Low Power Notebook LCD Panel EMI Reduction IC

Features

- FCC approved method of EMI attenuation.
- Generates a low EMI spread spectrum clock of the input frequency.
- Optimized for frequency range from 50 to 110MHz.
- Internal loop filter minimizes external components and board space.
- Four selectable spread ranges.
- Low inherent cycle-to-cycle jitter.
- 3.3V operating voltage range.
- TTL or CMOS compatible inputs and outputs.
- Ultra-low power CMOS design.
  - 8.46 mA @3.3V, 54MHz
  - 9.79 mA @3.3V, 65MHz
  - 12.06 mA @3.3V, 81MHz
  - 16.51 mA @3.3V, 108MHz
- Supports notebook VGA and other LCD timing controller applications.
- Pinout compatible to ICS MK1708 and Cypress CY25560.
- SSON/SBM pin for Spread Spectrum On/Off and Standby Mode controls.
- Available in 8-pin SOIC and TSSOP.

Product Description

The P1708C is a versatile spread spectrum frequency modulator designed specifically for input clock frequencies. The P1708C reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of down stream clock and data dependent signals. The P1708C allows significant system cost savings by reducing the number of circuit board layers ferrite beads, shielding and other passive components that are traditionally required to pass EMI regulations.

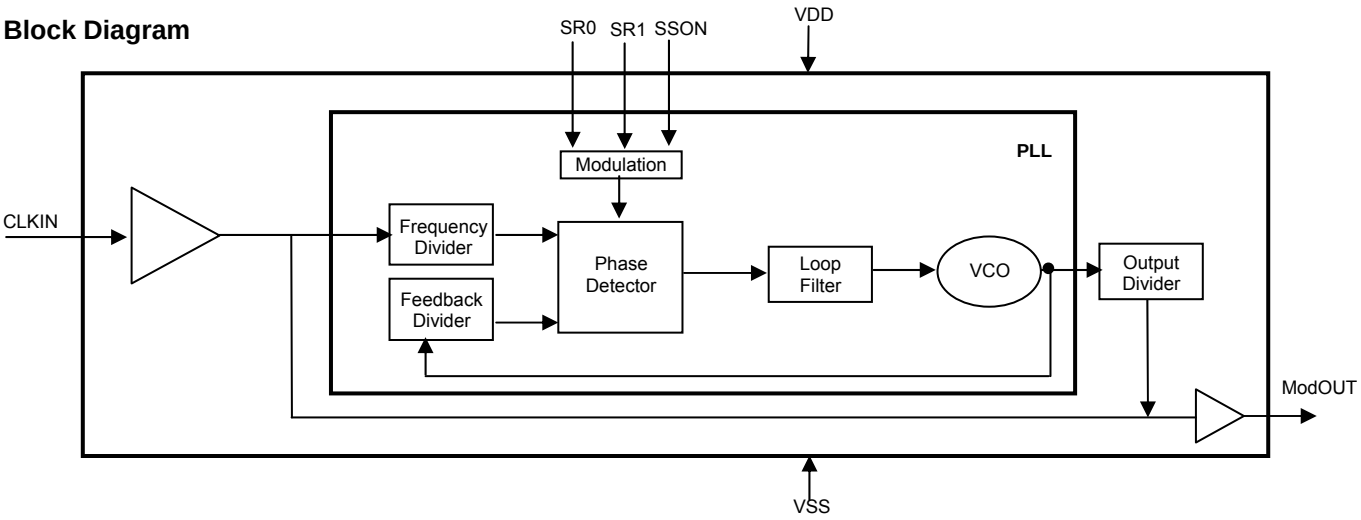
The P1708C modulates the output of a single PLL in order to "spread" the bandwidth of a synthesized clock, and more importantly, decreases the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most frequency generators. Lowering EMI by increasing a signal's bandwidth is called 'spread spectrum clock generation'.

The P1708C uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all digital method.

Applications

The P1708C is targeted towards notebook LCD displays, and other displays using an LVDS interface, PC peripheral devices, and embedded systems.

