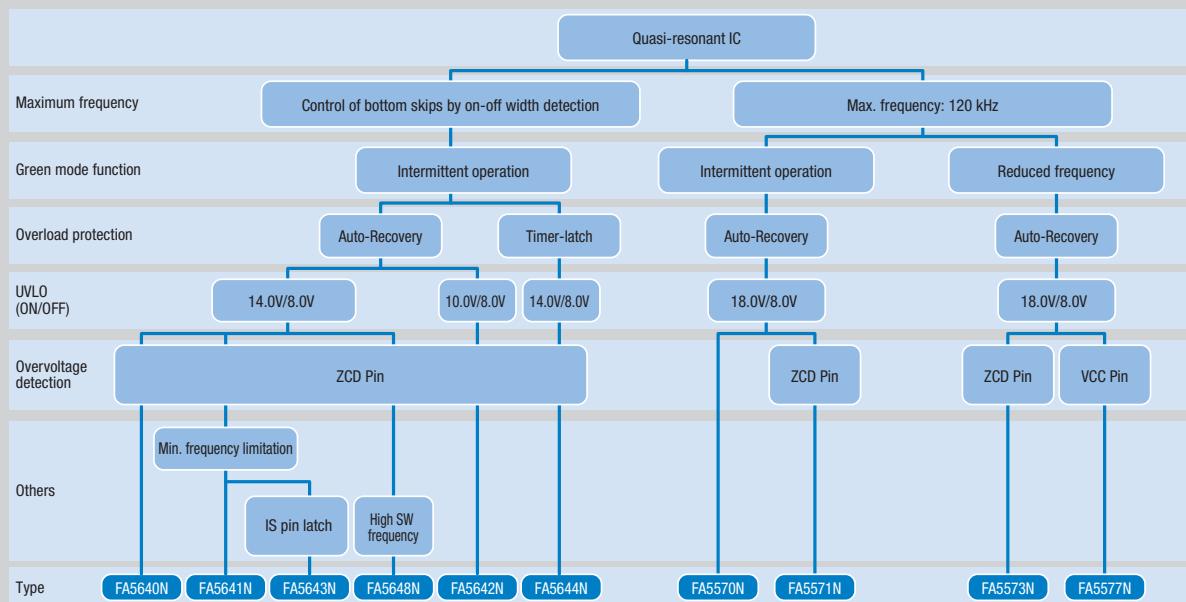
## ■ Green Mode Quasi-resonant ICs (Current Mode)

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	✓ 500V	Bottom skip count control via self-excited on-off width detection, estimated frequency switching from 1st to 2nd bottom 110kHz (FA5648 is 260 kHz)	+ detection +0.5V (AC100V) +0.45V (AC230V)	Auto-Recovery	Latch ZCD voltage detection	Intermittent operation	11-26V	14V	8V	SOP-8	-					
		FA5641N										10V			Minimum frequency (25kHz)					
		FA5642N										14V			Vcc on-voltage (10V)					
		FA5643N						Timer-latch				14V	8V		IS pin latch stop					
		FA5644N										14V			Overload latch stop					
		FA5648N										14V			For High SW frequency					
3rd generation	FA5571 Series	FA5570N			✓ 500V	Self-oscillation Maximum 120kHz	+ detection +1.0V	Auto-Recovery	- Latch ZCD voltage detection	Intermittent operation	10-28V	18V	8V	SOP-8	Without overvoltage protection					
		FA5571N													Overvoltage ZCD detection					
		FA5573N					+ detection +0.5V		Latch Vcc voltage detection	Linearly frequency reduction					Overvoltage Vcc detection					
		FA5577N																		

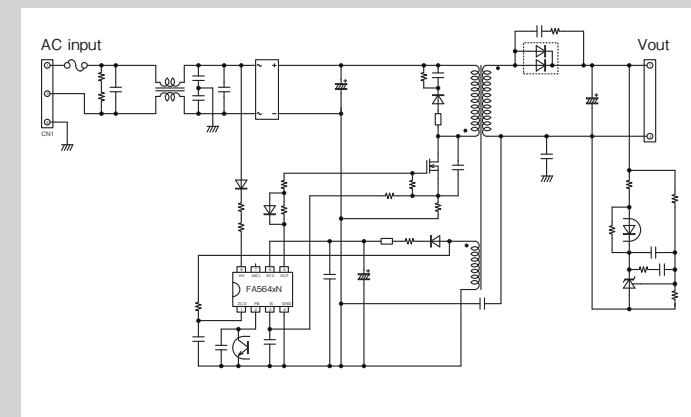
## ■ Green Mode Quasi-resonant ICs (Current Mode)

