

rev 1.1

## Peak Reducing EMI Solution

### Features

- FCC approved method of EMI attenuation.
- Provides up to 15dB EMI reduction.
- Generates a 1X low EMI spread spectrum clock from the input frequency.
- Optimized for frequency range:
  - P2180 / 84: 20MHz to 40MHz
  - P2181: 60MHz to 160MHz
  - P2182 / 83: 10MHz to 20MHz
- Internal loop filter minimizes external components and board space.
- Selectable spread options: Down Spread and Center Spread.
- Low inherent cycle-to-cycle jitter.
- Eight spread % selections:
  - $\pm 0.625\%$  to  $-3.5\%$ .
- 3.3V operating voltage.
- CMOS/TTL compatible inputs and outputs.
- Low-power CMOS design.
- Supports notebook VGA and other LCD timing controller applications.
- Drop-in replacement to Cypress W180/1.
- Products are available for industrial temperature range.
- Available in 8-pin SOIC and TSSOP packages.

### Product Description

The P2180/81X is a versatile spread spectrum frequency modulator designed specifically for a wide range of clock frequencies from 20MHz to 40MHz and 60MHz to 160MHz (*Refer Input Frequency and Modulation Rate Table.*) The P2180/81X can generate an EMI reduced clock form an OSC or a system generated clock. The P2180/81A to P2180/81D offer various combinations of spread options and percentage deviations. (*Refer Spread Deviation Selections Table.*) These combinations include Down and Center Spread and percentage deviation range from  $\pm 0.625\%$  to  $-3.50\%$ .

The P2180/81X reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of down stream clock and data dependent signals. The P2180/81X allows significant system cost savings by reducing the number of circuit board layers and shielding that are traditionally required to pass EMI regulations.

The P2180/81X modulates the output of a single PLL in order to “spread” the bandwidth of a synthesized clock, thereby decreasing 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 clock generators. Lowering EMI by increasing a signal’s bandwidth is called spread spectrum clock generation.

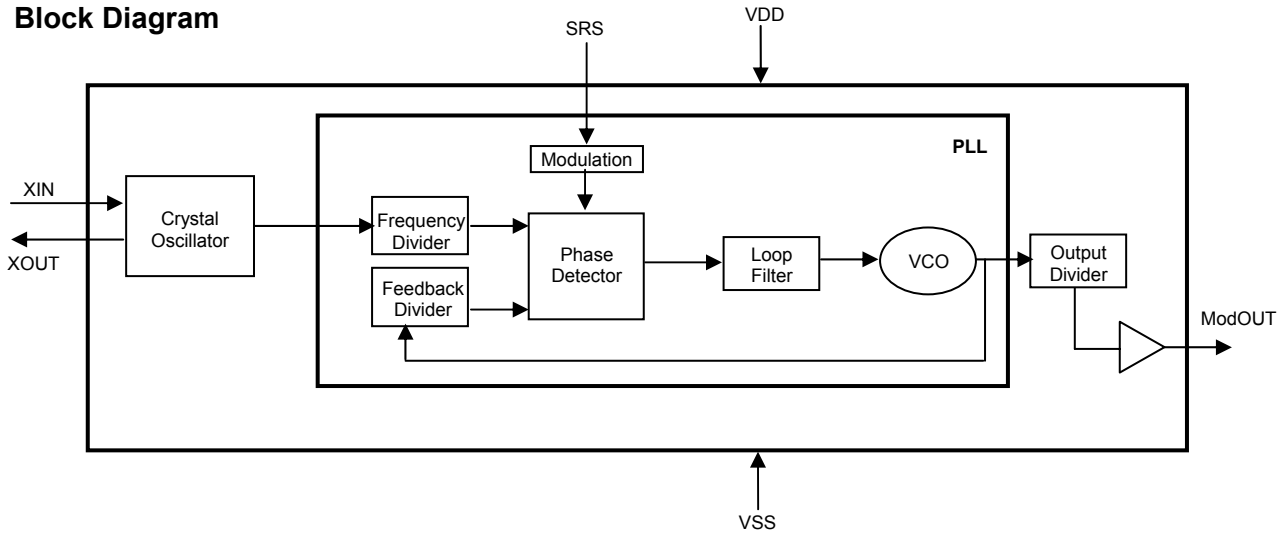
The P2180/81X uses the most efficient and optimized modulation profile approved by the FCC and is implemented by using a proprietary all-digital method.

### Applications

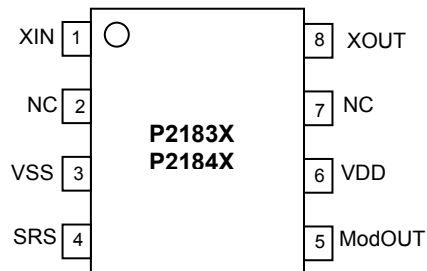
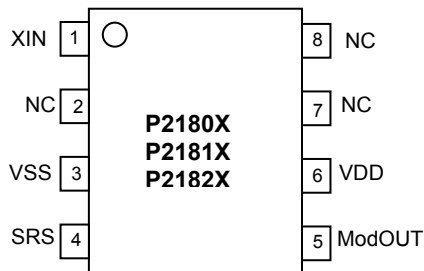
The P2180/81X is targeted towards EMI management for memory and LVDS interfaces in mobile graphic chipsets and high-speed digital applications such as PC peripheral devices, consumer electronics, and embedded controller systems.