Block Diagram



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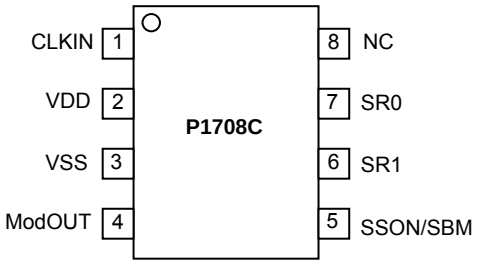
Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	CLKIN	I	Connect to externally generated clock signal. To put the part into standby mode, disable the input clock signal to this pin and pull SSON/SBM (pin 5) low. *Refer Standby Mode Selection Table.*
2	VDD	P	Connect to +3.3V.
3	VSS	P	Ground Connection. Connect to system ground.
4	ModOUT	O	Spread spectrum clock output.
5	SSON/SBM	I	Spread Spectrum On/Off and standby mode control. *Refer Standby Mode Selection Table.* This pin has an internal pull-up resistor.
6	SR1	I	Digital logic input used to select Spreading Range. *Refer Spread Spectrum Selection Table.* This pin has an internal pull-up resistor.
7	SR0	I	Digital logic input used to select Spreading Range. *Refer Spread Spectrum Selection Table.* This pin has an internal pull-up resistor.
8	NC	-	No connect.

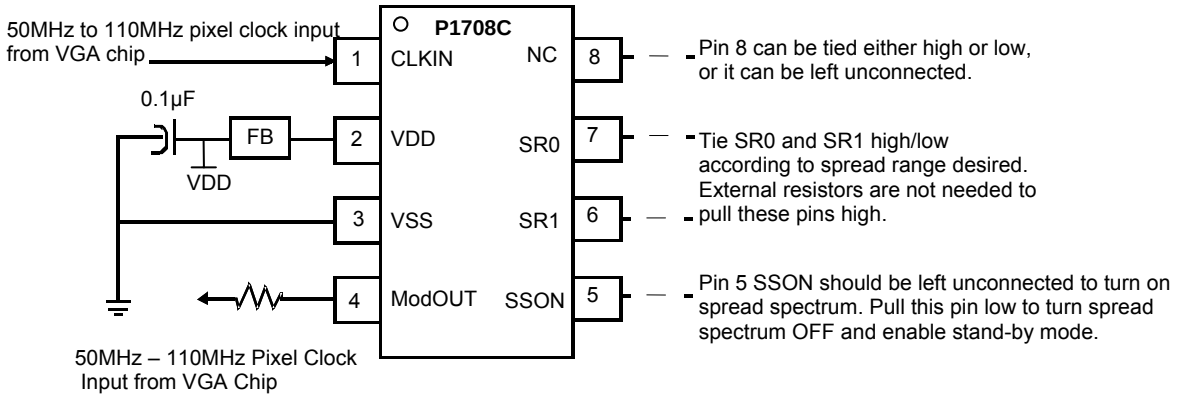
Standby Mode Selection

CLKIN	SSON/SBM	Spread Spectrum	ModOUT	PLL	Mode
Disabled	0	N/A	Disabled	Disabled	Standby
Disabled	1	N/A	Disabled	Free Running	Free Running
Enabled	0	Off	Reference	Disabled	Buffer out
Enabled	1	On	Normal	Normal	Normal

Spread Range Selection

SR1	SR0	Spreading Range	Modulation Rate
0	0	± 1.00%	(F_{IN}/40) * 62.49 KHz
0	1	± 2.00%	(F_{IN}/40) * 62.49 KHz
1	0	± 0.25%	(F_{IN}/40) * 62.49 KHz
1	1	± 0.75%	(F_{IN}/40) * 62.49 KHz

Schematic for Notebook VGA Application



Note: To set the P1708C to standby mode, disable the input clock (pin 1 CLKIN) and pull SSON (pin 5) low. *Refer Standby Mode Selection Table.*

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
VDD, V_{IN}	Voltage on any pin with respect to Ground	-0.5 to +7.0	V
T_{STG}	Storage temperature	-65 to +125	°C
T_A	Operating temperature	0 to +70	°C
T_s	Max. Soldering Temperature (10 sec)	260	°C
T_J	Junction Temperature	150	°C
T_{DV}	Static Discharge Voltage (As per JEDEC STD22- A114-B)	2	KV

Note: These are stress ratings only and are not implied for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.

