Functional Description

SEMI8312H is a versatile, 3.3 V Timing −Safe™ Peak EMI reduction IC.SEMI8312H accepts an input clock either from a fundamental Crystal or from an external reference (AC or DC coupled to XIN/CLKIN) and locks on to it delivering a 1x modulated clock output. SEMI8312H has a SSON pin for enabling and disabling Spread Spectrum function.

SEMI8312H has an SSEXTR pin to select different deviations depending upon the value of an external resistor connected between SSEXTR and GND. Modulation Rate (MR) control selects one of the two different Modulation Rates.

SEMI8312H operates from a 3.3 V supply, and is available in an 8−pin, WDFN(2 mm x 2 mm) package.

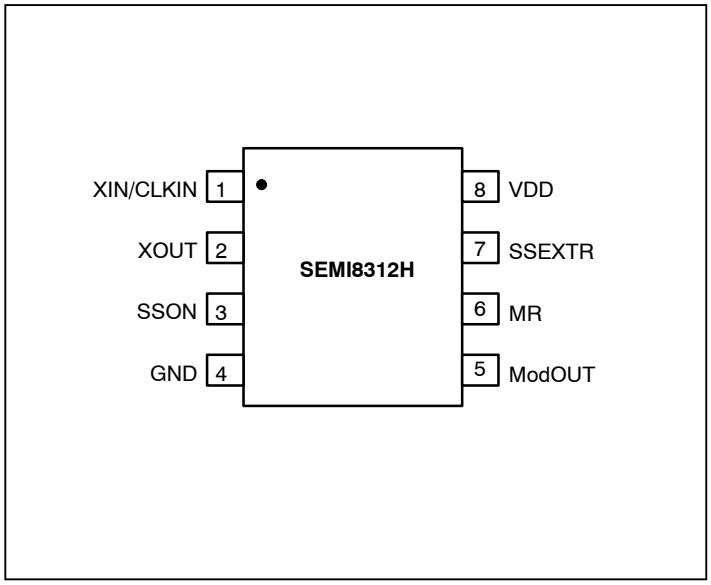
Making Diagrams

WDFN8
CASE 511AQ
DA = Specific Device Code
M = Date Code
▪ = Pb−Free Device
(Note: Microdot may be in either location)

General Features

- 1x, LVCMOS Peak EMI Reduction
- Input frequency:
  - 15 MHz – 50 MHz
- Output frequency:
  - 15 MHz – 50 MHz
- Analog Deviation Selection
- ModRate selection option
- Spread Spectrum Enable/Disable
- Supply Voltage: 3.3 V ± 0.3 V
- 8−pin, WDFN 2 mm x 2 mm (TDFN) Package
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Pin Configuration



Applications

SEMI8312H is targeted for consumer electronics application like DPF, MFP.

