rev 1.0

Low-Power Mobile VGA 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:
  - P1817A – 20 to 30MHz. Operation
  - P1817B – 10 to 20MHz Operation
- Internal loop filter minimizes external components and board space.
- Two selectable spread ranges.
- Low inherent cycle-to-cycle jitter.
- 3.3V or 5V operating voltage range.
- TTL or CMOS compatible outputs.
- Ultra-low power CMOS design.
  - 3.17mA @3.3V, 10MHz | 6.20mA@5.0V, 10MHz
  - 4.28mA @3.3V, 14MHz | 7.50mA @5.0V, 14MHz
  - 5.50mA @3.3V, 20MHz | 9.50mA @5.0V, 20MHz
- Supports notebook VGA and other LCD timing controller applications.
- SSON pin for Spread Spectrum On/Off and Standby Mode controls.
- Available in 8-pin SOIC and TSSOP.

Product Description

The P1817 is a versatile spread spectrum frequency modulator designed specifically for input clock frequencies. The P1817 reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of down stream clock and data dependent signals. The P1817 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.

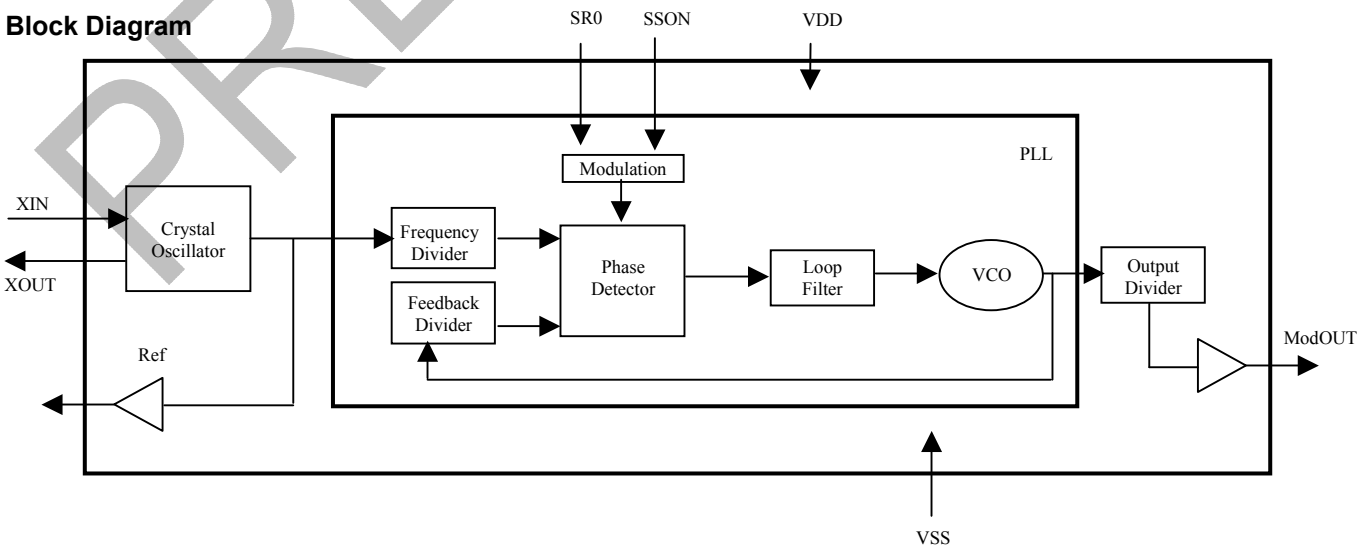
The P1817 modulates the output of a single PLL in order to "spread" the bandwidth of a synthesized clock, and more importantly, decreases the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most frequency generators. Lowering EMI by increasing a signal's bandwidth is called 'spread spectrum clock generation'.

The P1817 uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all digital method.

Applications

The P1817 is targeted towards notebook VGA chip and other displays using an LVDS interface, PC peripheral devices, and embedded systems.

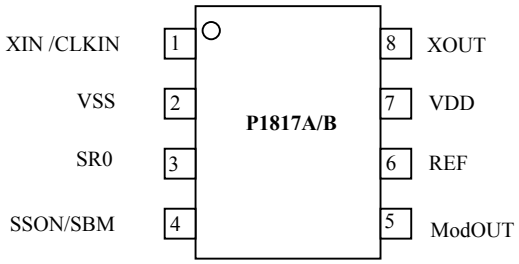
Block Diagram



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Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	XIN/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 4) low. *Refer Standby Mode Selection Table.*
2	VSS	P	Ground Connection. Connect to system ground.
3	SR0	I	Digital logic input used to select Spreading Range. *Refer Spread Spectrum Selection Table.* This pin has an internal pull-up resistor.
4	SSON/SBM	I	Spread Spectrum On/Off and standby mode control. *Refer Standby Mode Selection Table.*
5	ModOUT	O	Spread spectrum clock output or reference output. *Refer Standby Mode Selection Table.*
6	REF	O	Reference output.
7	VDD	P	Connect to +3.3V or 5.0V.
8	XOUT	O	Connect to crystal. No connect if externally generated clock signal is used.

