

# ASM3P2187A, ASM3P2187B

## Product Preview

# Spread Spectrum Clock Generator for Mobile Applications

### Description

The ASM3P2187A/B is a versatile spread spectrum frequency modulator designed specifically for a wide range of clock frequencies. The ASM3P2187A/B reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The ASM3P2187A/B allows significant system cost savings by reducing the number of circuit board layers, ferrite beads and shielding that are traditionally required to pass EMI regulations.

ASM3P2187A device has an option of Spread ON/OFF and ASM3P2187B device has Powerdown option.

### Application

The ASM3P2187A/B is targeted towards mobile phones, mobile audio players and PDAs.

### Features

- Generates a 4X EMI Optimized Clock Signal at the Output
- Input Frequency: 12.5 MHz to 20 MHz
- Output Frequency: 50 MHz to 80 MHz
- SSON/PDB Option
- Selectable Centre Spread:  $\pm 0.5\%$ ,  $\pm 1.0\%$
- Low Power CMOS Design
- Supply Voltage:  $3.3\text{ V} \pm 0.3\text{ V}$
- Industrial Temperature Range
- 8-pin TSSOP Package
- Drop-in Replacement for MB88155-412 Device
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.



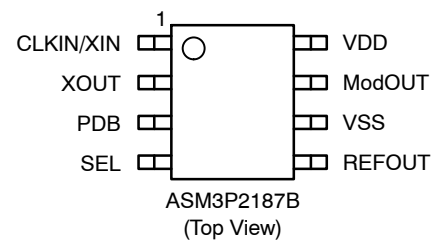
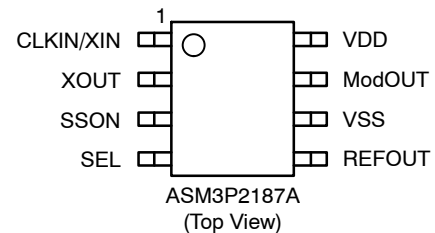
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TSSOP-8  
T SUFFIX  
CASE 948AL

### PIN CONFIGURATIONS



### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

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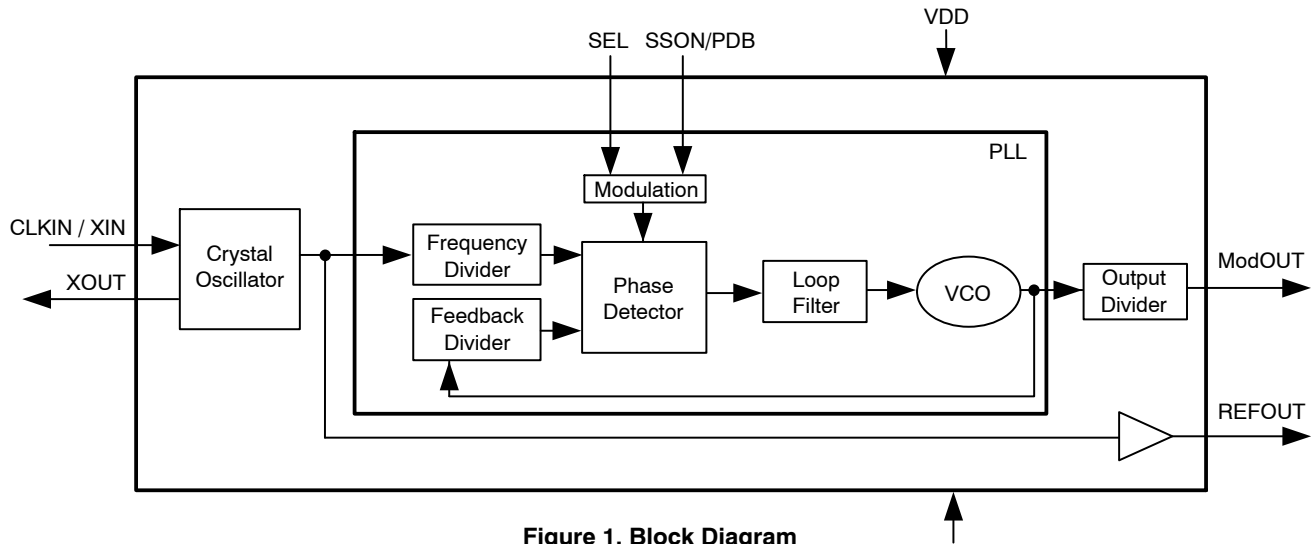


Figure 1. Block Diagram

Table 1. PIN DESCRIPTION

Pin#	Pin Name	Type	Description
1	CLKIN / XIN	I	External reference Clock input or Crystal connection.
2	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.
3	SSON / PDB (Note 1)	I	Modulation enable pin/ Power down pin. Has an Internal pull up resistor.
4	SEL	I	Modulation rate setting pin Centre spread, SEL = "L": Frequency Deviation $\pm 0.5\%$ Centre spread, SEL = "H": Frequency Deviation $\pm 1.0\%$ Has an Internal pull up resistor.
5	REFOUT	O	Non-modulated clock output pin. The Frequency is same as input frequency. This pin becomes to "L" at power-down.
6	VSS	P	Ground Connection. Connect to system ground.
7	ModOUT	O	Modulated clock output pin This pin becomes to "L" at power-down.
8	VDD	P	Power Supply Voltage Pin. Connect to +3.3 V.