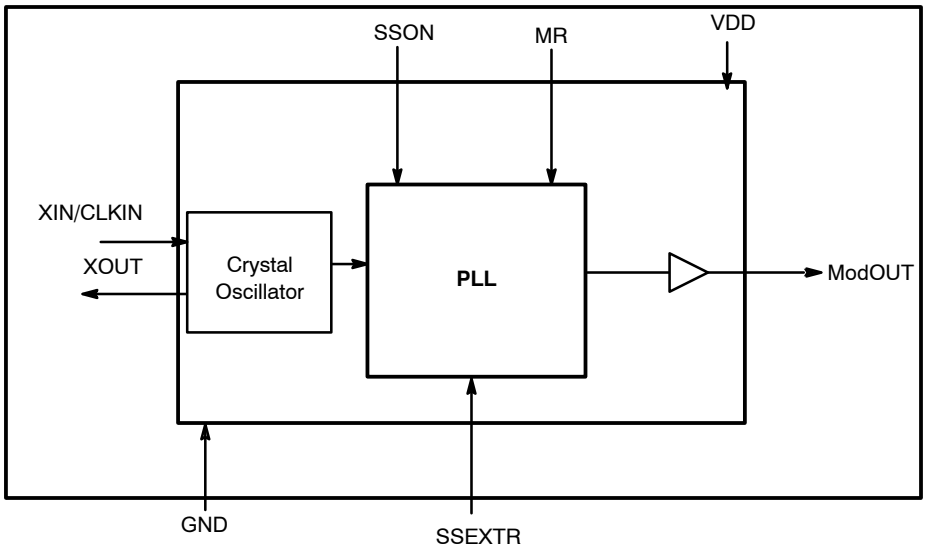


Figure 1. Block Diagram

Table 1.Pin Description

Pin#	Pin Name	Type	Description
1	XIN / CLKIN	I	Crystal connection or External reference clock input.
2	XOUT	O	Crystal connection. If using an external reference, this pin should be left open.
3	SSON	I	Spread Spectrum ON/OFF. Spread Spectrum function enabled when HIGH, disabled when LOW. Has an internal pull−up resistor.
4	GND	P	Ground
5	ModOUT	O	Modulated clock output
6	MR	I	Modulation Rate Select. When LOW selects Low Modulation Rate. Selects High Modulation Rate when pulled HIGH. Has an internal pull−up resistor.
7	SSEXTR	I	Analog Deviation Selection through external resistor to GND.
8	V_{DD}	P	3.3 V supply Voltage.

Table 2.Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{DD}	Supply Voltage	3	3.6	V
T_A	Operating Temperature	0	70	°C
C_L	Load Capacitance		10	pF
C_{IN}	Input Capacitance		7	pF

Table 3.Absolute Maximum Rating

Symbol	Parameter	Rating	Unit
V_{DD}, V_{IN}	Voltage on any input pin with respect to Ground	−0.5 to +4.6	V
T_{STG}	Storage Temperature	−65 to +125	°C
T_s	Max. Soldering Temperature (10 sec)	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3.Absolute Maximum Rating

Symbol	Parameter	Rating	Unit
T_J	Junction Temperature	150	°C
T_{DV}	Static Discharge Voltage (As per JEDEC STD22− A114−B)	2	kV

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 4.DC Electrical Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
VDD	Supply Voltage		3.0	3.3	3.6	V
V_{IL}	Input LOW Voltage				0.8	V
V_{IH}	Input HIGH Voltage		2.0			V
I_{IL}	Input LOW Current	V_{IN} = 0 V			25	μA
I_{IH}	Input HIGH Current	V_{IN} = V_{DD}			25	μA
V_{OL}	Output LOW Voltage	I_{OL} = 8 mA			0.4	V
V_{OH}	Output HIGH Voltage	I_{OH} = −8 mA	2.4			V
I_{CC}	Static Supply Current	XIN / CLKIN pulled low			50	μA
I_{DD}	Dynamic Supply Current	Unloaded Output			20	mA
Z_o	Output Impedance			30		Ω

Table 5.Switching Characteristcs

Parameter	Test Conditions	Min	Typ	Max	Unit
Input Frequency* / ModOUT		15		50	MHz
Duty Cycle (Notes 1 and 2)	Measured at V_{DD} / 2	45	50	55	%
Output Rise Time (Notes 1 and 2)	Measured between 20% to 80%			1.8	ns
Output Fall Time (Notes 1 and 2)	Measured between 80% to 20%			1.6	ns
Cycle−to−Cycle Jitter (Note 2)	Unloaded output with SSEXTR OPEN @ 27 MHz		±150	±250	ps
PLL Lock Time (Note 2)	Stable power supply, valid clock presented on XIN / CLKIN			3	ms

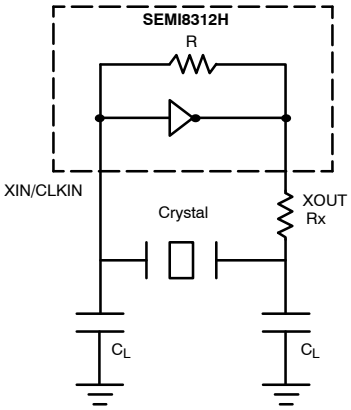
*Functionality with Crystal is guaranteed by design and characterization. Not tested in production.

1. All parameters are specified with10 pF loaded outputs.
2. Parameter is guaranteed by design and characterization. Not tested in production.

Fundamental At Cut Parallel Resonant Crystal

Nominal frequency	27 MHz
Frequency tolerance	±50 ppm or better at 25°C
Operating temperature range	−25°C to +85°C
Storage temperature	−40°C to +85°C
Load capacitance (C_P)	18 pF
Shunt capacitance	7 pF maximum
ESR	25 Ω

NOTE: C_L is the Load Capacitance and Rx is used to prevent oscillations at overtone frequency of the Fundamental frequency.



