

P1P8160A

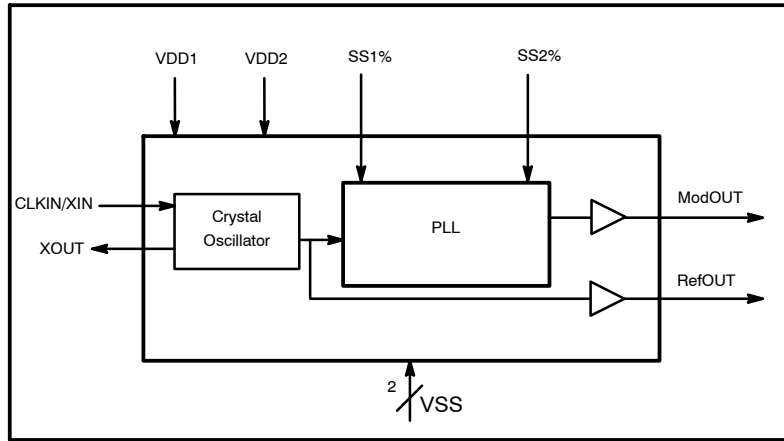


Figure 1. Block Diagram

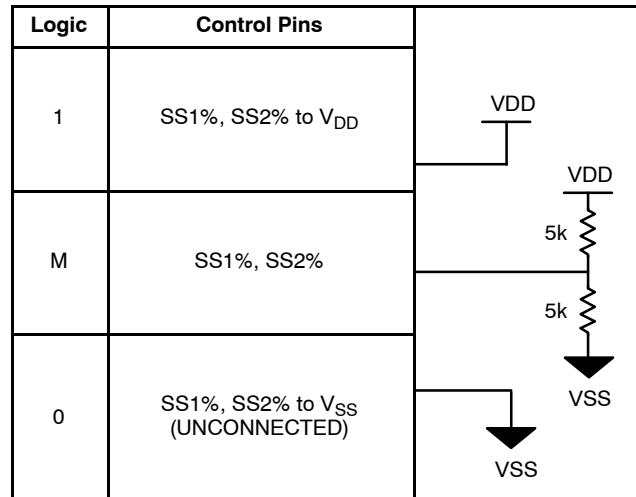
Table 1. PIN DESCRIPTION

Pin#	Pin Name	Type	Description
1	CLKIN / XIN	I	Crystal connection or External Reference Clock Input.
2	VSS	P	Ground to entire chip
3	SS2%	I	Frequency Deviation Selection. Tri-level logic pin. Has an internal pull down resistor. Refer to <i>Frequency Deviation Selection table</i>
4	VDD1		Supply Voltage for 100 MHz ModOUT
5	ModOUT	O	Buffered 100MHz spread spectrum clock output
6	VSS	P	Ground to entire chip
7	SS1%	I	Frequency Deviation Selection. Tri-level logic pin. Has an internal pull down resistor. Refer to <i>Frequency Deviation Selection table</i>
8	VDD2	P	Supply Voltage for 27 MHz RefOUT
9	RefOUT	O	Buffered reference clock output
10	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.

3 Level Digital Logic

SS1% and SS2% digital inputs are designed to sense 3 different logic levels designated as High “1”, Low “0” and Middle “M”. With this 3-Level digital inputs, 9 different logic states can be detected.

Use 5k/5k resistor divider at SS1% and SS2% pins from V_{DD} to V_{SS} to obtain $V_{DD}/2$, Middle “M” logic level as shown:



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Table 2. FREQUENCY DEVIATION SELECTION TABLE

SS2% (Pin#3)	SS1% (Pin#7)	Deviation at 100 MHz (%) (Pin#5)	ModRate (kHz)
L	L	SSOFF	32
L	M	-0.5	
L	H	-2.5	
M	L	-0.25	
M	M	-0.75	
M	H	-1	
H	L	-1.5	
H	M	-2	
H	H	-3	

Table 3. OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{DD}	Voltage on any pin with respect to VSS	2.97	3.63	V
T _A	Operating Temperature	-10	+85	°C
C _L	Load Capacitance		15	pF
C _{IN}	Input Capacitance		7	pF

Table 4. ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
V _{DD} , V _{IN}	Voltage on any 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
T _J	Junction Temperature	150	°C
T _{DV}	Static Discharge Voltage (As per JEDEC STD 22- 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 5. DC ELECTRICAL CHARACTERISTICS

