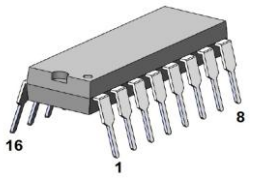
AS3340 / AS3345 - Voltage Controlled Oscillator (VCO)

FEATURES

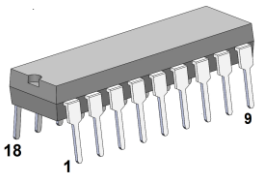
- Large Sweep Range: 500,000:1
- Fully Temperature Compensated
- Four Output Waveforms Available; No waveform trimming required
- Summing Node Inputs for Frequency Control
- High Exponential Scale Accuracy
- Low Temperature Drift
- Voltage Controlled Pulse Width
- Hard and Soft Sync Inputs
- Linear FM
- Buffered, Short Circuit Protected Outputs
- ±15 Volt Supplies

AS3340
PDIP-16 (300 mil)

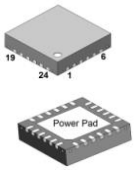


AS3340D
SOIC-16 (150 mil)

AS3345
PDIP-18 (300 mil)



AS3345F
QFN-24 4x4 mm 0,5 mm



APPLICATIONS

for electronic music

General Description

The AS 3340 and AS 3345 are completely self contained, precision voltage controlled oscillators, featuring both exponential and linear control scales and up to four buffered output waveforms: triangle, sawtooth, square, and pulse with voltage controllable pulse width. Full temperature compensation makes these VCOs extremely stable, and eliminates the need for a temperature compensation resistor. The highly accurate exponential and linear control inputs are virtual ground summing nodes, allowing multiple control voltages to be mixed within the device itself.

Also included is provision for hard and soft synchronization of the frequency, and an output for easy adjustment of high frequency tracking. Special care in the design ensures oscillation start-up under any power-on sequence and supply conditions.

An on-chip 7.4 volt Zener diode allows the device to operate off ±15 volt supplies, as well as +15,-5 volt supplies. For voltages greater than -7.5 volts, a series current limiting resistor must be added between pin 3 and the negative supply. Its value is calculated as follows:

$R_{EE} = (V_{EE} - 7.4) / .008$

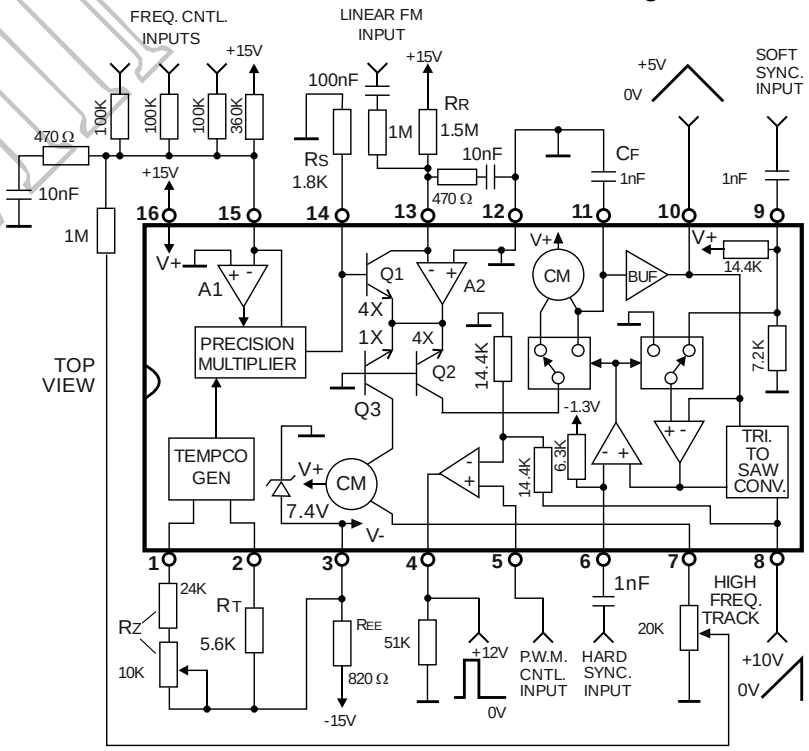
To minimize self-heating and improve thermo-stability it is recommended to keep V_{EE} = -5V (external power supply).