$C_L = 2 * (C_P - C_S)$,
Where C_P = Load capacitance of crystal from crystal vendor datasheet
C_S = Stray capacitance due to C_{IN}, PCB, Trace etc.

Figure 2. Typical Crystal Interface Circuit

Switching Waveforms

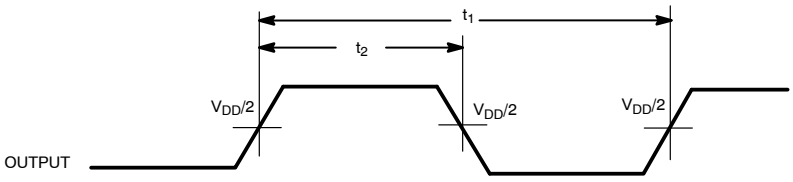


Figure 3. Duty Cycle Timing

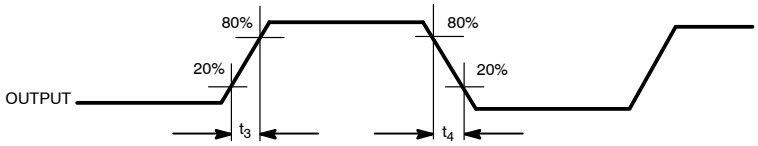
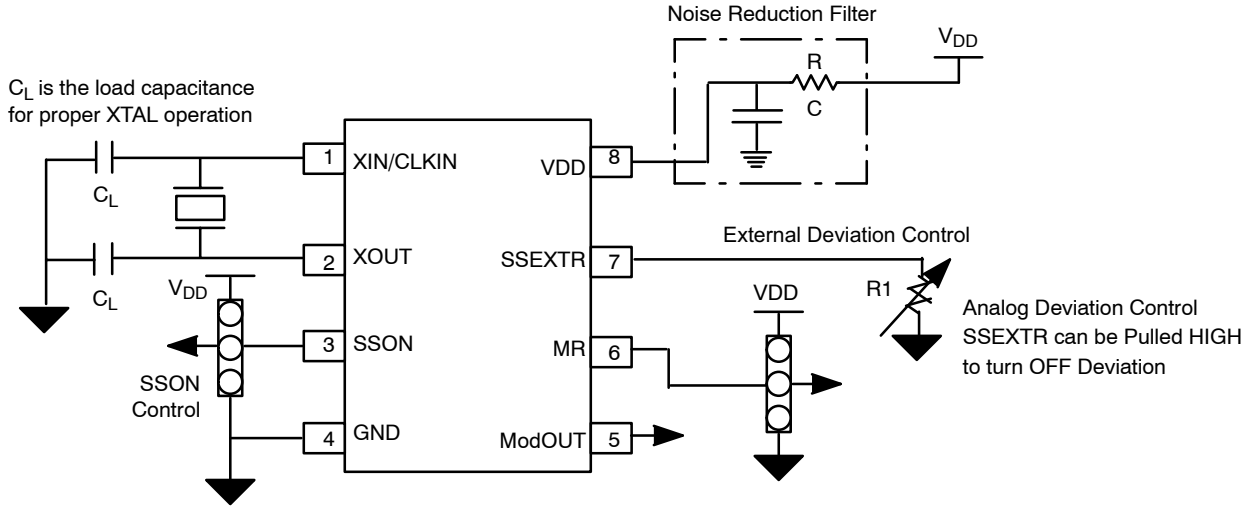


Figure 4. Output Rise/Fall Time



NOTE: SSON (Pin#3) MR (Pin#6): Connect to V_{DD} or GND
Refer to Pin Description table for Functionality details