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**Block Diagram**



**Pin Diagram**



**Pin Description**

Pin#	Pin Name	Type	Description
1	XIN	I	Connect to externally generated clock signal or crystal.
2	NC		No connect.
3	VSS	P	Ground to entire chip.
4	SRS	I	Spread Range Select. Digital logic input used to select frequency deviation (Refer Spread Deviation Selections Table). This pin has an internal pull-up resistor.
5	ModOUT	O	Spread spectrum low EMI output.
6	VDD	P	Connect to +3.3V.
7	NC		No connect.
8	NC		No connect.
8*	XOUT	O	Crystal connection.

\* Available for P2183 and P2184 only.

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### Input Frequency and Modulation Rate

Part Number	Input Frequency Range (MHz)	Output Frequency Range (MHz)	Modulation Rate
P2180/P2184	20 to 40	20 to 40	Input frequency / 768
P2181	60 to 160	60 to 160	Input frequency / 2048
P2182/P2183	10 to 20	10 to 20	TBD

### Spread Deviation Selections

Part Number	SRS	Spread Deviation
P2180/1/2/3/4 A	0	-1.25% (Down)
	1	-1.75% (Down)
P2180/1/2/3/4 B	0	± 1.25% (Center)
	1	± 1.75% (Center)
P2180/1/2/3/4 C	0	-2.50% (Down)
	1	-3.50 (Down)
P2180/1/2/3/4 D	0	± 0.625%(Center)
	1	± 0.875% (Center)

### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
VDD, V <sub>IN</sub>	Voltage on any pin with respect to Ground	-0.5 to +4.6	V
T <sub>STG</sub>	Storage temperature	-65 to +125	°C
T <sub>A</sub>	Operating temperature	0 to +70	°C
T <sub>s</sub>	Max. Soldering Temperature (10 sec)	260	°C
T <sub>J</sub>	Junction Temperature	150	°C
T <sub>DV</sub>	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.

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### DC Electrical Characteristics

Unless otherwise noted,  $V_{DD} = 3.3V$  and  $T_A = 25^\circ C$

Symbol	Parameter	Min	Typ	Max	Unit
$V_{IL}$	Input low voltage	GND – 0.3	-	0.8	V
$V_{IH}$	Input high voltage	-	-	$V_{DD} + 0.3$	V
$I_{IL}$	Input low current (input SRS)	-60.0	-	-20.0	$\mu A$
$I_{IH}$	Input high current	-	-	1.00	$\mu A$
$I_{XOL}$	$X_{OUT}$ output low current (@ 0.4V, $V_{DD} = 3.3V$ )	2.00	-	12.00	mA
$I_{XOH}$	$X_{OUT}$ output high current (@2.5V, $V_{DD} = 3.3V$ )	-	-	12.00	mA
$V_{OL}$	Output low voltage ( $V_{DD} = 3.3V$ , $I_{OL} = 20mA$ )	-	-	0.4	V
$V_{OH}$	Output high voltage ( $V_{DD} = 3.3V$ , $I_{OH} = 20mA$ )	2.8	-	-	V
$I_{CC}$	Dynamic supply current normal mode (3.3V and 10pF loading)	$8.6 f_{IN} - \text{min}$	-	$27.0 f_{IN} - \text{max}$	mA
$I_{DD}$	Static supply current standby mode	-	4.5	-	mA
$V_{DD}$	Operating voltage	-	3.3	-	V
$t_{ON}$	Power up time (first locked clock cycle after power up)	-	-	-	mS
$Z_{OUT}$	Clock output impedance	-	-	-	$\Omega$

### AC Electrical Characteristics

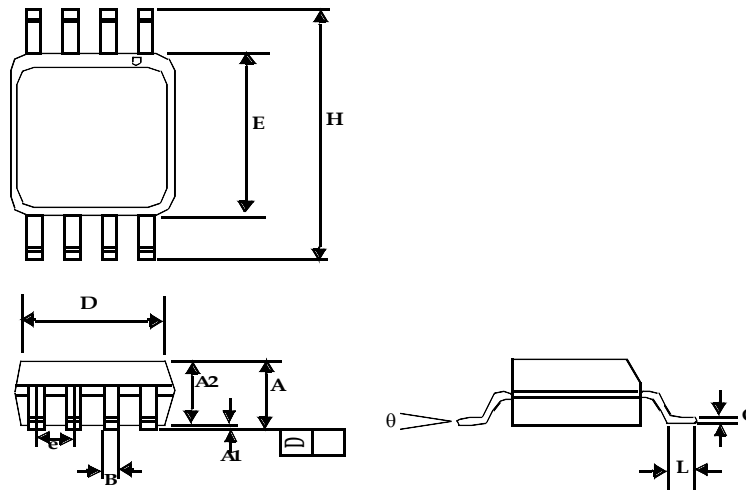
Symbol	Parameter	Min	Typ	Max	Unit
$f_{IN}$	Input frequency	10	-	160	MHz
$f_{OUT}$	Output frequency	10	-	160	MHz
$t_{LH}^*$	Output rise time (measured at 0.8V to 2.0V)	-	0.69	-	ns
$t_{HL}^*$	Output fall time (measured at 2.0V to 0.8V)	-	0.66	-	ns
$t_{JC}$	Jitter (cycle to cycle)	-200	-	200	ps
$t_D$	Output duty cycle	45	50	55	%

