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# 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: 20MHz to 40MHz
- Internal loop filter minimizes external components and board space.
- Selectable spread options: Down Spread.
- Low inherent cycle-to-cycle jitter.
- 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.
- Available in 8-pin SOIC package.

## Product Description

The P2180 is a versatile spread spectrum frequency modulator designed specifically for a range of clock frequencies from 20MHz to 40MHz. The P2180 can generate an EMI reduced clock from an OSC or a system generated clock. The P2180 offers various combinations

of percentage deviations. Refer *Spread Deviation Selections Table*.

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

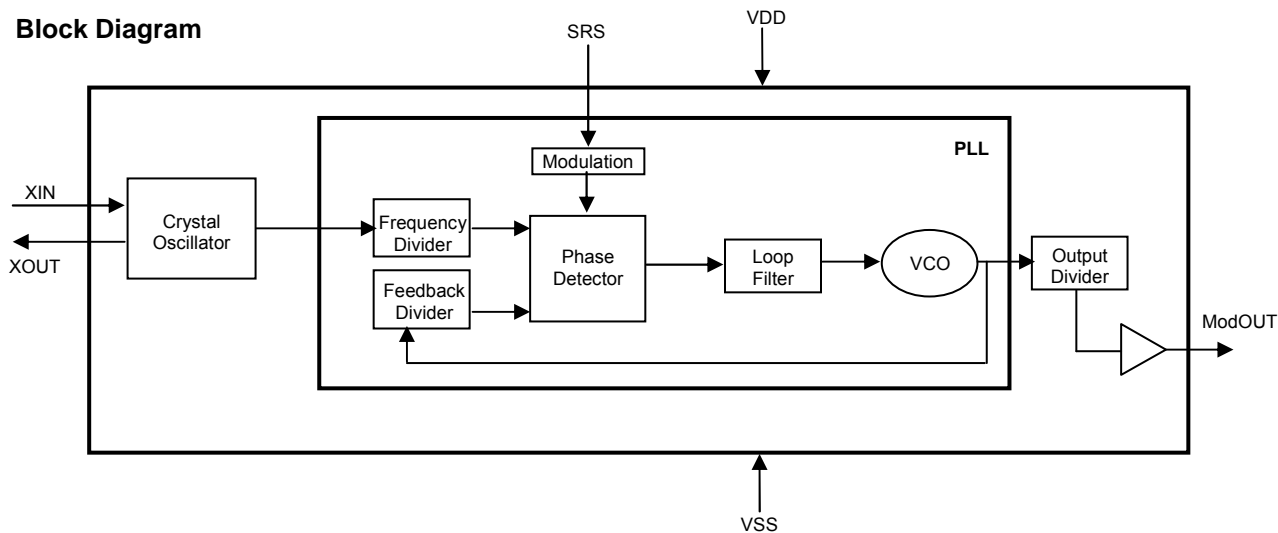
The P2180 modulates the output of a single PLL in order to "spread" the bandwidth of a synthesized clock, thereby decreasing the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most clock generators. Lowering EMI by increasing a signal's bandwidth is called spread spectrum clock generation.

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

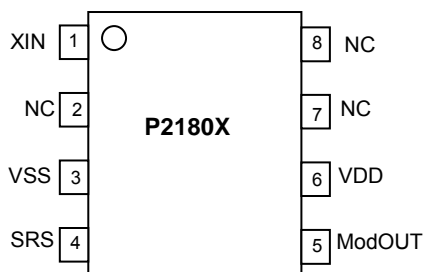
## Applications

The P2180 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.

**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 <i>Spread Deviation Selections Table</i> . 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.

**Input Frequency and Modulation Rate**

Part Number	Input Frequency Range (MHz)	Output Frequency Range (MHz)	Modulation Rate
P2180	20 to 40	20 to 40	Input frequency / 768

**Spread Deviation Selections**

Part Number	SRS	Spread Deviation
P2180 A	0	-1.25% (Down)
	1	-1.75% (Down)

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Unit
VDD, VIN	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>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.

**Operating Conditions**

Parameter	Description	Min	Max	Unit
VDD	Supply Voltage	3.0	3.6	V
T <sub>A</sub>	Operating Temperature (Ambient Temperature)	-40	+85	°C
C <sub>L</sub>	Load Capacitance		15	pF
C <sub>IN</sub>	Input Capacitance		7	pF

### 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				$\Omega$

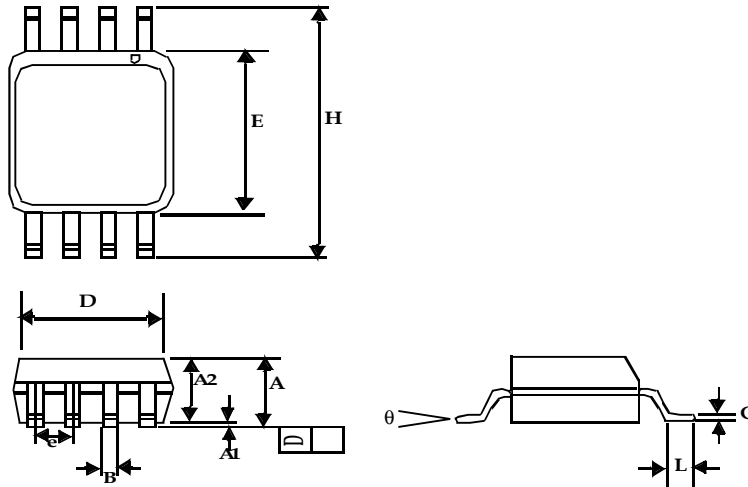
### AC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$f_{IN}$	Input frequency	20		40	MHz
$f_{OUT}$	Output frequency	20		40	MHz
$t_{LH}^1$	Output rise time (measured at 0.8V to 2.0V)		0.69		ns
$t_{HL}^1$	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	%

Note: 1.  $t_{LH}$  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.

**Ordering Information**

Part number	Marking	Package Type	Temperature
P2180AF-08SR	ACF	8-Pin SOIC, Tape and Reel, Pb Free	0°C to +70°C

A "microdot" placed at the end of last row of marking or just below the last row toward the center of package indicates Pb-free.

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