

Crystal Oscillator

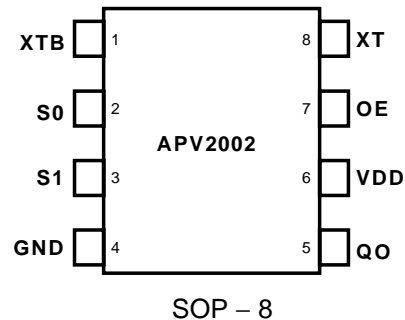
Features

- Single Chip XO
- Up to 60MHz Square Wave
- Load Capacitors Build-in
- Feedback Resistor Build-in
- 3-State Output
- High Reliability
- CMOS/TTL Input Level
- CMOS/TTL Output Duty Level
- Fundamental Oscillator
- Frequency Divider Build-in
- 2.7V to 5.5V Supply Voltage
- High Stability Against Noise on VDD
- Chip Form and SOP-8 Package Available

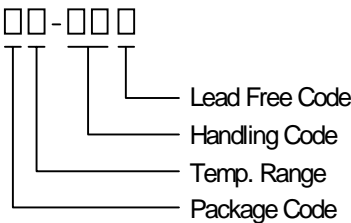
General Description

The APV2002 is a CMOS IC that integrates all circuit components required for an oscillator. It is a low cost, low jitter, high performance oscillator, which consists of low-current oscillator circuit and output buffer. The IC also incorporates a high-precision, thin-film feedback resistor and load capacitors with excellent frequency characteristics. It also offers frequency divider for application flexibility choice.

Pin Assignment



Ordering Information

<p>APV2002 □□-□□□</p>  <ul style="list-style-type: none"> Lead Free Code Handling Code Temp. Range Package Code 	<p>Package Code K : SOP-8 Y : CHIP FORM</p> <p>Temp. Range I : -40 to 85°C</p> <p>Handling Code TU : Tube TY : Tray TR : Tape & Reel W : Wafer</p> <p>Lead Free Code L : Lead Free Device Blank : Original Device</p>
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ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

Pin Description

Pin	Symbol	Function
1	XTB	Crystal drive
2	S0 (Note1)	Frequency select pin1
3	S1	Frequency select pin2
4	GND	Ground
5	QO	Frequency output
6	VDD	Power
7	OE (Note2)	Output enable
8	XT	Crystal feedback

Note1 : Please refer frequency selector

Note2 : High or no connection : enable , Low : disable

Electrical Characteristics

The following specifications apply for $V_{DD} = 5V$ unless otherwise noted.

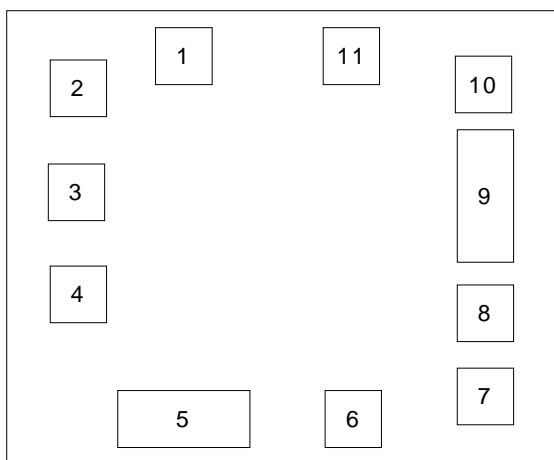
Symbol	Parameter	Test Condition	APV2002			Unit
			Min.	Typ.	Max.	
Operating condition						
VDD	Supply Voltage		4.5	5	5.5	V
	Ambient Temperature		-40		85	°C
DC characteristics						
Freq	Crystal Frequency		0.5		60	MHz
IDD	Operating Current	Crystal 50MHz , $C_L = 50pF$			20	mA
V_{IN}	Input Voltage		-0.5		$V_{DD}+0.5V$	
V_{OUT}	Output Voltage		-0.5		$V_{DD}+0.5V$	
AC characteristics						
Duty	Waveform Symmetry		40	50	60	%
Tr	Rise Time	0.5V to 4.5V , $C_L = 50pF$		3		ns
Tf	Fall Time	4.5V to 0.5V , $C_L = 50pF$		3		ns

Electrical Characteristics (Cont.)

The following specifications apply for $V_{DD} = 3.3V$ unless otherwise noted.