DC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
V_{IL}	Input low voltage	GND – 0.3		0.8	V
V_{IH}	Input high voltage	2.0		V_{DD} + 0.3	V
I_{IL}	Input low current (pull-up resistors on inputs SR0, SR1 and SSON/SBM)			-35	µA
I_{IH}	Input high current			35	µA
I_{XOL}	X_{OUT} output low current @ 0.4V, V_{DD} = 3.3V		3		mA
I_{XOH}	X_{OUT} output high current @ 2.5V, V_{DD} = 3.3V		3		mA
V_{OL}	Output low voltage V_{DD} = 3.3V, I_{OL} = 20mA			0.4	V
V_{OH}	Output high voltage V_{DD} = 3.3V, I_{OH} = 20mA	2.5			V
I_{CC}	Dynamic supply current normal mode 3.3V and 10pF loading	7.90	9.79	17.53 f_{IN} -max	mA
I_{DD}	Static supply current standby mode		0.6		mA
V_{DD}	Operating voltage	2.7	3.3	3.7	V
t_{ON}	Power up time (first locked clock cycle after power up)		0.18		mS
Z_{OUT}	Clock output impedance		50		Ω

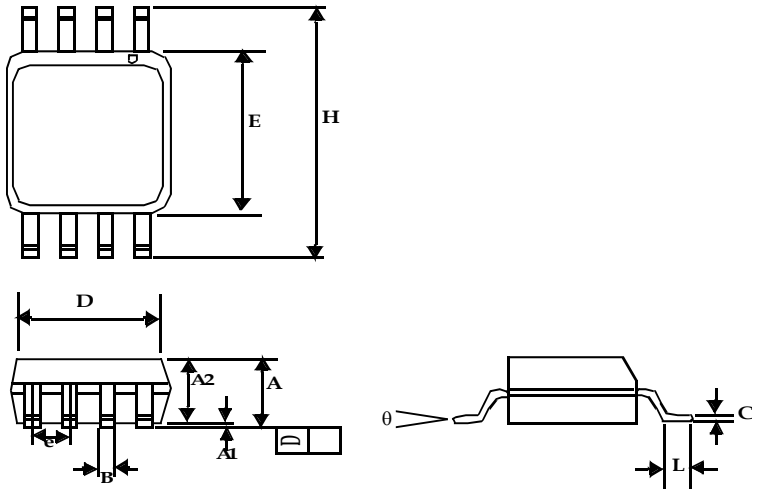
AC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
f_{IN}	Input frequency	50		110	MHz
f_{OUT}	Output frequency	50		110	MHz
t_{LH}*	Output rise time Measured at 0.8V to 2.0V	0.7	0.9	1.1	ns
t_{HL}*	Output fall time Measured at 0.8V to 2.0V	0.6	0.8	1.0	ns
t_{JC}	Jitter (cycle to cycle)			360	ps
t_D	Output duty cycle	45	50	55	%

