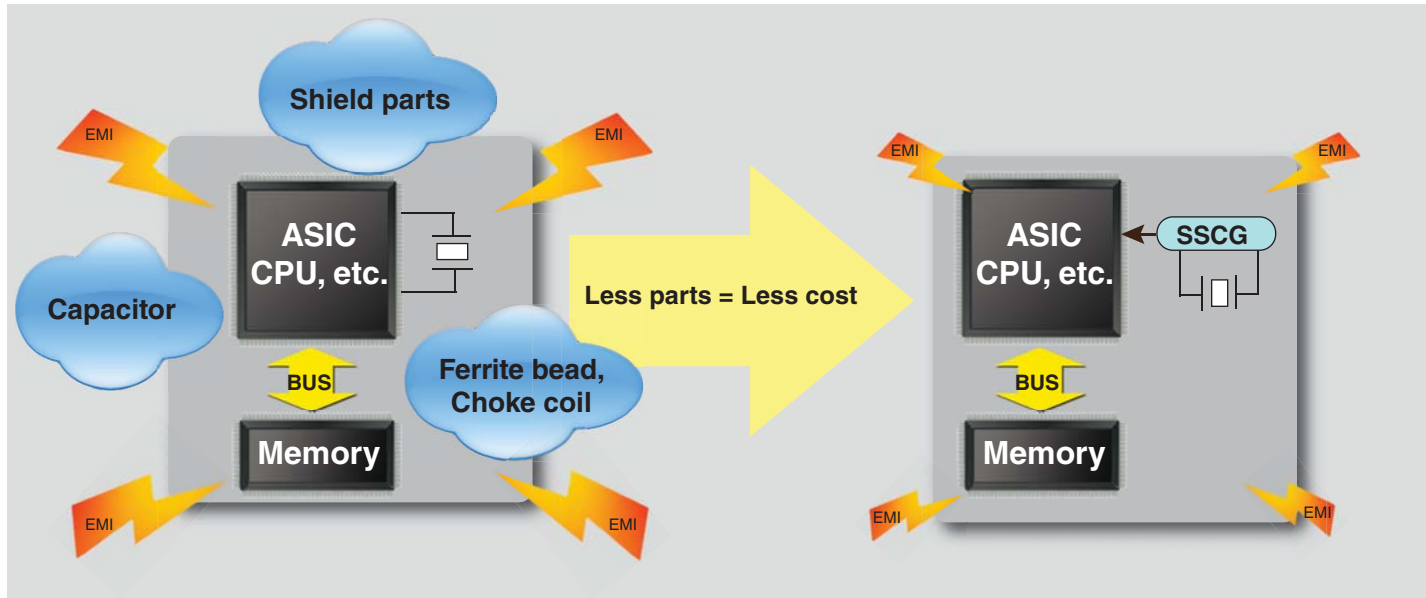


# The Fujitsu Spread Spectrum Clock Generator



## ► Description

Electromagnetic interference (EMI), which is due to electromagnetic radiation emitted from an external source, is an unwanted disturbance in an electrical circuit. In general, EMI is generated when the clock oscillator outputs a high-frequency signal. To reduce EMI, various components need to be added to the board, increasing the time and resources to complete design and measurement.

The Fujitsu Spread Spectrum Clock Generator (SSCG) reduces radiated EMI that results from system clock operation. It minimizes the need for other shielding components like bypass capacitors, choke coil and ferrite bead, resulting in system-level cost savings.

## ► Applications

### Industrial/Home Office

- FAX
- Digital copiers
- Scanners
- Printers
- Projectors

### Consumer

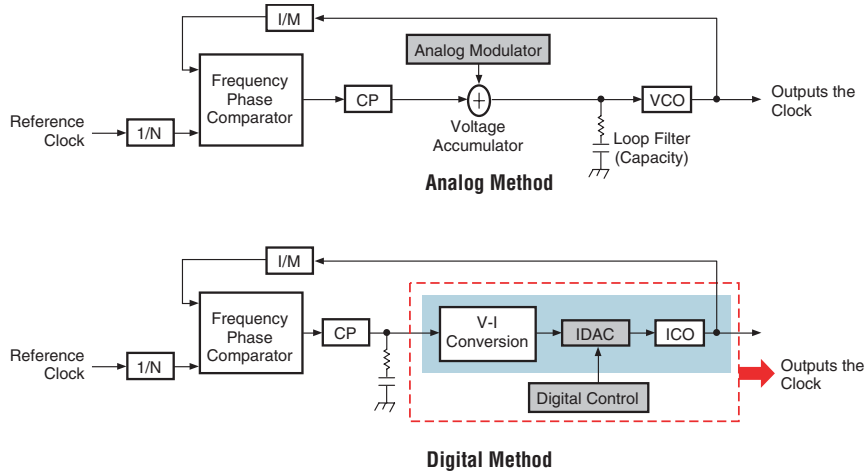
- LCD monitors
- HDTVs
- PDAs
- Mobile phones