## ● Features

- Built-in 500V 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

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	Overtoltage			ON	OFF		
4th generation	FA6Cxx Series	FA6C60N	Current resonant LLC (Half bridge)	✓ 650V	✓ "None" can be selected using the state setting	100 V/200 V system switching	CA Pin detection Auto switching	50%	Positive-Negative	24.4-639kH	Auto-recovery	Auto-recovery	Auto-Recovery	Burst operation FB pin control	14-36V	14.0V	9.0V	SOP-16 (N)	During burst operation, Soft start function, X-Cap. discharge function, Auto standby function, State setting function, Built-in FET drive power supply	
		FA6C61N									Latch	Latch							X-Cap. discharge function, Auto standby function, State setting function, Built-in FET drive power supply	
		FA6C62N									Auto-recovery	Auto-recovery							Auto standby function, State setting function	
		FA6C63N									Latch	Latch							Transient response improvement, Auto standby function	
		FA6C64N									Auto-recovery	Auto-recovery							BO detection delay extension type, Auto standby function	
3rd generation	FA6Bxx Series	FA6B19N		✓ 600V	-	✓ Fixed	CA Pin detection Auto switching/ external switching	50%	Positive-Negative	25-450kHz	Auto-recovery	Auto-Recovery	Auto-Recovery	Burst operation FB pin control	14-29V	14.0V	9.0V		Auto standby function, State setting function	
		FA6B20N																	BO detection delay extension type, Auto standby function	
		FA6B21N																	Power good signal output, State setting function, Supports W/W input voltage	
		FA6B22N <sup>1</sup>																	Brown out detection level adjustment, State setting function, Supports W/W input voltage	
2nd generation	FA6Axx Series	FA6A00AN	Current resonant LLC (Half bridge)	✓ 600V	✓	✓ Fixed	External switching STB pin	50%	Positive-Negative	38-350kHz	Timer-latch	Auto-Recovery	Timer-latch	Burst operation Vcc pin control	14-27V	12.0V	9.0V	SOP-16 (N)	State setting function, Brown out detection level adjustment, Supports W/W input voltage	
		FA6A10N									Auto-recovery	Auto-Recovery							State setting function, Brown out detection level adjustment, Supports W/W input voltage	
		FA6A11N									Timer-latch	Timer-latch							State setting function, Brown out detection level adjustment, Supports W/W input voltage	
		FA6A30N									Auto-recovery	Auto-Recovery							State setting function, Brown out detection level adjustment, Supports W/W input voltage	
		FA6A31N									Timer-latch	Timer-latch							State setting function, Brown out detection level adjustment, Supports W/W input voltage	