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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, VDD = 5V

CLKIN frequency	SR0	Spreading Range	Modulation Rate
10 MHz	1	± 1.5%	(CLKIN/10) * 20.83KHz
	0	± 1.9%	
14.318MHz	1	± 1.36%	
	0	± 1.64%	
15MHz	1	± 1.3%	
	0	± 1.5%	
20MHz	1	± 0.95%	
	0	± 1.125%	

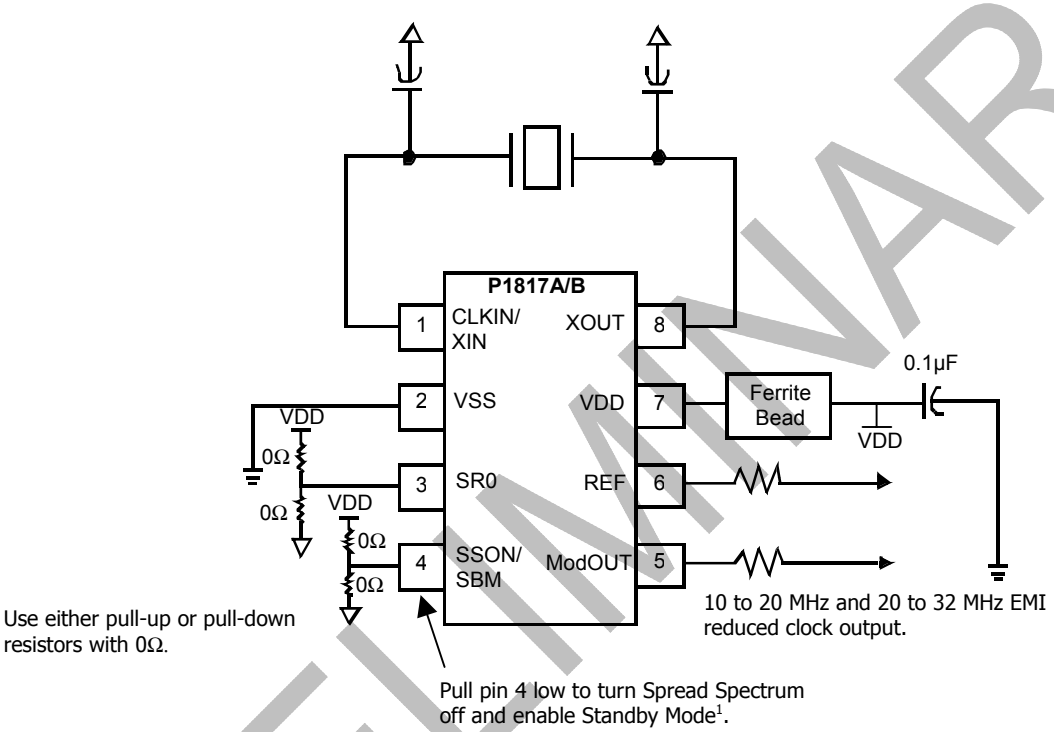
Spread Range Selection, VDD = 3.3V

CLKIN frequency	SR0	Spreading Range	Modulation Rate
10 MHz	1	± 1.5%	(CLKIN/10) * 20.83KHz
	0	± 1.65%	
14.318MHz	1	± 1.4%	
	0	± 1.7%	
15MHz	1	± 1.37%	
	0	± 1.63%	
20MHz	1	± 1.1%	
	0	± 1.28%	

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Schematic for Notebook VGA Application



[1]. To set the P1817 to standby mode, disable the input clock (pin 1 CLKIN), and pull pin 4 SSON/SBM low.

