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Low-Power EMI Reduction IC

Features

- FCC approved method of EMI attenuation
- Provides up to 15 dB EMI reduction
- Generates 1X, 2X, and 4X low EMI spread spectrum clock of the input frequency
- 1X: P2811, 2X: P2812, 4X: P2814
- Optimized for input frequency range from 10 to 40 MHz P2811: 10 to 40 MHz P2812: 10 to 40 MHz P2814: 10 to 40 MHz
- 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: ±0.625% to –3.5%
- 3.3 V operating voltage
- CMOS/TTL compatible inputs and outputs
- Pinout compatible with Cypress CY25811, CY25812, and CY25814
- Products available for industrial temperature range
- Available in 8-pin SOIC and TSSOP

Product Description

The P28xx is a versatile spread spectrum frequency modulator designed specifically for input clock frequencies from 10 to 40 MHz (see Input/Output Frequency Range Selections). The P28xx can generate an EMI reduced clock from crystal, ceramic resonator, or system clock. The P28xx-A and P28xx-B offer various combinations of spread options and percentage deviations (see Output Frequency Deviation and Spread Option Selections section). These combinations include Down Spread, Center Spread and percentage deviation range from ±0.625% to -3.50%.

The P28xx reduces electromagnetic interference (EMI) at the clock source, allowing a system wide EMI reduction for all the down stream clocks and data dependent signals. The P28xx 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.

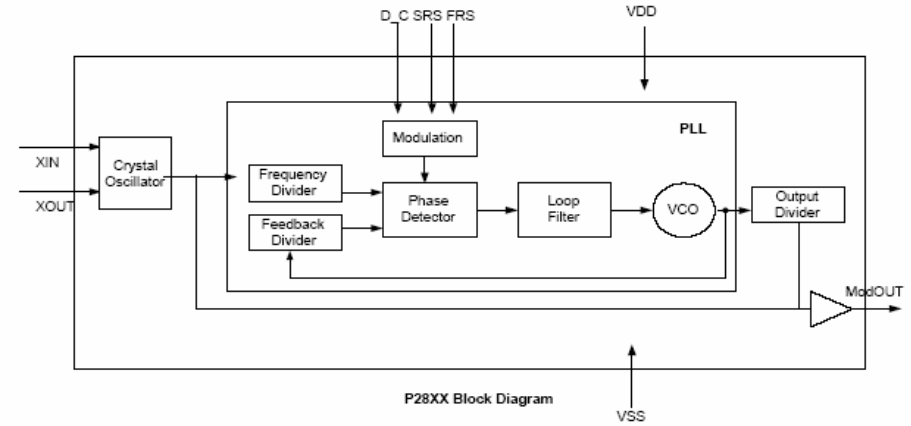
The P28xx modulates the output of a single PLL in order to "spread" the bandwidth of a synthesized clock, thereby decreasing the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most clock generators. Lowering EMI by increasing a signal's bandwidth is called "spread spectrum clock generation".

The P28xx uses the most efficient and optimized modulation profile approved by the FCC and is implemented by using a proprietary all-digital method.

Applications

The P28xx is targeted towards EMI management for memory interfaces in mobile graphic chipsets and high-speed digital applications such as PC peripheral devices, consumer electronics, and embedded controller systems.

Block Diagram



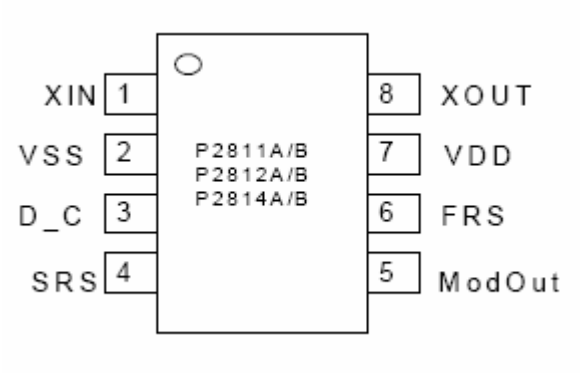
P28XX Block Diagram

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Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	XIN	I	Connect to externally generated clock signal or crystal.
2	VSS	P	Ground Connection. Connect to system ground.
3	D_C	I	Digital logic input used to select Down (LOW) or Center (HIGH) Spread Options (see Output Frequency Deviation and Spread Option Selections). This pin has an internal pull-up resistor.
4	SRS	I	Spread Range Selection. Digital logic input used to select frequency deviation (see Output Frequency Deviation and Spread Option Selections). This pin has an internal pull-up resistor.
5	ModOut	O	Spread Spectrum clock output (see Input/Output Frequency Range Selections and Output Frequency Deviation and Spread Option Selections).
6	FRS	I	Frequency Range Selection. Digital logic input used to select input frequency range (see Input/Output Frequency Range Selections). This pin has an internal pull-up resistor.
7	VDD	P	Connect to +3.3 V
8	XOUT	I	Connect to crystal. No connect if externally generated clock signal is used.