Power pad in QFN package highly improves thermal stability of parameters of AS3345F.

AS3340 Pin Information

PDIP-16, SOIC-16 Pin No	Pin Name	Description
1	Scale 1	Scale Adjust 1
2	Scale 2	Scale Adjust 2
3	V_{EE}	Negative supply
4	V_P	Pulse Output
5	V_{PWM}	PWM Control Input
6	V_{HSI}	Hard Synchronization Input
7	V_{HFT}	High Frequency Track
8	V_{SO}	Sawtooth Output
9	V_{SSI}	Soft Synchronization Input
10	V_{TO}	Triangle Output
11	Cap	Capacitor
12	GND	Ground
13	V_{LFI}	Linear FM Input
14	V_S	Scale
15	V_{FCI}	Frequency Control Input
16	V_{CC}	Positive supply

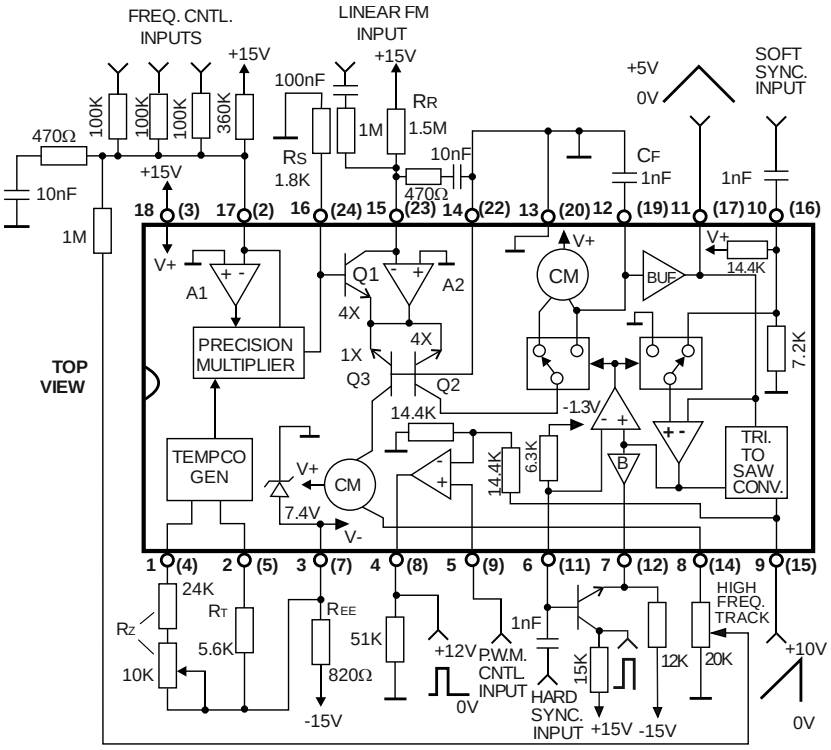
AS3340 Circuit Block and Connection Diagram