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

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Package Information

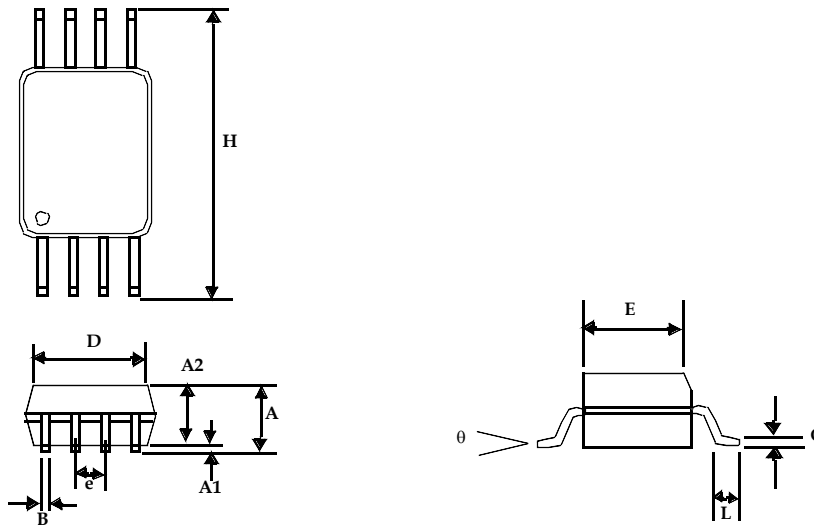
8-Pin SOIC Package



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
$\theta$	0°	8°	0°	8°

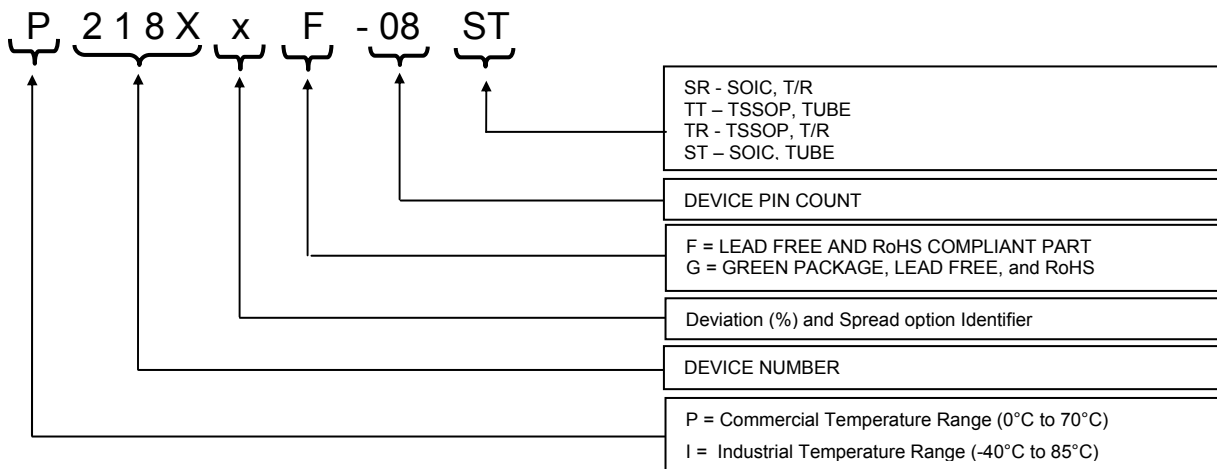
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**Ordering Information**

Part number	Marking	Package Type	Temperature
P218XxF-08-ST	P2181XxF	8-Pin SOIC, Tube, Pb Free	Commercial
P218XxF-08-SR	P2181XxF	8-Pin SOIC, Tape and Reel, Pb Free	Commercial
P218XxF-08-TT	P2181XxF	8-Pin TSSOP, Tube, Pb Free	Commercial
P218XxF-08-TR	P2181XxF	8-Pin TSSOP, Tape and Reel, Pb Free	Commercial
P218XxG-08-ST	P2181XxG	8-Pin SOIC, Tube, Green	Commercial
P218XxG-08-SR	P2181XxG	8-Pin SOIC, Tape and Reel, Green	Commercial
P218XxG-08-TT	P2181XxG	8-Pin TSSOP, Tube, Green	Commercial
P218XxG-08-TR	P2181XxG	8-Pin TSSOP, Tape and Reel, Green	Commercial

Note: X= 0 / 1 / 2 / 3 / 4  
x= A / B / C / D

**Device Ordering Information**



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Licensed under US patent numbers 5,488,627 and 5,631,920.





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Document Version: v1.1

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003

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