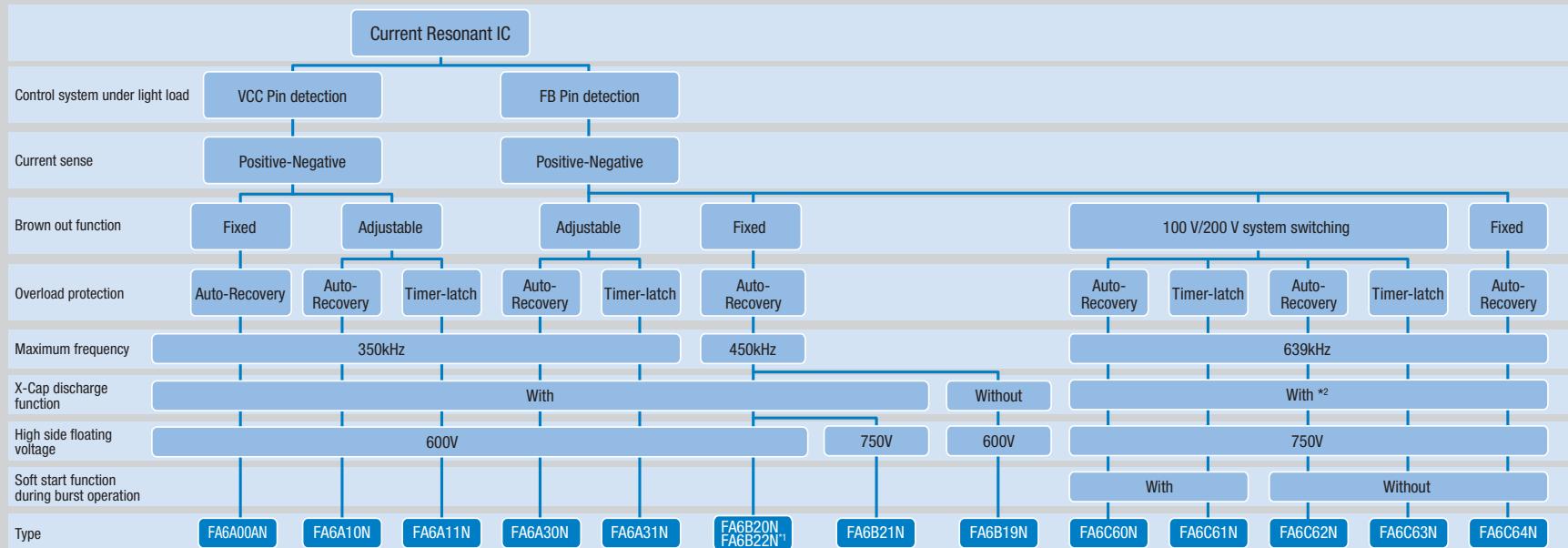
\*1: BO detection delay time extension type

## ■ Current Resonant ICs

### ● Features

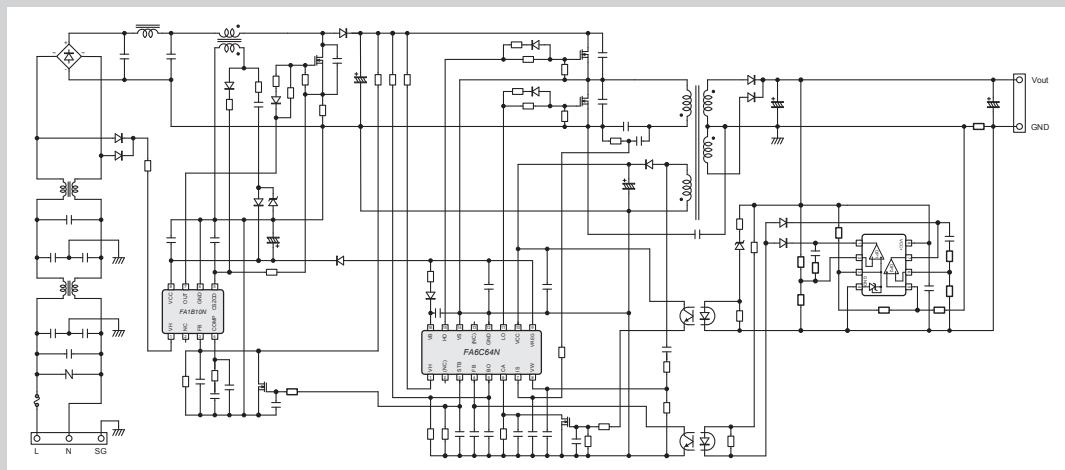
- Realize 1 convertor circuit structure at worldwide input power
  - Built-in High side driver

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



\*1: BO detection delay time extension type \*2: "No X-Cap. Discharge" can be selected using the state setting.