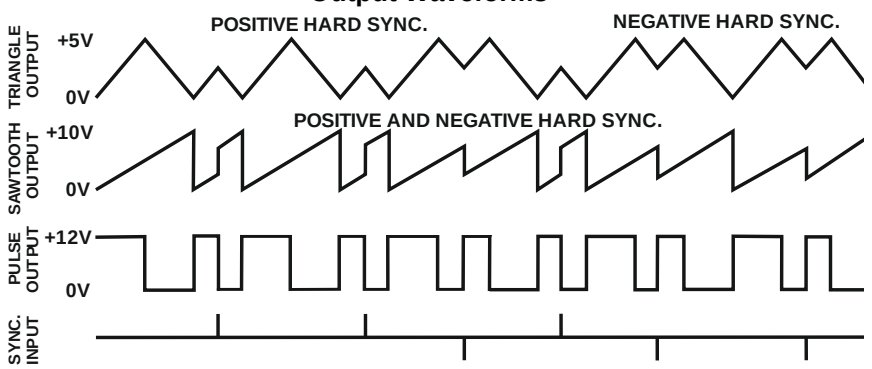
AS3345 Pin Information

PDIP-18, Pin No	QFN-24, Pin No	Pin Name	Description
1	4	Scale 1	Scale Adjust 1
2	5	Scale 2	Scale Adjust 2
3	7	V_{EE}	Negative supply
4	8	V_P	Pulse Output
5	9	V_{PWM}	PWM Control Input
6	11	V_{HSI}	Hard Synchronization Input
7	12	V_{MO}	Meander Output
8	14	V_{HFT}	High Frequency Track
9	15	V_{SO}	Sawtooth Output
10	16	V_{SSI}	Soft Synchronization Input
11	17	V_{TO}	Triangle Output
12	19	Cap	Capacitor
13	20	GND	Ground
14	22	GND	Ground
15	23	V_{LFI}	Linear FM Input
16	24	V_S	Scale
17	2	V_{FCI}	Frequency Control Input
18	3	V_{CC}	Positive supply
-	1,6,10, 13,18,21	NC	Not connected
-	Power Pad	Power Pad	Don't connect

AS3345 Circuit Block and Connection Diagram PDIP-18 (QFN-24)



Output Waveforms



Absolute Maximum Ratings

Voltage Between V_{CC} and V_{EE} Pins	+24V, -0,5V
Voltage Between V_{CC} and GND Pins	+18V, -0,5V
Voltage Between V_{EE} and GND Pins	-6V, +0,5V
Current through Any Pin	±40mA
Voltage Between Frequency Control Pin or Reference Current Pin and GND Pin	±6V
Voltage Between Multiplier Output Pin and GND Pin	+6V, -1V
Storage Temperature Range	- 55°C to 150°C
Operating Temperature Range	- 25°C to 75°C

Typical Electrical Characteristics

V_{CC}=+15V V_{EE} = Internal Zener T_A= 20°

Parameter	Min.	Typ.	Max.	Units
Frequency Control Range	50K:1	500K:1	-	
Exponential Scale Error, Untrimmed[1]	-	0.2	1	%
Exponential Scale Error, Trimmed[1]	-	0.05	0,3	%
Multiplier Gain Errors[2]	-	0.0005	0.008	%/µA
Tempo Cancellation[3]	-150	0	+150	ppm
Oscillator Drift[4]	-	±50	±200	ppm
Triangle Buffer Input Current	-	0.3	3	nA
Triangle Waveform Upper Level	4.85	5.0	5.15	V
Triangle Waveform Lower Level	-15	0	+15	mV
Triangle Waveform Symmetry	45	50	55	%
Sawtooth Waveform Upper Level	9.4	10.0	10.6	V
Sawtooth Waveform Lower Level	-25	0	+25	mV
Triangle Output Sink Capability	400	550	750	µA
Sawtooth Output Sink Capability	640	800	1000	µA
Triangle& Sawtooth Output Impedance[5]	65	100	150	Ω
Pulse Output Source Capability at +10V	2.8	3.5	4.6	mA
Squarewave Output Levels[6], AS3345	-1.8,-0.4	-1.3,0	-0.8,+0.4	V
PWM Input Pin Current [7]	.5	1.5	3.5	µA
PWM Input Voltage for 0% Pulse Width	-15	0	+15	mV
PWM Input Voltage for 100% Pulse Width	4.6	5.0	5.4	V
Input Bias Current at Reference and Control Current Inputs	80	200	400	nA
Tempco of Input Bias Currents	-1000	0	+1000	ppm
Offset Voltage at Reference and Control Current Inputs	-5	0	+5	mV
Hard Sync Reference Voltage	-1.2	-1.4	-1.5	V
Hard Sync Input Resistance	5	6.3	7.9	KΩ
Max Capacitor Charge/Discharge Current	400	570	800	µA
Positive Supply Current	4	5	6.5	mA
Positive Supply Voltage Range	+10	-	+18	V
Negative Supply Voltage Range [8]	-4.5	-	-18	V

