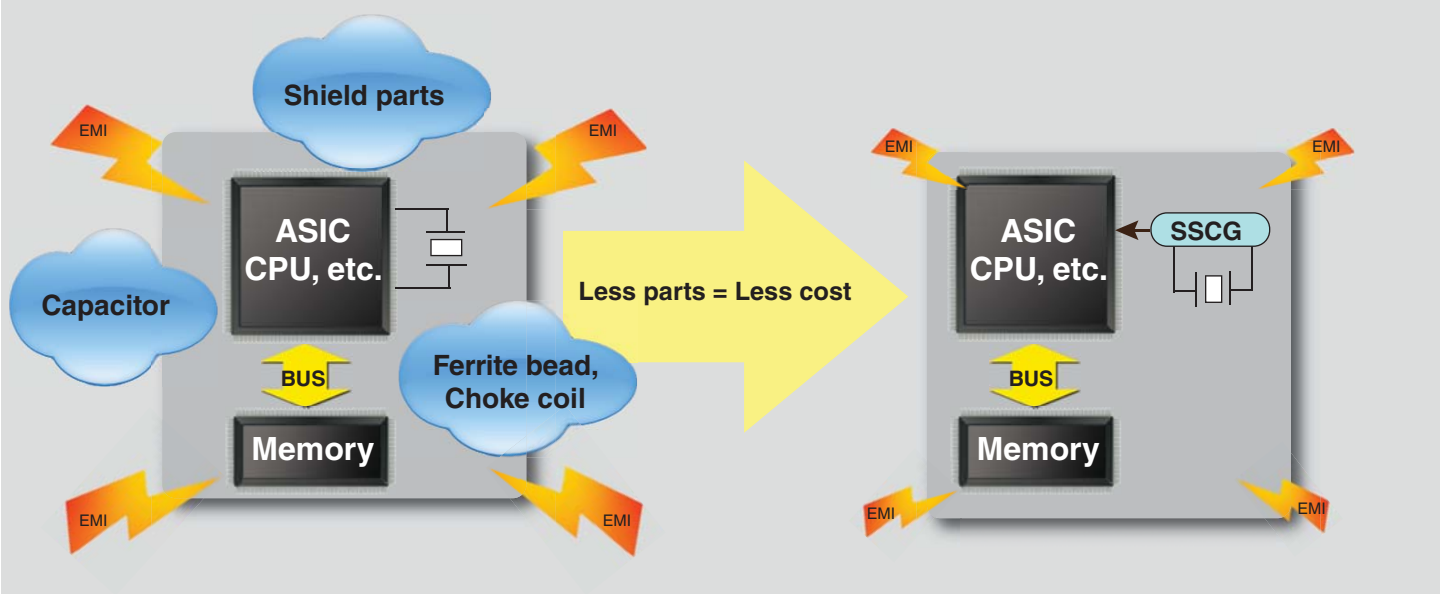
The Fujitsu Spread Spectrum Clock Generator



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

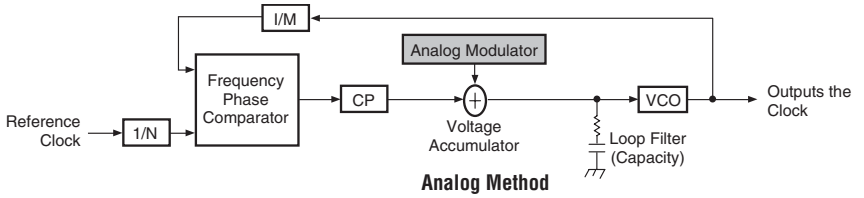
Industrial/Home Office
- FAX
- Digital copiers
- Scanners
- Printers
- Projectors

Consumer
- LCD monitors
- HDTVs
- PDAs
- Mobile phones

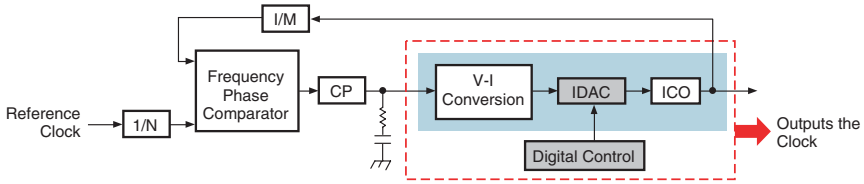
Networking
- Ethernet appliances
- LAN switches and hubs
- Servers