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



## ■ Power Factor Correction ICs

### Critical Conduction Mode PFC Control IC

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)	Overtoltage				ON	OFF			
FA1Bxx Series	FA1B00N			PFC (Boost/Flyback)	-	ZCD pin (Winding)	+ detection	Self-oscillation	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	Frequency limiting (Bottom skip operation)	10-24V	10-24V	9.0V		PFC flyback support, THD improvement function
	FA1B10N			PFC (Boost)								Intermittent operation (burst operation)					THD improvement function, X-Cap. discharge function, 650V startup circuit, Operates in conjunction with FA6C64N
FA1Axx Series	FA1A00N	Voltage mode	PFC (Boost)	✓	CS pin (Resistance)	- detection	Self-oscillation	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	Frequency limiting (Bottom skip operation)	10-26V	9.6V	8.8V	SOP-8	Light-load bottom skip function, Output overvoltage double protection	
	FA1A01N			-							12.4V	Light-load bottom skip function					
	FA1A10N			✓							9.6V	Light-load bottom skip function, FA1A00N enhanced version					
	FA1A11N			✓							12.4V	Light-load intermittent switching coordinated operation with FA6B19N/20N/22N					
	FA1A50N			✓							9.6V	8.8V	Light-load intermittent operation coordinated operation with FA6B21N				
	FA1A60N			✓							12.5V	7.5V	PFC flyback support, Soft start function, Overload protection				
	FA1A61N			✓							12.5V	7.5V	Max. frequency setting (100k to 800kHz)				
	FA1A21N			-	ZCD pin (Winding)	+ detection	Self-oscillation	Input current limitation (Auto-recovery)	Auto-Recovery Vcc detection	-	Frequency limiting (Bottom skip operation)	17.3V	9.6V			Max. frequency setting, Output overvoltage double protection	
FA5590 Series	FA5590N	Average current	PFC (Boost)	-	IS pin (Resistance)	- detection	Self-oscillation	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	Frequency limiting (Bottom skip operation)	10-26V	9.6V	9.0V	SOP-8	Overcurrent detection level switching, Fixed frequency, jitter switching	
	FA5591N			✓							13.0V	ON/OFF pin, Synchronous pin					
	FA5696N			✓							9.6V	ON/OFF pin, Synchronous pin					

### Continuous Conduction Mode PFC Control IC

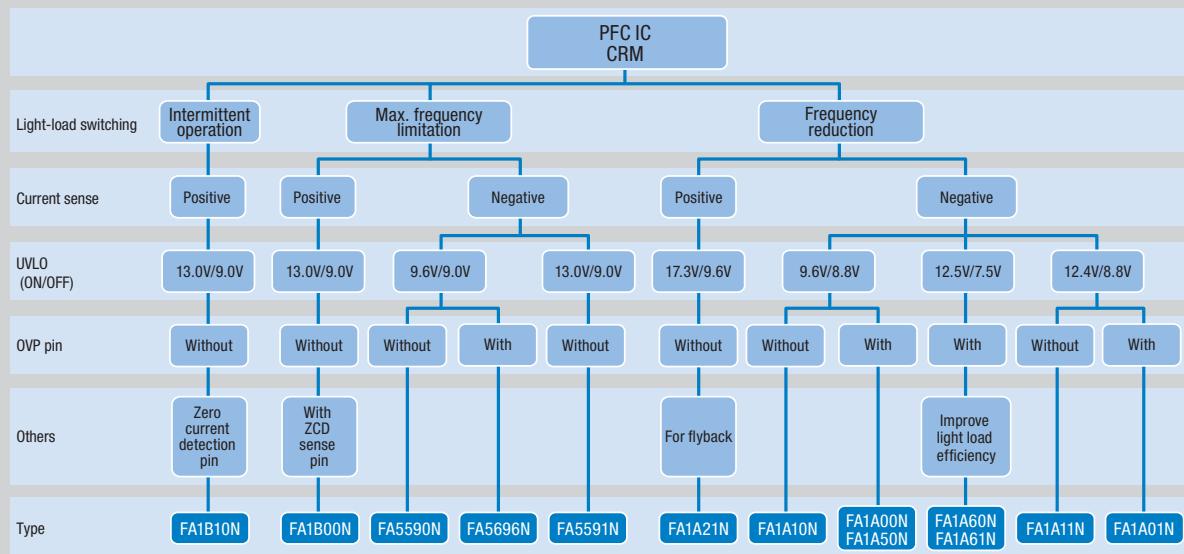
Series	Type name	Control mode	Applied circuit	OVP pin	Max Duty	Overcurrent detection	Frequency fsw	Protection mode		FB open/ short circuit protection	Light-load switching	Power supply voltage Vcc	Vcc threshold voltage		Package	Features
								Overcurrent (pulse-by-pulse)	Overtoltage				ON	OFF		
FA5612 Series	FA5612N	Average current	PFC (Boost)	-	94%	- detection -0.5V (AC100V) -0.4V (AC230V)	External selection (50-70 kHz jitter, 60 kHz, 65 kHz)	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	✓	-	10-26V	9.6V	9.0V	SOP-8	Overcurrent detection level switching, Fixed frequency, jitter switching
	FA5613N										13.0V					
FA5502 Series	FA5502M	Average current	PFC (Boost)	✓	94%	- detection	External settings 15-150kHz	Input current limitation (Auto-recovery)	Output voltage limitation (Auto-recovery)	-	-	10-28V	16.5V	8.9V	SOP-16 (M)	ON/OFF pin, Synchronous pin