Note 1: This error represents the percentage difference in scale factors (volts per frequency ratio) of the exponential generator anywhere over the exponential generator current range of 50nA to 100 µA. Most of this error occurs at the range extremities.

Note 2: This error represents the percentage difference in multiplier gains at any two input currents, within the range of 20 µA to 180 µA, per µA difference between the two corresponding outputs.

Note 3: This spec represents the difference between the actual tempco of the multiplier output voltage (expressed relative to the maximum output excursions) and the tempco required to precisely cancel the tempco of the exponential scale factor (q/KT).

Note 4: The multiplier output is grounded.

Note 5: For exponential generator currents less than 10 µA; above 10 µA**,** impedance drops to 1 /3 this value as the highest current is approached.

Note 6: With respect to the hard sync input reference voltage.

Note 7: For PWM control inputs between -1 and +6 volts. This current is significantly greater for inputs outside of this range.

Note 8: Current limiting resistor required for negative supplies greater than -6 volts.

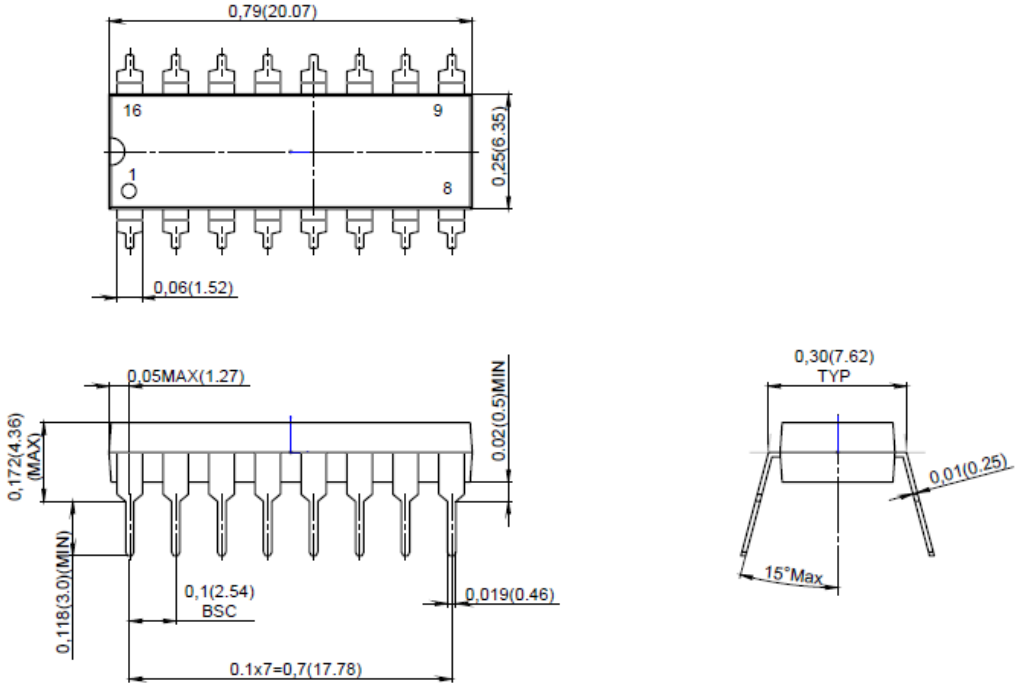
Specifications subject to change without notice.

Package Information.