1. SSON Pin is available in ASM3P2187A Device and PDB Pin is available in ASM3P2187B Device.

Table 2. MODULATION ENABLE SETTING

SSON	Modulation
L	No Modulation
H	Modulation

Table 4. SPREAD RANGE SELECTION

SEL	Deviation @ 15 MHz
L	$\pm 0.50\%$
H	$\pm 1.00\%$

Table 3. POWER DOWN STATUS

PDB	Status
L	Power Down Status
H	Operating Status

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**Table 5. ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Rating	Unit
VDD	Supply Voltage pin with respect to Ground	-0.5 to +4.6	V
V <sub>IN</sub>	Input Voltage pin with respect to Ground	VSS-0.5 to VDD+0.5	V
V <sub>OUT</sub>	Output Voltage pin with respect to Ground	VSS-0.5 to VDD+0.5	V
T <sub>STG</sub>	Storage temperature	-55 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

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 6. DC ELECTRICAL CHARACTERISTICS**

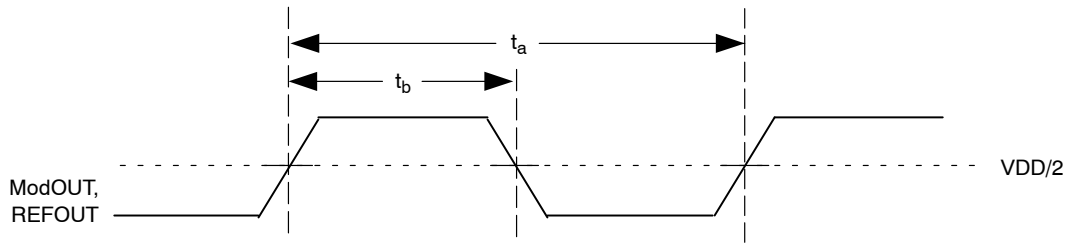
Symbol	Parameter		Min	Typ	Max	Unit
V <sub>IL</sub>	Input low voltage		VSS-0.3		0.8	V
V <sub>IH</sub>	Input high voltage		2.0		VDD+0.3	V
I <sub>IL</sub>	Input low current				-50	μA
I <sub>IH</sub>	Input high current				+50	μA
V <sub>OL</sub>	Output low voltage	For ModOUT, I <sub>OL</sub> = 4 mA	VSS		0.4	V
		For REFOUT, I <sub>OL</sub> = 3 mA				
V <sub>OH</sub>	Output high voltage	For ModOUT, I <sub>OH</sub> = -4 mA	2.4		VDD	V
		For REFOUT, I <sub>OH</sub> = -3 mA				
I <sub>CC</sub>	Dynamic supply current (Unloaded Outputs)				17	mA
I <sub>DD</sub>	Static supply current standby mode (CLKIN / XIN pulled LOW)				8	mA
VDD	Operating voltage		3.3	3.3	3.6	V
t <sub>ON</sub>	Power up time (first locked clock cycle after power up)			2	5	mS
Z <sub>OUT</sub>	Clock output impedance			50		Ω
C <sub>IN</sub>	Input Capacitance				7	pF
C <sub>L</sub>	Load Capacitance				15	pF

**Table 7. AC ELECTRICAL CHARACTERISTICS**

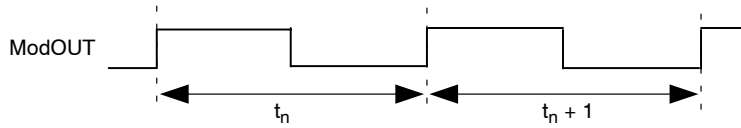
Symbol	Parameter		Min	Typ	Max	Unit
CLKIN / XIN	Input Clock frequency		12.5	15	20	MHz
CLKOUT	Output Clock frequency	REFOUT	12.5	15	20	MHz
		ModOUT	50	60	80	
M <sub>F</sub>	Modulation Frequency		32.4	39	52	KHz
t <sub>LH</sub> (Note 2)	Output rise time ( Measured from 20% to 80% )			2	2.5	nS
t <sub>HL</sub> (Note 2)	Output fall time ( Measured from 80% to 20% )			1.5	2	nS
t <sub>JC</sub>	Cycle-to-Cycle Jitter			±250	±325	pS
t <sub>Jp</sub>	Period Jitter (REFOUT)			±150	±200	
t <sub>D</sub>	Output duty cycle		45	50	55	%

2. t<sub>LH</sub> and t<sub>HL</sub> are measured with a capacitive load of 15 pF.