*t_{LH} and t_{HL} are measured into a capacitive load of 15pF

Package Information

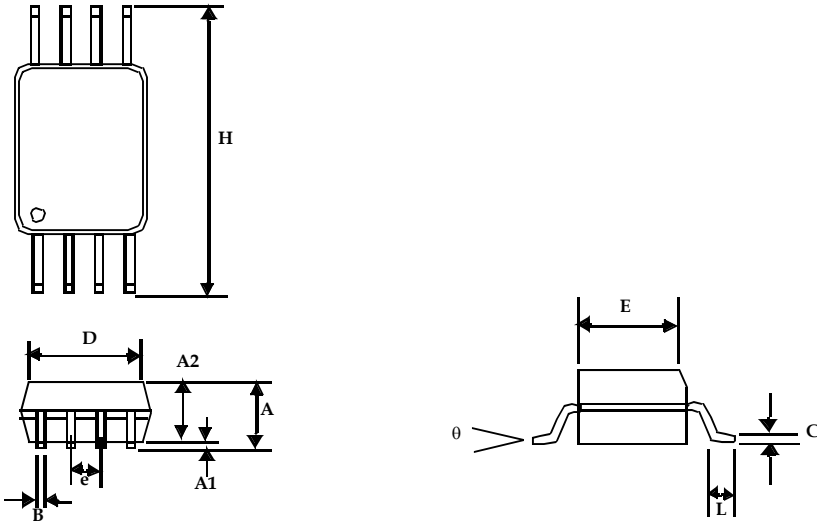
8-Pin SOIC Package



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

Note: Controlling dimensions are millimeters.
SOIC: 0.074 grams unit weight.

8-Pin TSSOP

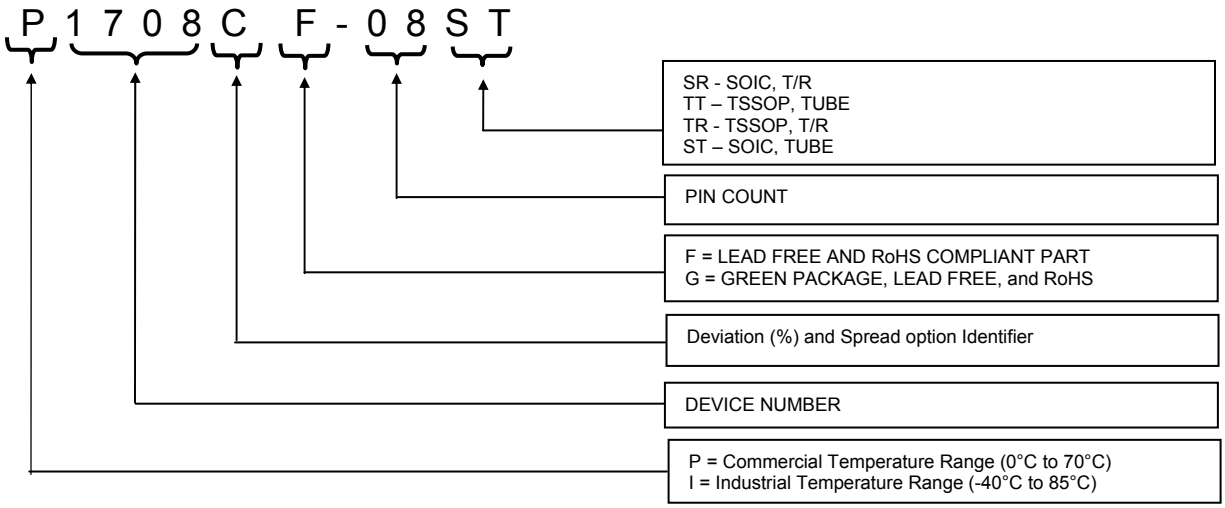


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°	8°

Ordering Codes

Part number	Marking	Package Type	Temperature
P1708CF-08ST	P1708CF	8-Pin SOIC, Tube, Pb Free	Commercial
P1708CF-08SR	P1708CF	8-Pin SOIC, Tape and Reel, Pb Free	Commercial
P1708CF-08TT	P1708CF	8-Pin TSSOP, Tube, Pb Free	Commercial
P1708CF-08TR	P1708CF	8-Pin TSSOP, Tape and Reel, Pb Free	Commercial
P1708CG-08ST	P1708CG	8-Pin SOIC, Tube, Green	Commercial
P1708CG-08SR	P1708CG	8-Pin SOIC, Tape and Reel, Green	Commercial
P1708CG-08TT	P1708CG	8-Pin TSSOP, Tube, Green	Commercial
P1708CG-08TR	P1708CG	8-Pin TSSOP, Tape and Reel, Green	Commercial

Device Ordering Information



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Preliminary Information
Part Number: P1708C
Document Version: 1.3

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003
Many PulseCore Semiconductor products are protected by issued patents or by applications for patent