Figure 5. Application Schematic

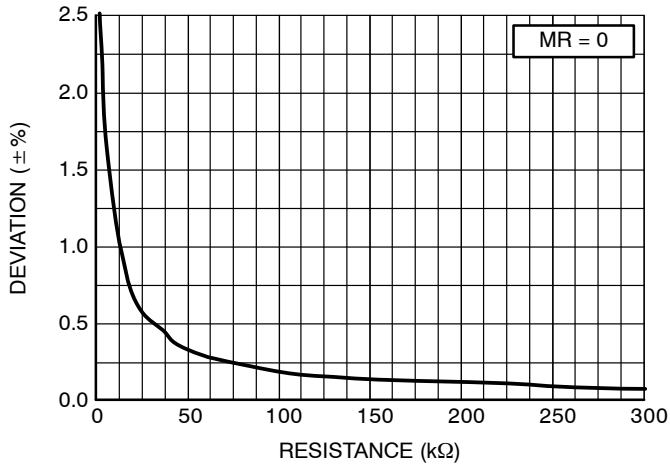


Figure 6. Deviation vs SSEXTR Resistance Chart at 27 MHz

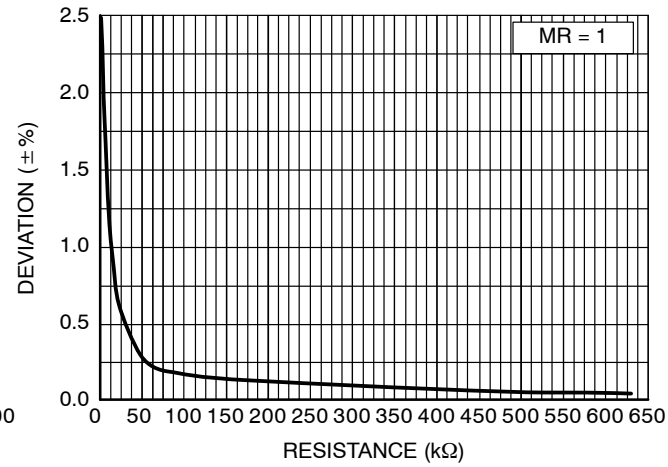


Figure 7. Deviation vs SSEXTR Resistance Chart at 27 MHz

NOTE: Device to Device variation of Deviation is ±10% (Commercial Temperature Range) and ±25% (Industrial Temperature Range)

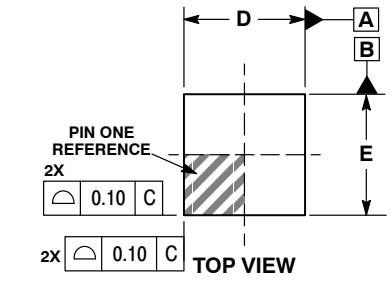
Ordering Information

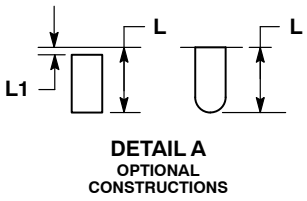
Part Number	Top Marking	Temperature	Package Type	Shipping†
SEMI8312H −08CR	DA	0°C to +70°C	8−Pin (2 mm x 2 mm) WDFN(TDFN) (Pb−Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
*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.

Package Dimensions

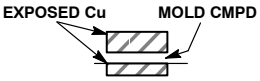
WDFN8 2x2, 0.5P
CASE 511AQ
ISSUE A



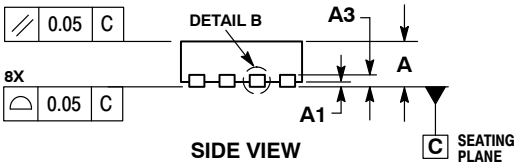


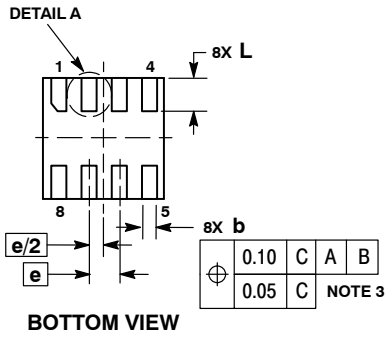
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30mm FROM TERMINAL.

DIM	MILLIMETERS	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.20	0.30
D	2.00 BSC	
E	2.00 BSC	
e	0.50 BSC	
L	0.50	0.60
L1	---	0.15

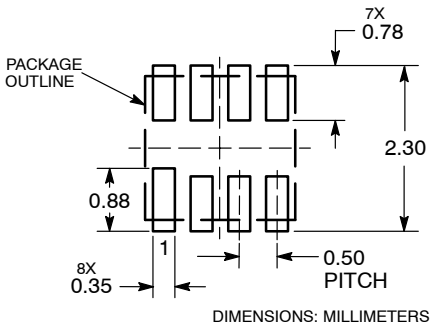


DETAIL B
OPTIONAL
CONSTRUCTION





RECOMMENDED SOLDERING FOOTPRINT*



*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.