## ASM3P2187A, ASM3P2187B

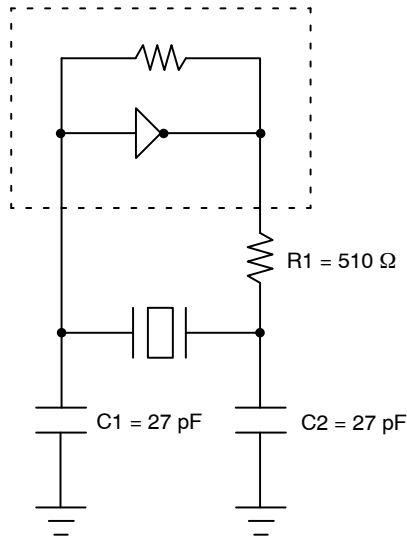


**Figure 2. Output Clock Duty Cycle  $t_D = (t_b / t_a)$**



NOTE: Cycle-to-cycle jitter indicates the difference between a certain cycle and the immediately succeeding (or preceding) cycle.

**Figure 3. Cycle-to-Cycle Jitter ( $t_{JC} = [t_n - t_{n+1}]$ )**



**Figure 4. Typical Crystal Oscillator Circuit**

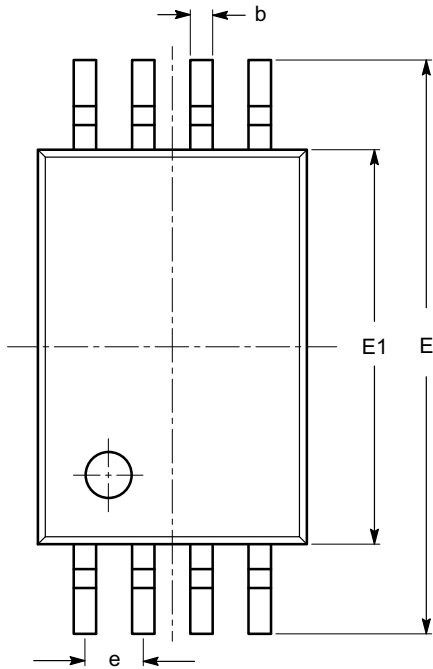
**Table 8. TYPICAL CRYSTAL SPECIFICATIONS**

Fundamental AT Cut Parallel Resonant Crystal	
Nominal frequency	14.31818 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	18 pF
Shunt capacitance	7 pF maximum
ESR	25 Ω

# ASM3P2187A, ASM3P2187B

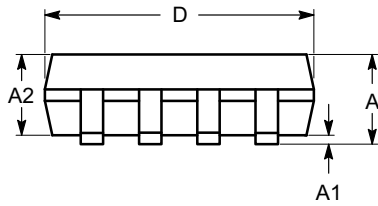
## PACKAGE DIMENSIONS

TSSOP8, 4.4x3  
CASE 948AL-01  
ISSUE O

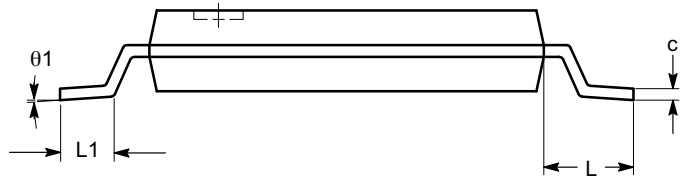


SYMBOL	MIN	NOM	MAX
A			1.20
A1	0.05		0.15
A2	0.80	0.90	1.05
b	0.19		0.30
c	0.09		0.20
D	2.90	3.00	3.10
E	6.30	6.40	6.50
E1	4.30	4.40	4.50
e	0.65 BSC		
L	1.00 REF		
L1	0.50	0.60	0.75
$\theta$	0°		8°

TOP VIEW



SIDE VIEW



END VIEW


### Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-153.

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**Table 9. ORDERING INFORMATION**

Part Number	Marking	Package Type	Temperature
ASM3P2187AG-08TT	3P2187AG	8-Pin TSSOP, TUBE, Green	Commercial
ASM3P2187AG-08TR	3P2187AG	8-Pin TSSOP, TAPE & REEL, Green	Commercial
ASM3I2187AG-08TT	3I2187AG	8-Pin TSSOP, TUBE, Green	Industrial
ASM3I2187AG-08TR	3I2187AG	8-Pin TSSOP, TAPE & REEL, Green	Industrial
ASM3P2187BG-08TT	3P2187BG	8-Pin TSSOP, TUBE, Green	Commercial
ASM3P2187BG-08TR	3P2187BG	8-Pin TSSOP, TAPE & REEL, Green	Commercial
ASM3I2187BG-08TT	3I2187BG	8-Pin TSSOP, TUBE, Green	Industrial
ASM3I2187BG-08TR	3I2187BG	8-Pin TSSOP, TAPE & REEL, Green	Industrial

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