(V_{DD} = 3.3 V ± 10%, Ambient Temperature Range: -10°C to +85°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit
V _{DD}	Supply Voltage	2.97	3.3	3.63	V
V _{IL}	Input Low Voltage (CLKIN/XIN, SS1%, SS2% Inputs)	0		0.2	V
V _{IM}	Input Middle Voltage (SS1%, SS2% Inputs)	0.4 × V _{DD}		0.6 × V _{DD}	V
V _{IH}	Input High Voltage (CLKIN/XIN, SS1%, SS2% Inputs)	0.9 × V _{DD}		V _{DD}	V
V _{OL}	Output Low Voltage (ModOUT, RefOUT)	I _{OL} = 15 mA		0.4	V
V _{OH}	Output High Voltage (ModOUT, RefOUT)	I _{OH} = -15 mA	2.4		V
I _{DD}	Dynamic Supply Current (C _L = 15 pF, V _{DD} = 3.63 V, T = +85°C)			22	mA
C _{IN1}	Input Capacitance (XIN and XOUT)		6.0		pF
C _{IN2}	Input Capacitance (SS1%, SS2% Inputs)			7.0	pF
R _{PD}	Pull Down Resistor (SS1%, SS2% Inputs)	100	200	250	kΩ

NOTE: The voltage on any input or I/O pin cannot exceed the power pin during power up.

Table 6. AC ELECTRICAL CHARACTERISTICS

(V_{DD} = 3.3 V ± 10%, Ambient Temperature Range: -10°C to +85°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit
f _{IN}	Input Clock frequency (Tolerance: ±10ppm)		27		MHz
f _{OUT}	ModOUT Clock frequency (SS1% & SS2% = 0) (Tolerance: ±30ppm)		100		MHz
	RefOUT Clock frequency (Tolerance: ±30ppm)		27		
t _{LH} , t _{HL} (Note 2)	RefOUT Rise and Fall time (Measured between 20% to 80%)	C _L = 5 pF		0.75	ns
		C _L = 15 pF		1.25	
t _{LH} , t _{HL} (Note 2)	ModOUT Rise and Fall time (Measured between 20% to 80%)	C _L = 5 pF		0.75	ns
		C _L = 15 pF		1.25	
T _{DCOUT} (Notes 1, 2)	Output Clock Duty Cycle	45	50	55	%
T _{JC} (Notes 1, 2)	Cycle–Cycle Jitter (For ModOUT, RefOUT)		125	200	ps
T _{JL} (Notes 1, 2)	Long Term Jitter (10k cycles)	27 MHz, RefOUT		150	
		100 MHz ModOUT (SSOFF)		350	
t _{ON} (Notes 1, 2)	Power Up Time (Stable power supply, valid input clock to valid Clock on ModOUT).			5	ms
t _{SS%} (Notes 1, 2)	Spread Percentage Setting Time (Time from SS1%/SS2% change to stable ModOUT with change in spread %)			1	ms
MF (Notes 1, 2)	Modulation Frequency	31	32	33	kHz
FMTSR (Notes 1, 2)	Frequency Modulation Type and Slew Rate (Triangular Modulation Profile)			0.125	%/μs

- Parameters are specified with 15 pF loaded outputs.
- Parameter is guaranteed by design and characterization. Not 100% tested in production