### Networking

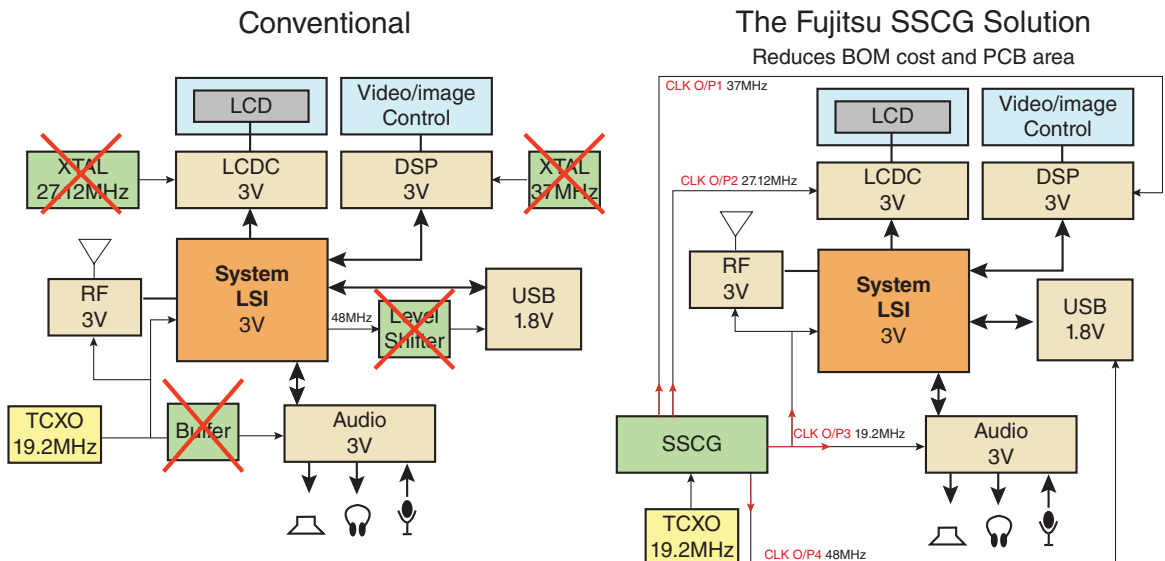
- Ethernet appliances
- LAN switches and hubs
- Servers

# The Fujitsu SSCG

## Features



- Digital frequency modulation technique
  - Digital control using a current D/A converter achieves accurate frequency modulation compared to conventional analog control, which causes distortion and blunting in the modulated waveform
- Programmable product (built-in FRAM)
  - Set and save output frequency and modulation parameters by changing the multiplication / division clock rate
- Single input and multiple outputs (Max. 8 Clock outputs, Example: MB88181)
  - One device supports multiple clocks, thus reducing the need for other components such as oscillators
- Selectable modulation rate
  - No modulation,  $\pm 0.5\%$ ,  $\pm 1.0\%$ ,  $\pm 2.0\%$ ,  $-1.0\%$ ,  $-2.0\%$ ,  $-4.0\%$
- Enhanced input frequency range
  - 8.3MHz to 134MHz
- Low current consumption
  - 5.5mA @ 25MHz
- Power supply voltage range
  - 1.65V to 3.6V
- Pin compatibility with other products in the market
- Package options
  - SOP8, TSSOP8, BCC6, BCC18, BCC20