Symbol	Parameter	Test Condition	APV2002			Unit
			Min.	Typ.	Max.	
Operating condition						
VDD	Supply Voltage		3.0	3.3	3.6	V
	Ambient Temperature		-40		85	°C
DC characteristics						
Freq	Crystal Frequency		0.5		60	MHz
IDD	Operating Current	Crystal 55MHz , $C_L = 50pF$			20	mA
V_{IN}	Input Voltage		-0.5		$V_{DD}+0.5V$	
V_{OUT}	Output Voltage		-0.5		$V_{DD}+0.5V$	
AC characteristics						
Duty	Waveform Symmetry		40	50	60	%
Tr	Rise Time	0.3V to 3.0V , $C_L = 50pF$		3		ns
Tf	Fall Time	3.0V to 0.3V , $C_L = 50pF$		3		ns

Pad Layout



Pad Description

Pad #	Symbol	Description
1	XTB	Crystal drive
2	OE	Output enable
3	S0	Frequency select pad1
4	S1	Frequency select pad2
5	GND	Ground
6	C/T (Note3)	Duty cycle modulation
7	QO	Frequency output
8	NC (Note4)	Reserve
9	VDD	Power
10	OE	Output enable
11	XT	Crystal feedback

Note3 : C/T-no connection or connect to VDD for above 30Meg XO; connect to GND for below 30Meg XO.

Note4 : NC-no connection

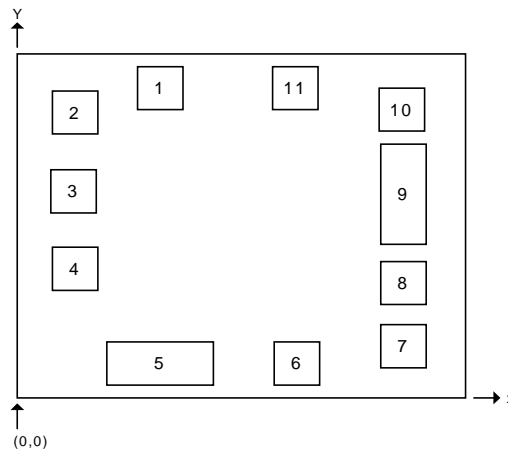
Frequency Selector

S1	S0	QO
X	X	Default
X	O	2
O	X	4
O	O	8

Note5 : X-no connection , O-connect to GND

Note6 : This function for die use only

Pad Position



Die Size = 716.5um * 821.5um

Pad Size = 86um * 86um

Die Thickness = 250um

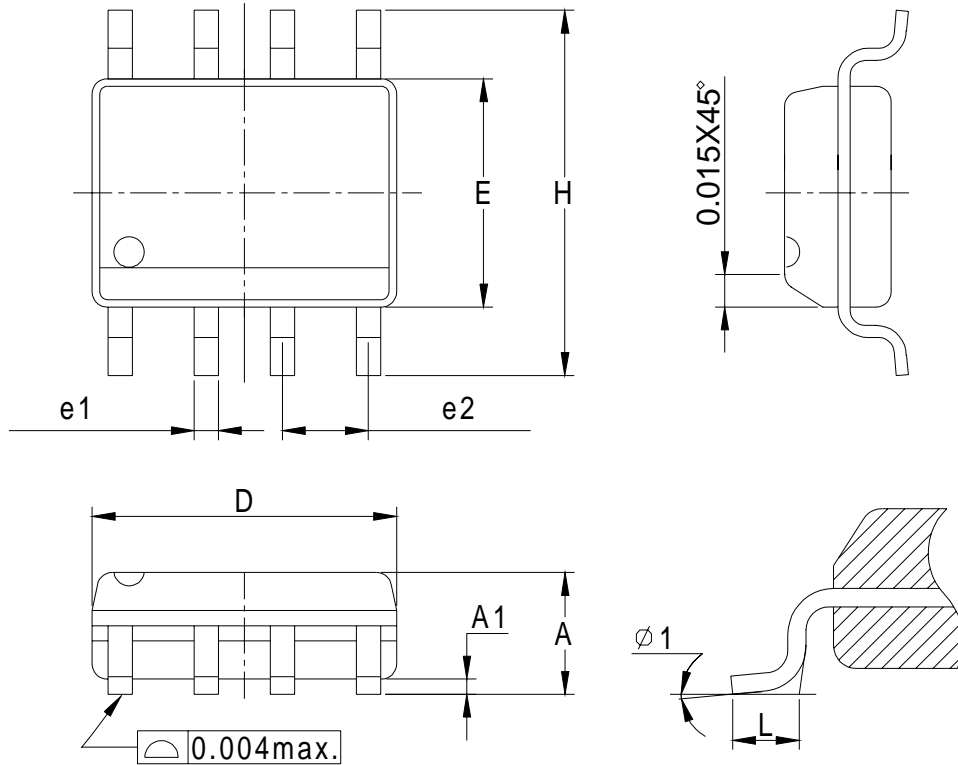
Pad #	Symbol	Pad Center	
		X(um)	Y(um)
1	XTB	260	743
2	OEPAD	78	700
3	S0PAD	78	531
4	S1PAD	78	359
5	GND	225,321	78,78
6	TCBPAD	468	78
7	QO	638	163
8	NC	638	356
9	VDD	638,638	457,553
10	OEPAD	638	700
11	XT	449	743