## ■ Power Factor Correction ICs

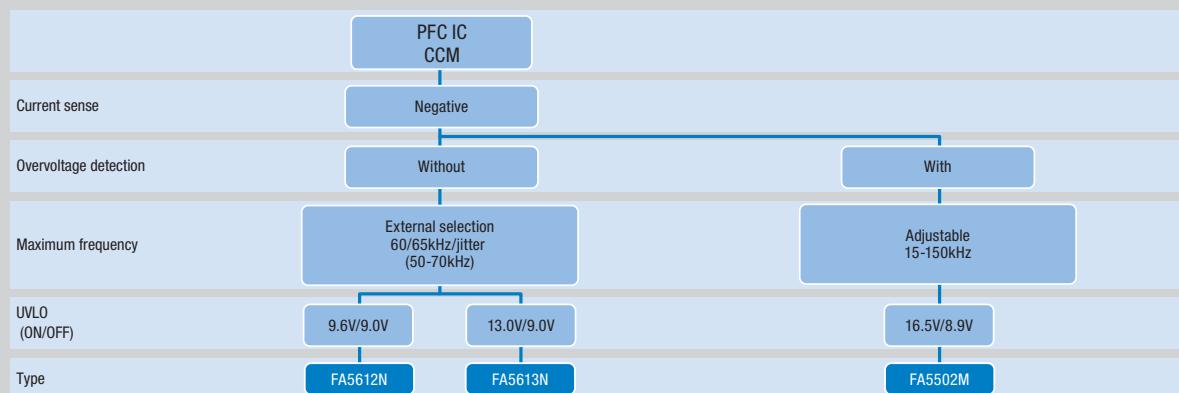
### ● Features

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

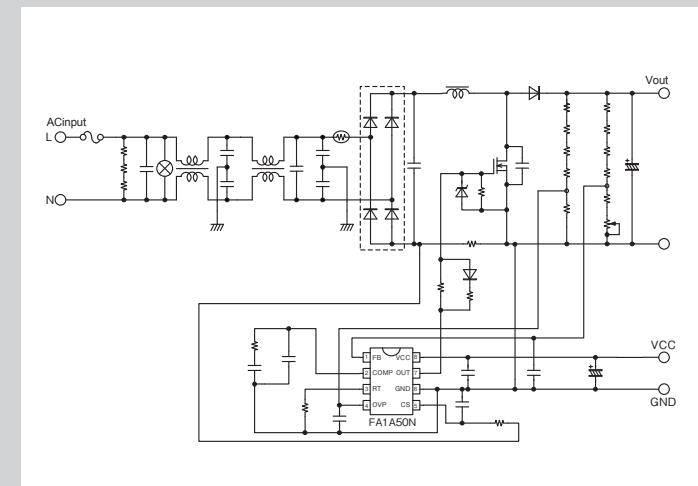
### Critical Conduction Mode PFC Control IC