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Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{DD}, V_{IN}	Voltage on any pin with respect to GND	-0.5 to + 7.0	V
T_{STG}	Storage temperature	-65 to +125	°C
T_A	Operating temperature	0 to 70	°C
Note: These are stress ratings only and functional operation is not implied. Exposure to absolute maximum ratings for extended periods 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 and SSON/SBM)		-	-	-35	µA
I_{IH}	Input high current (pull-down resistor on input SSON#)		-	-	35	µA
I_{XOL}	X_{OUT} output low current	@ 0.4V, V_{DD} = 3.3V	-	3	-	mA
		@ 0.4V, V_{DD} = 5.0V	-	20	-	
I_{XOH}	X_{OUT} output high current	@ 2.5V, V_{DD} = 3.3V	-	3	-	mA
		@ 4.5V, V_{DD} = 5.0V	-	20	-	
V_{OL}	Output low voltage	V_{DD} =3.3V, I_{OL} = 20mA	-	-	0.4	V
		V_{DD} =5.0V, I_{OL} = 20mA	-	-	-	
V_{OH}	Output high voltage	V_{DD} =3.3V, I_{OH} = 20mA	2.5	-	-	V
		V_{DD} =5.0V, I_{OH} = 20mA	4.5	-	-	
I_{CC}	Dynamic supply current normal mode	Normal Mode	f_{IN-min}	f_{IN-typ}	f_{IN-max}	mA
		3.3V and 10pF loading	3.2	-	7.0	
		5.0V and 10pF loading	6.2	-	13.6	
I_{DD}	Static supply current standby mode		-	0.6	-	mA
V_{DD}	Operating voltage		2.7	3.3	5.5	V
t_{ON}	Power up time (first locked clock cycle after power up)		-	0.18	-	mS
Z_{OUT}	Clock output impedance		-	50	-	Ω

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AC Electrical Characteristics

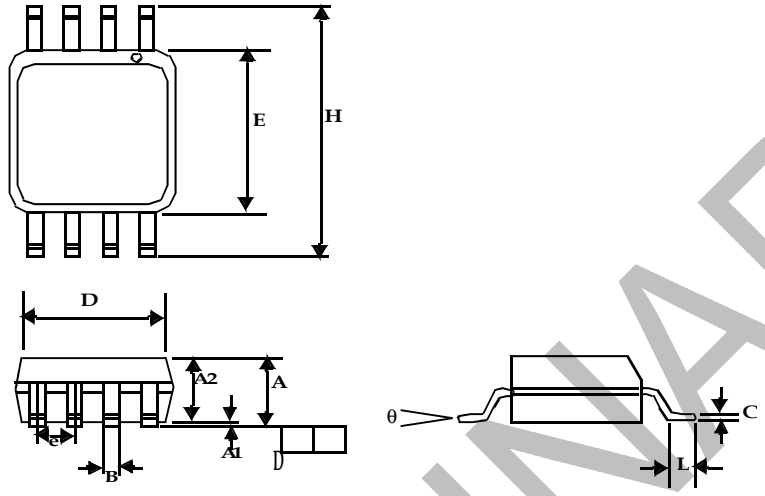
Symbol	Parameter		Min	Typ	Max	Unit
f_{IN}	Input frequency (See device type P1817A or P1817B).		10	-	32	MHz
f_{OUT}	Output frequency (See device type P1817A or P1817B).		10	-	32	MHz
t_{LH}*	Output rise time	Measured at 0.8V to 2.0V	0.7	0.9	1.1	ns
		Measured at 1.2V to 3.75V	-	0.75	-	ns
t_{HL}*	Output fall time	Measured at 0.8V to 2.0V	0.6	0.8	1.0	ns
		Measured at 1.2V to 3.75V	-	0.75	-	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						

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Package Information

Mechanical Package Outline 8-Pin SOIC



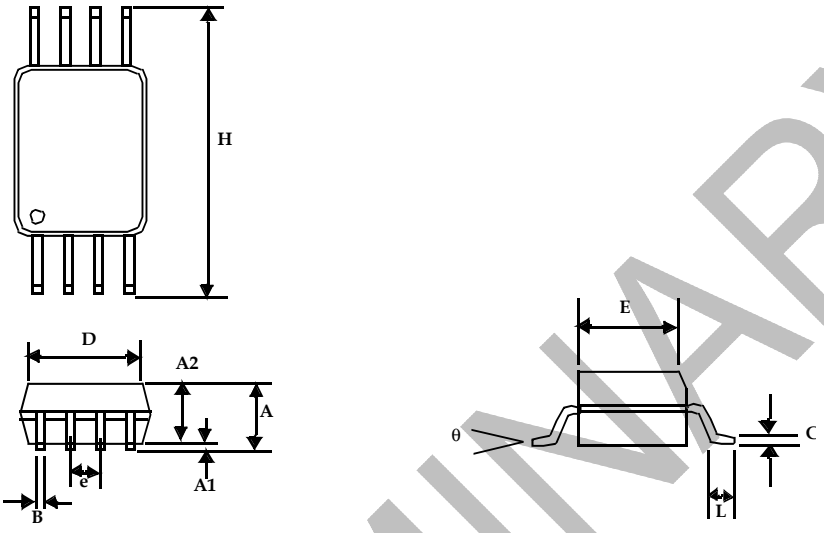
Symbol	Dimensions in inches		Dimensions in millimeters	
	Min	Max	Min	Max
A	0.057	0.071	1.45	1.80
A1	0.004	0.010	0.10	0.25
A2	0.053	0.069	1.35	1.75
B	0.012	0.020	0.31	0.51
C	0.004	0.01	0.10	0.25
D	0.186	0.202	4.72	5.12
E	0.148	0.164	3.75	4.15
e	0.050 BSC		1.27 BSC	
H	0.224	0.248	5.70	6.30
L	0.012	0.028	0.30	0.70
θ	0°	8°	0°	8°