Input/Output Frequency Range Selections

Pin 6	Part number						Modulation rate
	P2811 (1X)		P2812 (2X)		P2814 (4X)		
FRS	Input (MHz)	Output (MHz)	Input (MHz)	Output (MHz)	Input (MHz)	Output (MHz)	
0	10-20	10-20	10-20	20-40	10-20	40-80	Input frequency / 448
1	20-40	20-40	20-40	40-80	20-40	80-160	Input frequency / 896

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Output Frequency Deviation and Spread Option Selections

Part number	Pin 3 D_C	Pin 4 SRS	Output frequency deviation and spread option
P2811/12/14A	0	0	-2.50% (Down)
	0	1	-3.50% (Down)
	1	0	+/-1.25% (Center)
	1	1	+/-1.75% (Center)
P2811/12/14B	0	0	-1.25% (Down)
	0	1	-1.75% (Down)
	1	0	+/-0.625% (Center)
	1	1	+/-0.875% (Center)

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

DC Electrical Characteristics

3.3 V, 25° 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 (inputs D_C, SRS, and FRS)	-60.00	–	-20.00	µA
I_{IH}	Input High Current	–	–	1.00	µA
I_{XOL}	XOUT Output Low Current (@ 0.4V, VDD = 3.3V)	2.00	–	12.00	mA
I_{XOH}	XOUT Output High Current (@ 2.5V, VDD = 3.3V)	–	–	12.00	mA
V_{OL}	Output Low Voltage (VDD=3.3V, IOL = 20 mA)	–	–	0.4	V
V_{OH}	Output High Voltage (VDD=3.3V, IOH = 20 mA)	–	–	2.8	V
I_{DD}	Static Supply Current Standby Mode	–	4.5	–	mA
I_{CC}	Dynamic Supply Current Normal Mode (3.3V and 25 pF probe loading)	7.1 fIN-min	–	13.9 f_{IN-max}	mA
V_{DD}	Operating Voltage	–	3.3	–	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
3.3 V, 25° C

Symbol	Parameter	Min	Typ	Max	Unit
f_{IN}	Input frequency P2811/12/14	10	–	40	MHz
f_{OUT}	Output frequency P2811	10	–	40	MHz
	Output frequency P2812	20	–	80	MHz
	Output frequency P2814	40	–	160	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	%
1. tLH and tHL are measured into a capacitive load of 15 pF					

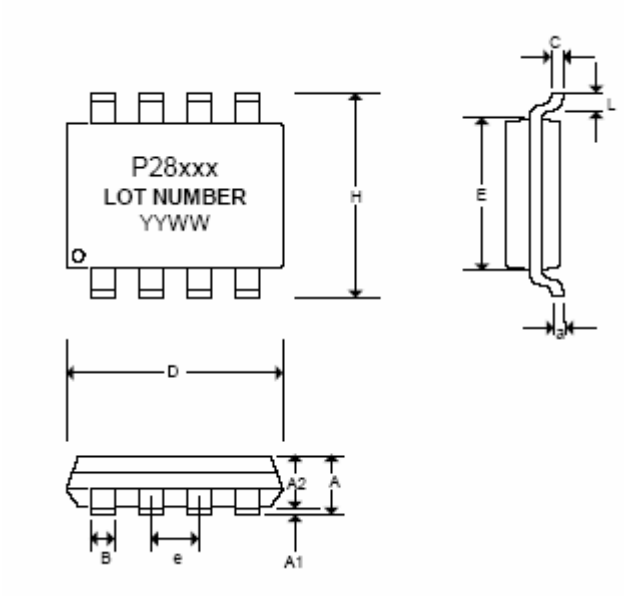
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Package Information

Mechanical Package Outline 8-Pin SOIC



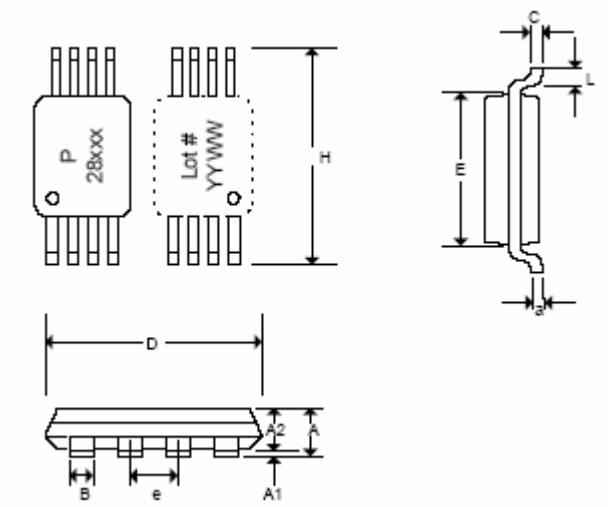
Symbol	Dimensions in inches			Dimensions in millimeters		
	Min	Nor	Max	Min	Nor	Max
A	0.057	0.064	0.071	1.45	1.63	1.80
A1	0.004	0.007	0.010	0.10	0.18	0.25
A2	0.053	0.061	0.069	1.35	1.55	1.75
B	0.012	0.016	0.020	0.31	0.41	0.51
C	0.004	0.006	0.01	0.10	0.15	0.25
D	0.186	0.194	0.202	4.72	4.92	5.12
E	0.148	0.156	0.164	3.75	3.95	4.15
e	0.050 BSC			1.27 BSC		
H	0.224	0.236	0.248	5.70	6.00	6.30
L	0.012	0.020	0.028	0.30	0.50	0.70
a	0°	5°	8°	0°	5°	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**	**Nor**	**Max**	**Min**	**Nor**	**Max**
A			0.047			1.10
A1	0.002		0.006	0.05		0.15
A2	0.031	0.039	0.041	0.80	1.00	1.05
B	0.007		0.012	0.19		0.30
C	0.004		0.008	0.09		0.20
D	0.114	0.118	0.122	2.90	3.00	3.10
E	0.169	0.173	0.177	4.30	4.40	4.50
e	0.026 BSC			0.65 BSC		
H	0.244	0.252	0.260	6.20	6.40	6.60
L	0.018	0.024	0.030	0.45	0.60	0.75
a	0°	5°	8°	0°	5°	8°