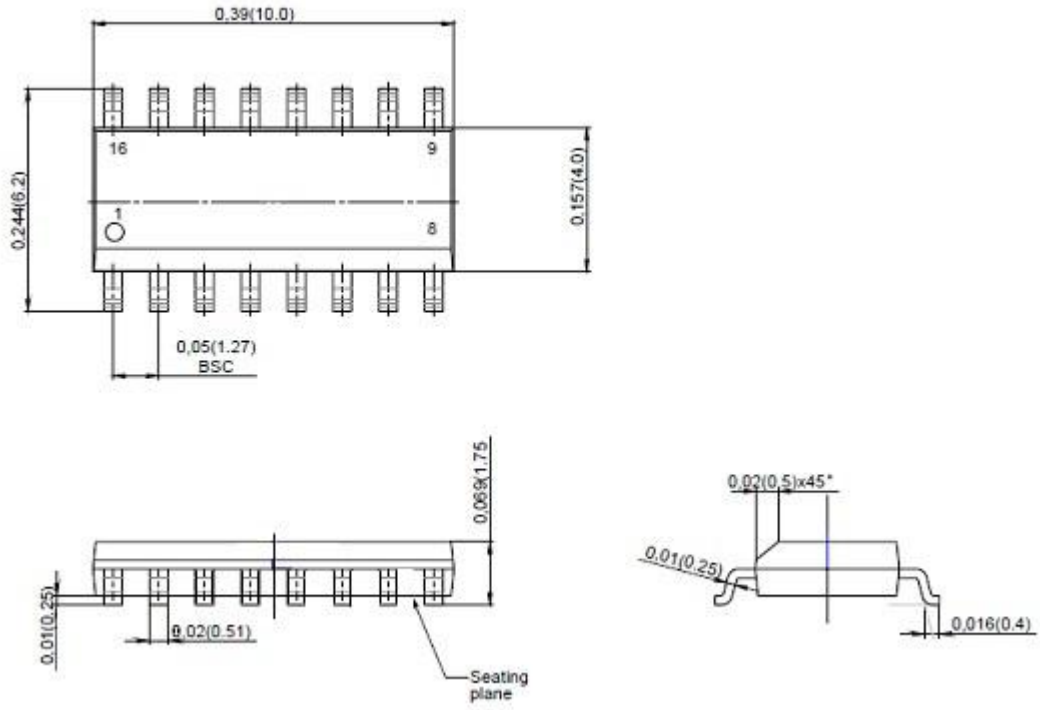
Device type	Package
AS3340	PDIP-16 (300 mil body)
AS3340D	SOIC-16 (150 Mil)

Units: inch (mm)

PDIP-16 (300 Mil)



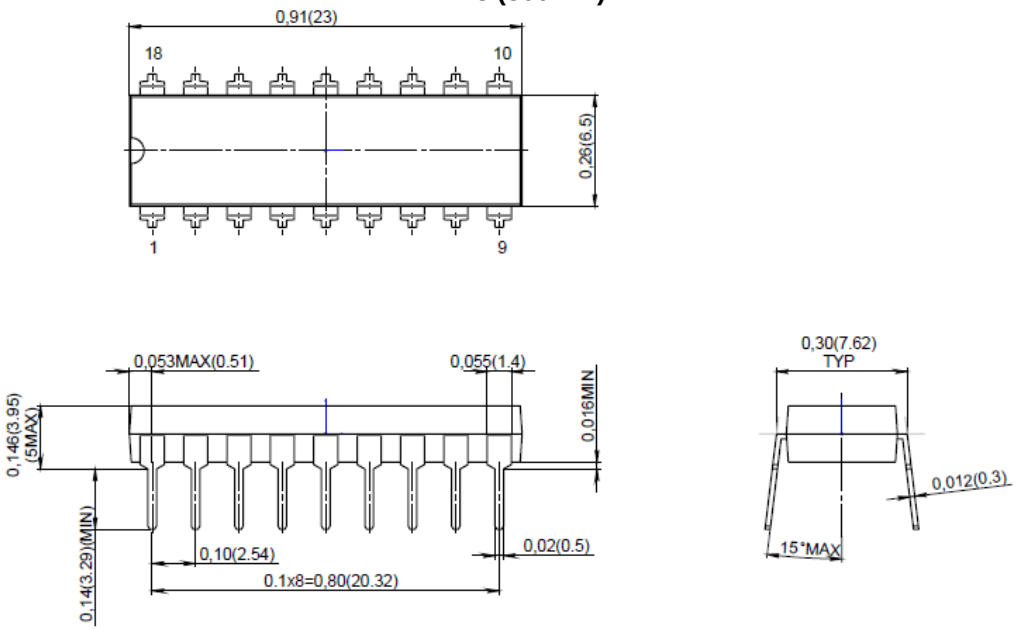
SOIC-16 (150 Mil)