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

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Mechanical Package Outline 8-Pin TSSOP



	Dimensions in inches		Dimensions in millimeters	
Symbol	**Min**	**Max**	**Min**	**Max**
A		0.047		1.10
A1	0.002	0.006	0.05	0.15
A2	0.031	0.041	0.80	1.05
B	0.007	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	0.244	0.260	6.20	6.60
L	0.018	0.030	0.45	0.75
θ	0°	8°	0°	8°

Note: Controlling dimensions are millimeters
TSSOP – 0.034 grams unit weight

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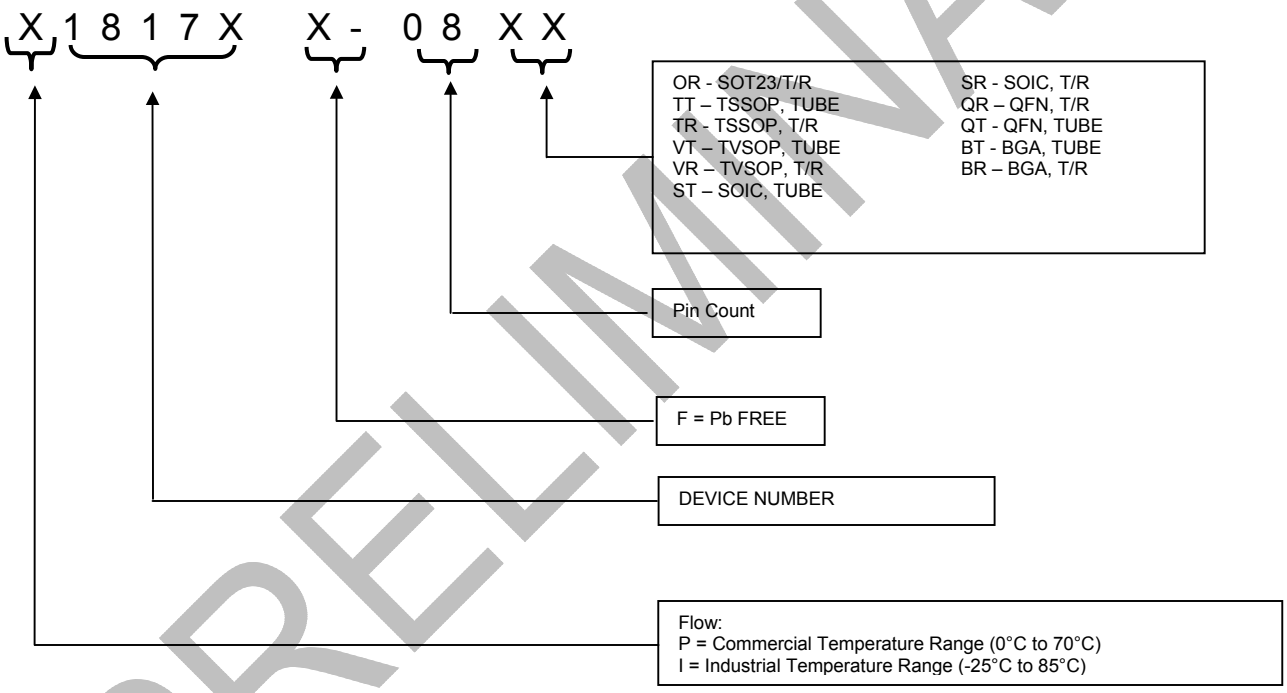
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Ordering Codes

Part Number	Marking	Input Frequency (MHz)	Package Type	Pb Free	Qty per reel	Temperature (°C)
P1817A-08ST	P1817A	20-32	8-pin SOIC, tube	No		0 to 70
P1817AF-08ST	P1817AF	20-32	8-pin SOIC, tube	Yes		0 to 70
I1817A-08SR	I1817A	20-32	8-pin SOIC, tape & reel	No	2500	-20 to 85
I1817BF-08TR	I1817BF	10-20	8-pin SOIC, tape & reel	Yes	2500	-20 to 85

Device Ordering Information



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Licensed under US patent Nos 5,488,627 and 5,631,920.
Preliminary datasheet. Specification subject to change without notice.

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