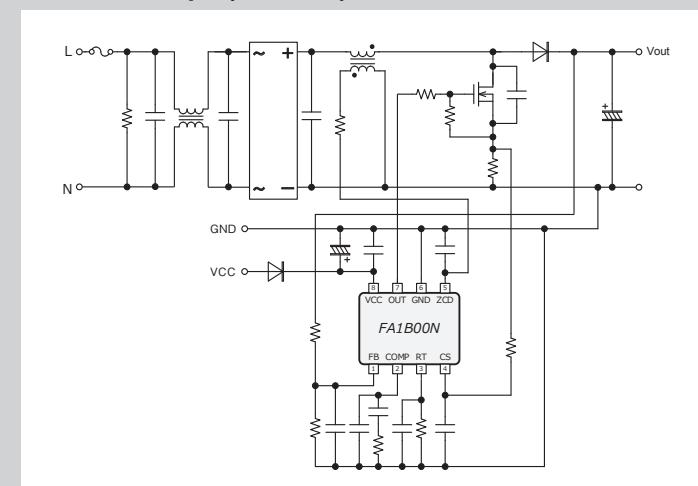
### Continuous Conduction Mode PFC Control IC



### ● Circuit example (PFC boost) : FA1A50N



### ● Circuit example (PFC boost) : FA1B00N



## ■ Driver ICs

### High and Low side driver ICs

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	800V	-1.4/1.8A	30V	500kHz	Logic "1" 2.1V Logic "0" 1.1V	125ns	12-18V	8.9V	8.2V	SOP-8	High-side and low-side delay time difference 30ns (max), high-side dVs/dt withstand 50kV/us, input 3.3V logic compatible

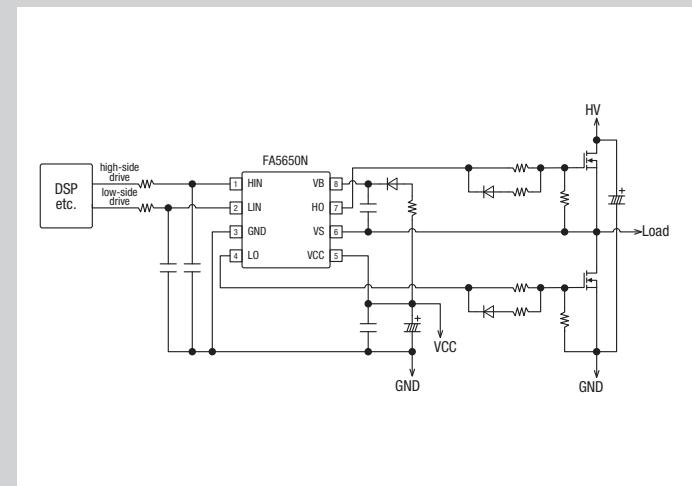
## ■ Driver ICs

### ● Features

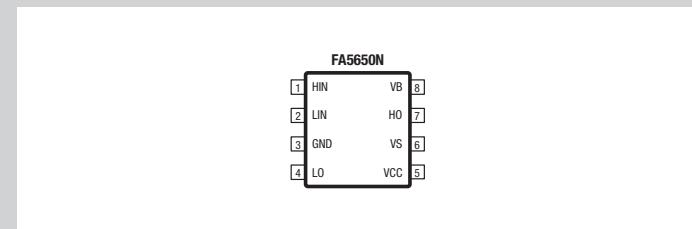
- High negative transient voltage on VS pin
- Wide range supply voltage up to 30V
- 3.3V logic compatible
- Built-in under voltage lockout
- Allowable high slew rate of VS pin:  $dVs/dt$  up to  $50kV/\mu s$
- High speed response: Turn on/off delay time 125ns (Typ.)