Note7 : Substrate should be connected to GND.

Note8 : VDD and GND are double pads.

Packaging Information

SOP-8 pin (Reference JEDEC Registration MS-012)

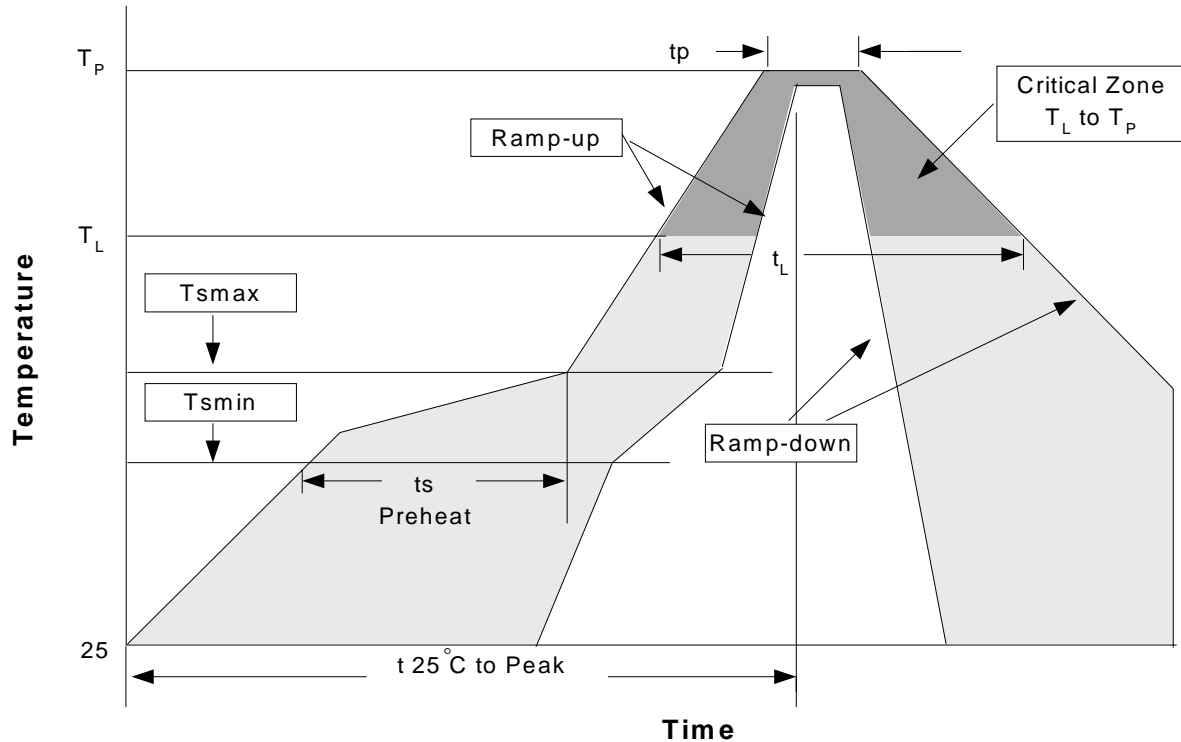


Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
E	3.80	4.00	0.150	0.157
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
φ 1	8°		8°	

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb), 100%Sn
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)