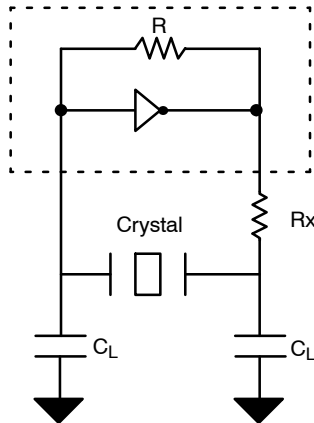


Figure 2. Typical Crystal Interface Circuit

$$C_L = 2 * (C_P - C_S),$$

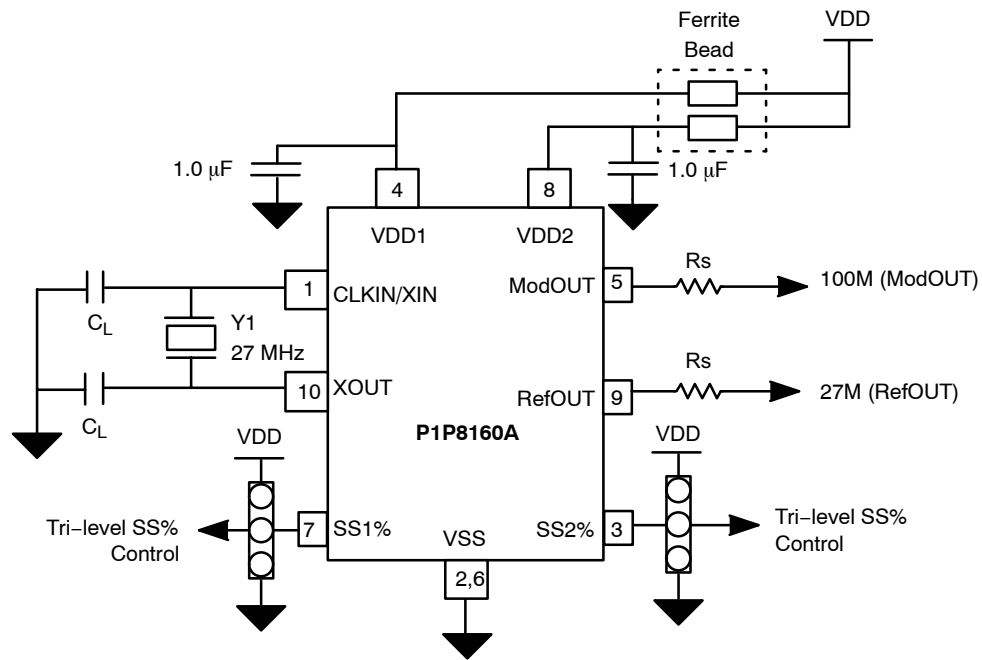
Where C_P = Load capacitance of crystal specified in a Crystal Datasheet

C_S = Stray capacitance due to C_{IN}, PCB, Trace etc.

C_L = Load capacitance to be used

R_x is used to reduce power dissipation in the Crystal

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NOTE: Refer Pin Description table for Functionality details
Figure 3. Typical Application Schematic

ORDERING INFORMATION

Part Number	Top Marking	Temperature	Package	Shipping†
P1P8160AG-10CR	1P 8160A	-10°C to +85°C	10 pin (3 mm x 3 mm) WDFN	2500 Tape & Reel

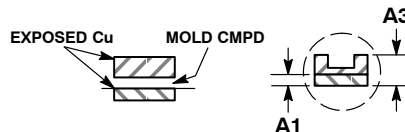
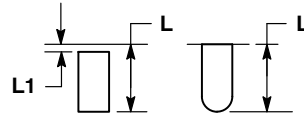
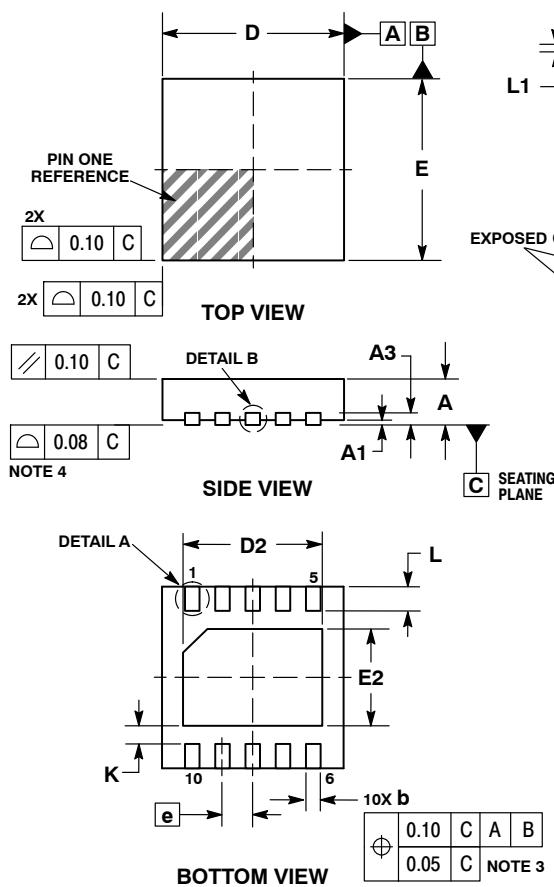
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*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.

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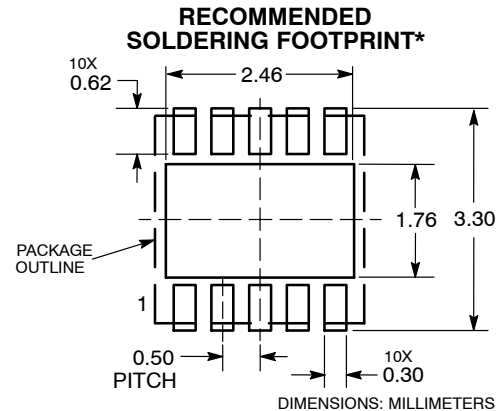
PACKAGE DIMENSIONS

WDFN10 3x3, 0.5P
CASE 511BK-01
ISSUE O



- 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.
 4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20	REF
b	0.20	0.30
D	3.00	BSC
D2	2.20	2.40
E	3.00	BSC
E2	1.50	1.70
e	0.50	BSC
K	0.20	---
L	0.35	0.45
L1	---	0.15



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

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