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

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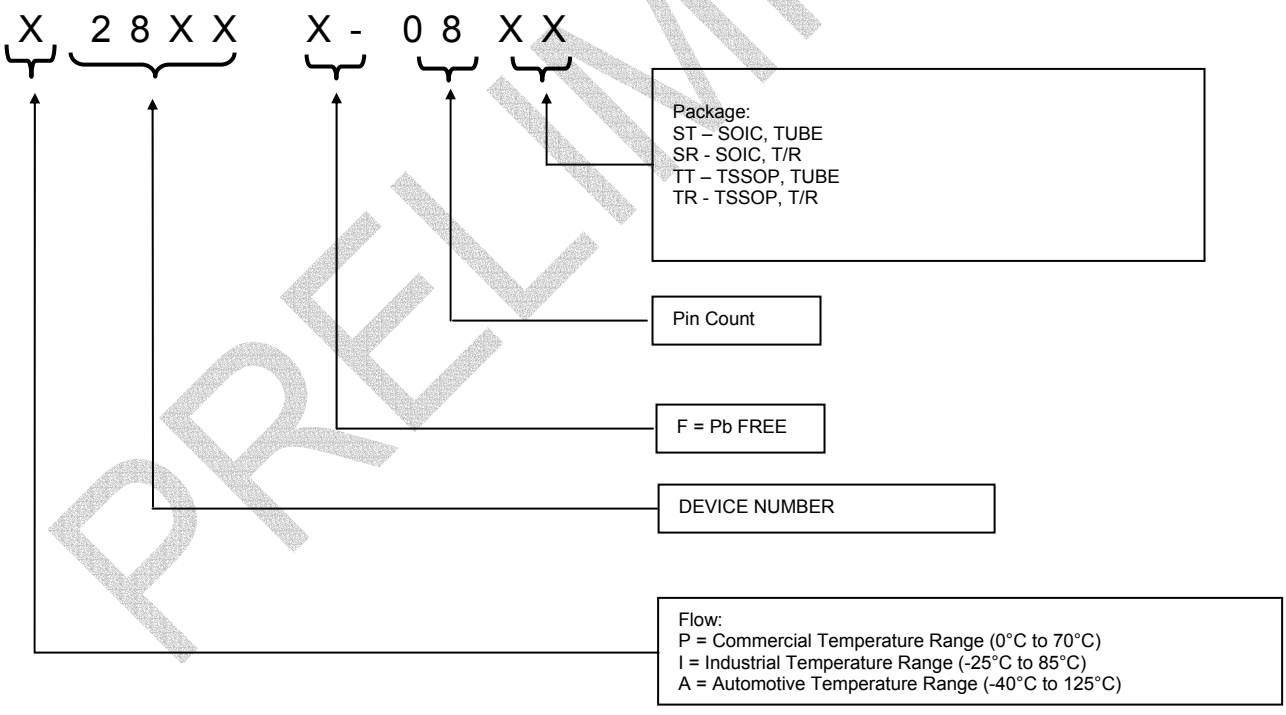
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Ordering Codes

Part Number	Marking	Package Type	Qty per reel	Temperature
P2811A-08ST	P2811A	8-pin SOIC, tube		0 to 70
P2812A-08ST	P2812A	8-pin SOIC, tube		0 to 70
P2814A-08ST	P2814A	8-pin SOIC, tube		0 to 70
P2811A-08SR	P2811A	8-pin SOIC, tape reel	2,500	0 to 70
P2812A-08SR	P2812A	8-pin SOIC, tape reel	2,500	0 to 70
P2814A-08SR	P2814A	8-pin SOIC, tape reel	2,500	0 to 70
P2811A-08TT	P2811A	8-pin TSSOP, tube		0 to 70
P2812A-08TT	P2812A	8-pin TSSOP, tube		0 to 70
P2814A-08TT	P2814A	8-pin TSSOP, tube		0 to 70
P2811A-08TR	P2811A	8-pin TSSOP, tape reel	2,500	0 to 70
P2812A-08TR	P2812A	8-pin TSSOP, tape reel	2,500	0 to 70
P2814A-08TR	P2814A	8-pin TSSOP, tape reel	2,500	0 to 70

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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