Classification Reflow Profiles

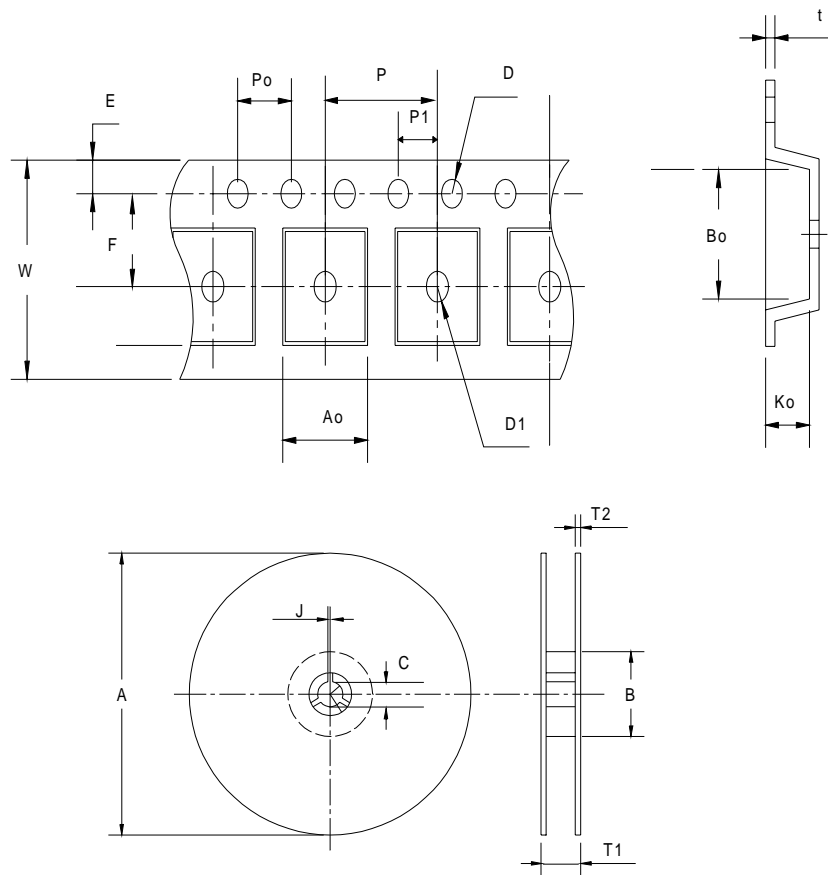
Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (T_L to T_P)	3°C/second max.		3°C/second max.	
Preheat				
- Temperature Min (T_{smin})	100°C		150°C	
- Temperature Max (T_{smax})	150°C		200°C	
- Time (min to max)(t_s)	60-120 seconds		60-180 seconds	
T_{smax} to T_L				
- Ramp-up Rate			3°C/second max	
T_{smax} to T_L				
- Temperature(T_L)	183°C		217°C	
- Time (t_L)	60-150 seconds		60-150 seconds	
Peak Temperature(T_p)	225 +0/-5°C	240 +0/-5°C	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature(t_p)	10-30 seconds	10-30 seconds	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max.		6°C/second max.	
Time 25°C to Peak Temperature	6 minutes max.		8 minutes max.	

Note: All temperatures refer to topside of the package. Measured on the body surface.

Reliability test program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C, 5 SEC
HOLT	MIL-STD-883D-1005.7	1000 Hrs Bias @ 125°C
PCT	JESD-22-B,A102	168 Hrs, 100%RH, 121°C
TST	MIL-STD-883D-1011.9	-65°C~150°C, 200 Cycles
ESD	MIL-STD-883D-3015.7	VHBM > 2KV, VMM > 200V
Latch-Up	JESD 78	10ms, $1_{tr} > 100\text{mA}$

Carrier Tape



Application	A	B	C	J	T1	T2	W	P	E
SOP-8	330 ± 1	$62 + 1.5$	$12.75 + 0.15$	2 ± 0.5	12.4 ± 0.2	2 ± 0.2	12 ± 0.3	8 ± 0.1	1.75 ± 0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	5.5 ± 1	$1.55 + 0.1$	$1.55 + 0.25$	4.0 ± 0.1	2.0 ± 0.1	6.4 ± 0.1	5.2 ± 0.1	2.1 ± 0.1	0.3 ± 0.013

(mm)

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOP- 8	12	9.3	2500

Customer Service

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