## Parts Ordering Information

ORDERING No. EX: MB881XXPNF-G-100-JNE1					Multiplication ratio	Input frequency (MHz)		Output frequency (MHz)				Demodulation rate(%)		PKG		P/S(V)		Remarks			
Product No.	Package Suffix	Grade (*1)	Freq type	Packing and Option(*2)		Min.	max.	Min.	Output frequency range				Max.	Center	Down	No. of pins/Type	Min.		Max.		
									40	80	120	160									
MB88151A	PNF	G	100	JN/ JNEF/ JNER	E1	1	16.6	33.4	16.6					33.4	~±1.5	~-3.0	8 SOP	3.0	3.6		
			101																		
			200																		
			201																		
			400																		
MB88152A	PNF	G	101	JN/ JNEF/ JNER	E1	1	16.6	67					67	~±1.5	~-3.0	8 SOP	3.0	3.6			
			111																		
			100																		
			110																		
			102																		
MB88153A	PNF	G	100	JN/ JNEF/ JNER	E1	1	16.6	134	16.6					134	~±1.5	~-3.0	8 SOP	3.0	3.6	*4	
			101																		
			110																		
			111																		
			501																		
MB88154A	PNF	G	103	JN/ JNEF/ JNER	E1	1	16.6	40					40	~±1.5	~-3.0	8 SOP	3.0	3.6			
			113																		
			102																		
			112																		
			101																		
MB88155	PFT	G	100	JN	E1	1	12.5	25	12.5					25	~±1.0	~-2.0	8 TSSOP	3.0	3.6		
			110																		
			102																		
			112																		
			101																		
MB88161	PVB	G	/	EF/ ER	E1	1	20	28	20					28	~±2.0	~-4.0	18 BCC	2.7	3.6	*5	
						2	14	40	28					80							
						4	20	42	80					168							
MB88162	PVB	G	/	EF/ ER	E1	1	12	28	12					28	~±2.0	~-4.0	18 BCC	2.7	3.6	*5	
						4	20	42	80					168							
MB88181A	PFT	G	XXX	BND	E1	Optional	16	32	8					166	~±2.0	-	20 TSSOP	3.0	3.6	*7	
MB88182	1A 1B 2A 2B	PVA1	G	/	(*3)/ ER/ EF	E1	Optional	19.2	19.2	8					100	~±2.0	-	20 BCC	1.65	2.7	*8
MB88R157 (FRAM)	under development				Optional	10	50	1					134	~±1.75	-	8 SOP	3.0	3.6	*9		

\*1 G: General Purpose use

\*2 JN: tray or tube packing, JNEF/EF: Emboss taping(EF type), JNER/ER: Emboss taping(ER type), E1: Lead free

\*3 No suffix: tray or tube packing

\*4 Use for external clock input

\*5 Small package (2.7mm×2.4mm) with clock output stop function

\*6 Small package (2.4mm×1.4mm)

\*7 Multiplication ratio and output frequency are the MASK option. CLK output has eight pins. The output pin state during power-down is fixed by mask option. ( L outputs, Hi-Z )

\*8 Input frequency, output frequency, modulation rate, oscillation stabilization, capacitance can be set. The output pin state during power-down is fixed by mask option ( L outputs, Hi-Z ).

\*9 Input frequency, output frequency, modulation rate, oscillation stabilization capacitance can be set on FRAM without restraint.

Modulation clock output pin situation is resistor setting ( L outputs, Hi-Z ) when in OE pin setting

# The Fujitsu SSCG

## ► Evaluation Board Ordering Information

Series	Evaluation Board Number	Evaluate Device Product No.
MB88151A	MB88151AEB01-100	MB88151A-100
	MB88151AEB01-101	MB88151A-101
	MB88151AEB01-200	MB88151A-200
	MB88151AEB01-201	MB88151A-201
	MB88151AEB01-400	MB88151A-400
	MB88151AEB01-401	MB88151A-401
	MB88151AEB01-500	MB88151A-500
	MB88151AEB01-501	MB88151A-501
	MB88151AEB01-800	MB88151A-800
MB88152A	MB88152AEB01-100	MB88152A-100
	MB88152AEB01-110	MB88152A-110
	MB88152AEB01-101	MB88152A-101
	MB88152AEB01-111	MB88152A-111
	MB88152AEB01-102	MB88152A-102
	MB88152AEB01-112	MB88152A-112
MB88153A	MB88153AEB01-100	MB88153A-100
	MB88153AEB01-101	MB88153A-101
	MB88153AEB01-110	MB88153A-110
	MB88153AEB01-111	MB88153A-111
MB88154A	MB88154AEB01-101	MB88154A-101
	MB88154AEB01-102	MB88154A-102
	MB88154AEB01-103	MB88154A-103
	MB88154AEB01-111	MB88154A-111
	MB88154AEB01-112	MB88154A-112
	MB88154AEB01-113	MB88154A-113

Series	Evaluation Board Number	Evaluate Device Product No.
MB88155	MB88155EB01-100	MB88155-100
	MB88155EB01-101	MB88155-101
	MB88155EB01-102	MB88155-102
	MB88155EB01-103	MB88155-103
	MB88155EB01-110	MB88155-110
	MB88155EB01-111	MB88155-111
	MB88155EB01-112	MB88155-112
	MB88155EB01-113	MB88155-113
	MB88155EB01-400	MB88155-400
	MB88155EB01-402	MB88155-402
	MB88155EB01-410	MB88155-410
	MB88155EB01-412	MB88155-412
MB88161	MB88161EB01	MB88161
MB88162	MB88162EB01	MB88162
MB88182	MB88182EB01-1A	MB881821A
	(under development)	
	MB88182EB01-2A	MB881822A
	(under development)	
MB88182EB01-1B	(under development)	MB881821B
	(under development)	
	(under development)	MB881822B
MB88R157	MB88R157EB01	MB88R157
	(under development)	

## ► Evaluation Board



**Evaluation Board (MB88182EB01)**

All listed boards have similar features

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