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

### ● Circuit example : FA5650N

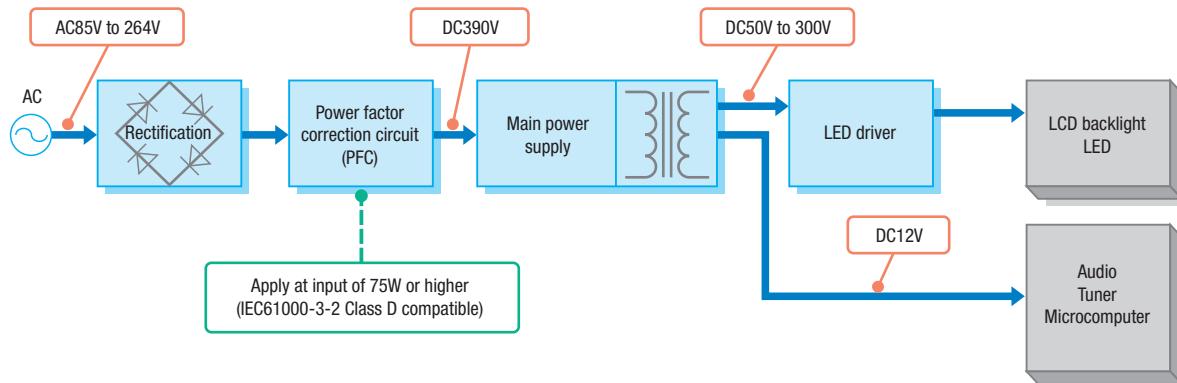


### ● Pin Layout



## ■ Application circuit examples

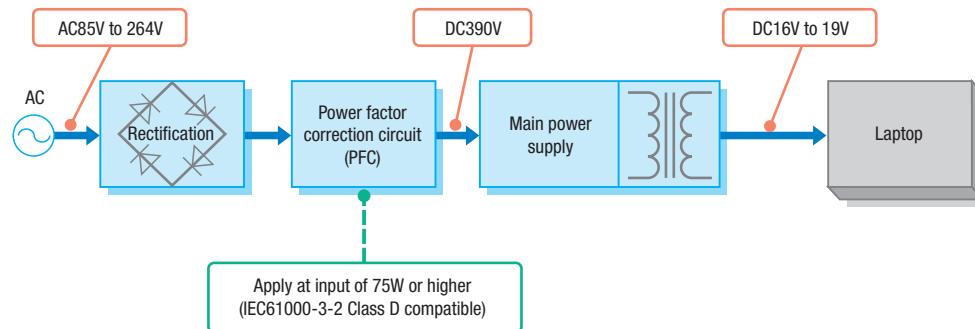
### 1. LCD TV power supply



### ■ Recommended IC

Circuit	Type	Recommended IC	Page
Power factor correction	PFC (75W-200W)	FA1Axx Series	16
	PFC (more than 200W)	FA561x Series	16
Main power supply	Quasi-resonant	FA564x Series	12
	PWM	FA8A6x Series	8
LLC		FA6Axx Series	14
		FA6Bxx Series	14
		FA6Cxx Series	14

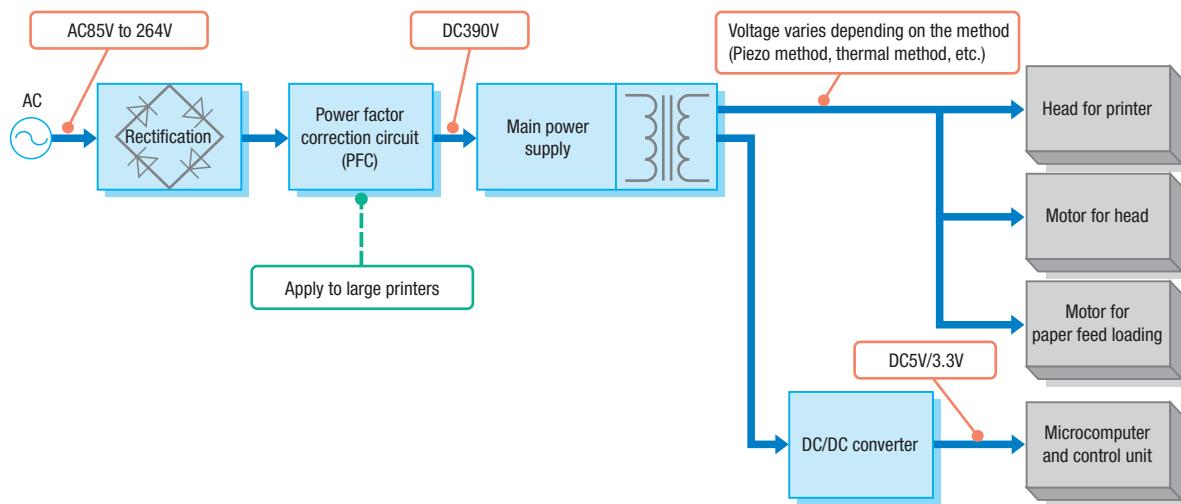
### 2. Laptop (AC Adapter) Power Supply



### ■ Recommended IC

Circuit	Type	Recommended IC	Page
Power factor correction	PFC (75W-200W)	FA1Axx Series	16
	PFC (more than 200W)	FA561x Series	16
Main power supply	Quasi-resonant	FA564x Series	12
	PWM	FA8A6x Series	8
LLC		FA6Bxx Series	14
		FA6Cxx Series	14