The Fujitsu SSCG

Features



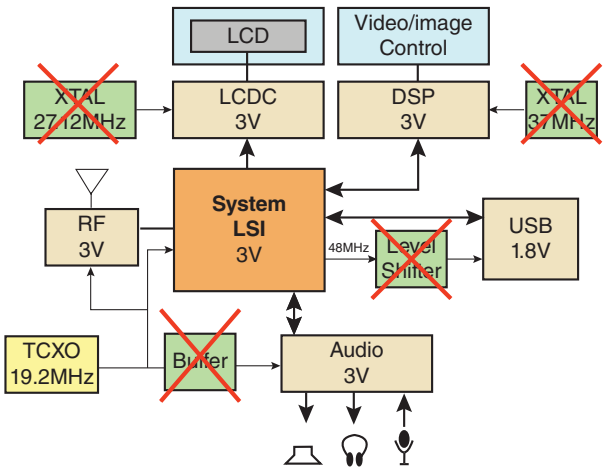
Analog Method



Digital Method

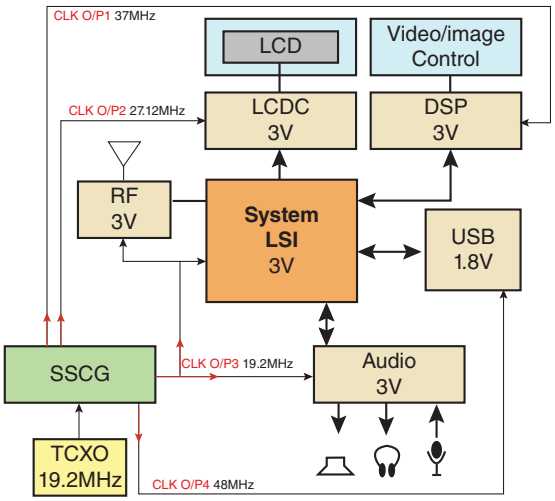
- Digital frequency modulation technique
  - –Digital control using a current D/A converter achieves accurate frequency modulation compared to conventional analog control, which causes distortion and blunting in the modulated waveform
- Programmable product (built-in FRAM)
  - –Set and save output frequency 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, ±0.5%, ±1.0%, ±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
  - –1.65 V to 3.6 V
- Pin compatibility with other products in the market
- Package options
  - –SOP8, TSSOP8, BCC6, BCC18, BCC20

Conventional



The Fujitsu SSCG Solution

Reduces BOM cost and PCB area



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.	Pakage Suffix	Grade (*1)	Freq type	Packing and Option(*2)			Min.	max.	Min.	Output frequency range 40 80 120 160	Max.	Center	Down	No. of pins/Type	Min.	Max.	
MB88151A	PNF	G	100 101 200 201 400 401 500 501 800 801	JN/ JNEF/ JNER	E1	1	16.6	33.4	16.6		33.4	~±1.5	~-3.0	8 SOP	3.0	3.6	
						2			33.2		66.8						
						4			66.4		134						
						1/2			8.3		16.7						
						8	8.3	16.7	66.4		134						
MB88152A	PNF	G	101 111 100 110 102 112	JN/ JNEF/ JNER	E1	1	16.6	67	16.6		67	- ~±1.5	~-3.0 -	8 SOP	3.0	3.6	
								134	16.6		134	- ~±1.5	~-3.0 -				
							40	134	40		134	- ~±1.5	~-3.0 -				
MB88153A	PNF	G	100 101 110 111	JN/ JNEF/ JNER	E1	1	16.6	134	16.6		134	- ±0.5 ±1.5	-1.0 -3.0 -	8 SOP	3.0	3.6	*4
MB88154A	PNF	G	103 113 102 112 101 111	JN/ JNEF/ JNER	E1	1	16.6	40	16.6		40	- ~±1.5	~-3.0 -	8 SOP	3.0	3.6	
							33	67	33		67	- ~±1.5	~-3.0 -				
							50	80	50		80	- ~±1.5	~-3.0 -				
MB88155	PFT	G	100 110 102 112 101 111 103 113 400 402 410 412	JN	E1	1	12.5	25	12.5		25	- ~±1.0 - ~±1.0	~-2.0 - ~-2.0 -	8 TSSOP	3.0	3.6	
							25	50	25		50	- ~±1.0 - ~±1.0	~-2.0 - ~-2.0 -				
						4	12.5	20	50		80	- - ~±1.0 ~±1.0	~-2.0 ~-2.0 - -				
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						
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				3.0	3.6	
MB88181A	PFT	G	XXX	BND	E1	Option-al	16	32	8		166	~±2.0	-	20 TSSOP	3.0	3.6	*7
MB88182 1A 1B 2A 2B	PVA1	G		(*3)/ ER/ EF	E1	Option-al	19.2	19.2	8		100	~±2.0	-	20 BCC	1.65	2.7	*8
MB88R157 (FRAM)	under development					Option-al	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
	MB88151AEB01-801	MB88151A-801
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 (under development)	MB881821A
	MB88182EB01-2A (under development)	MB881822A
	MB88182EB01-1B (under development)	MB881821B
	MB88182EB01-2B (under development)	MB881822B
MB88R157	MB88R157EB01 (under development)	MB88R157

Evaluation Board



Evaluation Board (MB88182EB01)
All listed boards have similar features

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