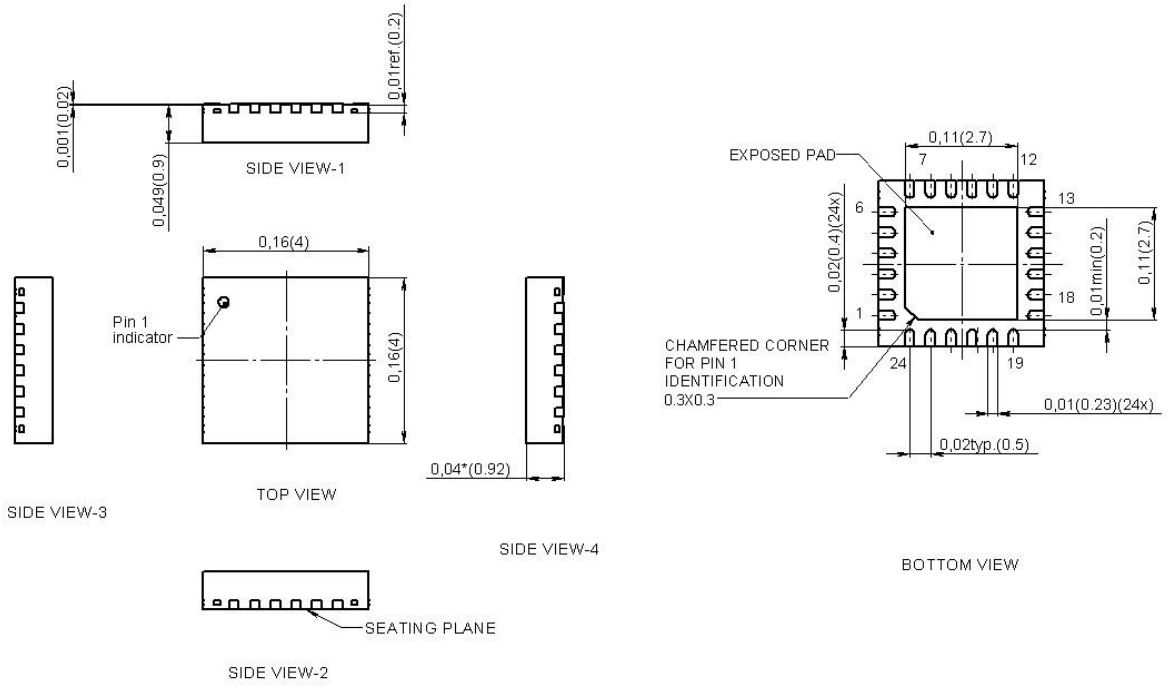
Device type	Package
AS3345	PDIP-18 (300 mil body)
AS3345F	QFN-24L (4x4 mm 0.5 mm)

Units: inch (mm)

PDIP-18 (300MIL)



QFN-24 4x4 mm 0.5 mm



Revision history

Date	Revision	Changes
28-Aug-2017	**1**	Preliminary version 1
10-Sep-2017	**2**	Minor changes
19-Dec-2017	**3**	Changes in Description and Block Diagram
07-Mar-2018	**4**	Changes in Description
31-May-2018	**5**	Minor changes