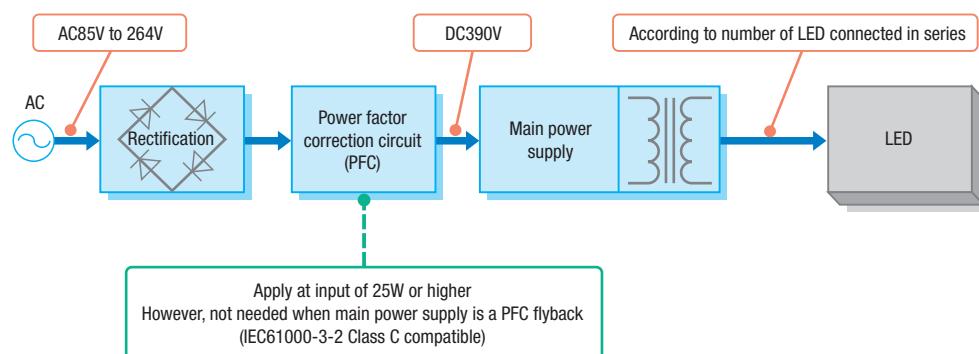
### 3. Printer (IJP) Power Supply



#### ■ Recommended IC

Circuit	Type	Recommended IC	Page
Power factor correction	PFC (75W-200W)	FA1Axx Series	16
	PFC (more than 200W)	FA561x Series	16
Main power supply	Quasi-resonant	FA564x Series	12
	PWM	FA8A6x Series	8

### 4. LED lighting Power Supply

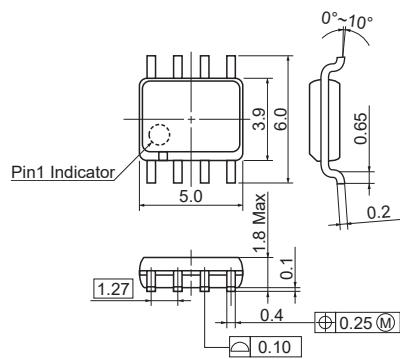


#### ■ Recommended IC

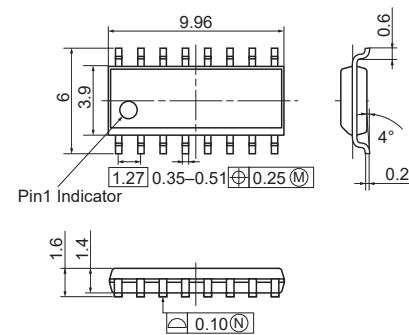
Circuit	Type	Recommended IC	Page
Power factor correction	PFC (25W-200W)	FA1Axx Series	16
	FA1B00N		16
	PFC (more than 200W)	FA561x Series	16
Main power supply	Quasi-resonant	FA564x Series	12
	PWM	FA8A6x Series	8
	LLC	FA6Bxx Series	14
	PFC Flyback	FA1A21N	16
		FA1B00N	16

## Package Outlines, mm

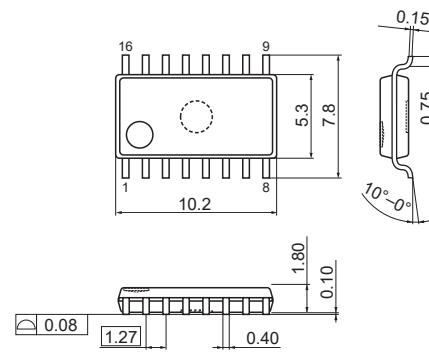
SOP-8 \*1



SOP-16(N)



SOP-16(M)



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





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