

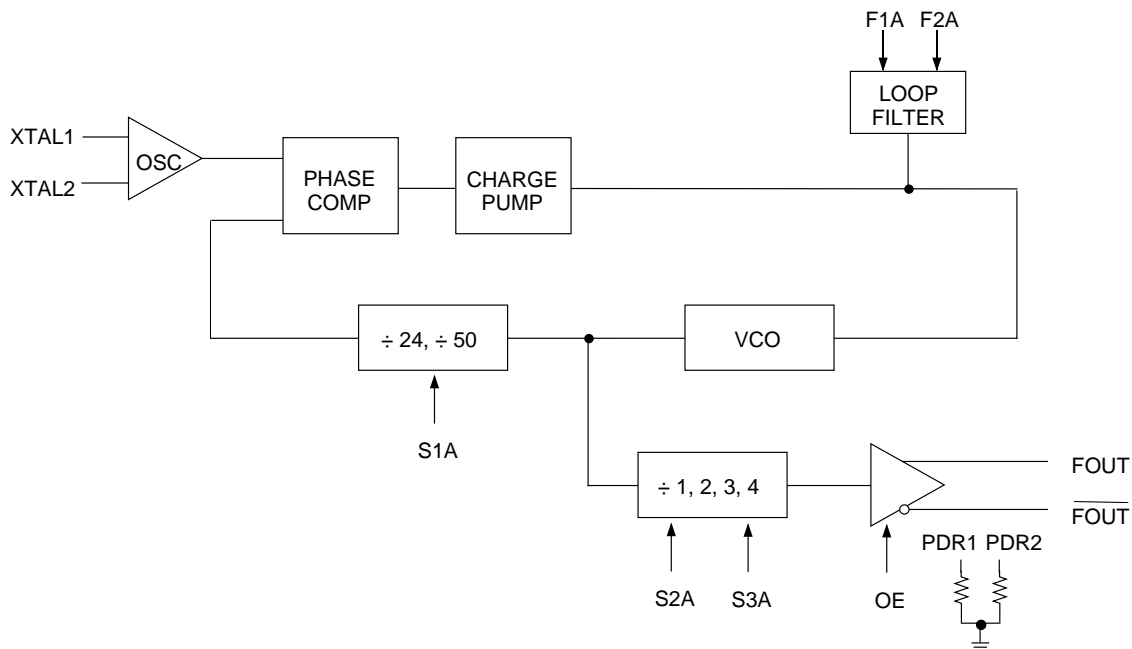
## FEATURES

- 3.3V and 5V power supply options
- Up to 1GHz clock frequencies
- Internal quartz reference oscillator driven by quartz crystal or PECL source
- Low jitter PLL design
- On-chip 20 ohm driver
- Differential outputs with 600mV (min) swing
- Optional pull-down resistors for AC-coupled outputs
- Low power consumption
- External loop filter optimizes performance/cost
- Available in 16-pin SOIC package

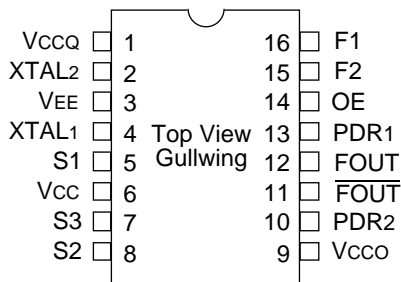
## DESCRIPTION

The SY89424V is a low-power Phase Locked Loop (PLL) based frequency synthesizer. The device is capable of generating up to 1GHz clock frequencies with a low-cost 10–25MHz external series-resonant quartz crystal. One can also use PECL differential clock signals to drive this device instead of the quartz crystal. Operation of this chip is controlled by three select pins (S1, S2 and S3). S1 selects the divide ratio of 24 or 50 for the PLL. S2 and S3 select the output frequency. There are two pull-down resistor pins (PDR1 and PDR2). Each pin has an on-chip resistor that will control the output driver currents. When PDR1 and PDR2 pins are open, both outputs are normal open emitter PECL drivers. When PDR1 and PDR2 pins are shorted to the outputs, on-chip pull down currents of 25mA (40mA at 5V Vcc) are provided. Both output drivers are capable of driving 20 ohm clock lines. An output enable (OE) pin is available and it can be HIGH or left open for normal operation. When OE is LOW, a built-in Disable Timing Synchronizer will force the FOUT output to LOW at the completion of the HIGH clock cycle. The FOUT output remains HIGH during that time.

## BLOCK DIAGRAM



**PIN CONFIGURATION**



**PIN NAMES**

Pin	Function	I/O
XTAL1	Crystal Input 1 (PECL)	I/O
XTAL2	Crystal Input 2 (PECL)	I/O
F1	Filter Pin 1	—
F2	Filter Pin 2 (Reference)	—
VccQ	Positive Power Supply (Charge Pump)	—
S1	Select Input 1 (TTL)	I
S2	Select Input 2 (TTL)	I
S3	Select Input 3 (TTL)	I
FOUT	Output (PECL)	O
$\overline{\text{FOUT}}$	Complement Output (PECL)	O
Vcc	Positive Power Supply (Logic)	—
Vcco	Positive Power Supply (PECL Outputs)	—
OE	Output Enable (TTL)	I
VEE	Negative Power Supply (0.0V)	—
PDR1	Pulldown Resistor (100Ω)	—
PDR2	Pulldown Resistor (100Ω)	—

**FREQUENCY SELECTION TABLE**

Input	S1	S2	S3	FOUT, $\overline{\text{FOUT}}$	Frequency Range MHz
Fosc <sup>(1)</sup>	0	0	0	24X Fosc	240 – 480
	0	0	1	12X Fosc	120 – 240
	0	1	0	8X Fosc	80 – 160
	0	1	1	6X Fosc	60 – 120
	1	0	0	50X Fosc	500 – 1000
	1	0	1	25X Fosc	250 – 500
	1	1	0	16.67X Fosc	167 – 333
	1	1	1	12.5X Fosc	125 – 250

**NOTE:**

1. FOSC = 10MHz to 25MHz.

**ABSOLUTE MAXIMUM RATING<sup>(1)</sup>**

Symbol	Parameter	Value	Unit	
Vcc	Power Supply Voltage	-0.5 to +7.0	V	
Vi	TTL Input Voltage <sup>(2)</sup>	-0.5 to 6.0	V	
Ii	TTL Input Current <sup>(2)</sup>	-30 to +5.0	mA	
IOUT	ECL Output Current	-Continuous -Surge	50 100	mA
Tstore	Storage Temperature	-65 to +150	°C	
TA	Operating Temperature	0 to +75	°C	

**NOTES:**

- Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to ABSOLUTE MAXIMUM RATING conditions for extended periods may affect device reliability.
- Either voltage limit or current limit is sufficient to protect input.

**5V DC ELECTRICAL CHARACTERISTICS**

VCC = VCCQ = VCCO = 4.75V to 5.25V

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VCC	Power Supply Voltage	4.75	—	5.25	V	VCC = VCCQ = VCCO
ICC	Power Supply Current (VCC)	—	—	80	mA	
ICCQ	Power Supply Current (VCCQ)	—	—	10	mA	
ICCO	Power Supply Current (VCCO)	—	—	20	mA	PECL outputs FOUT & $\overline{\text{FOUT}}$ are open

**3.3V DC ELECTRICAL CHARACTERISTICS**

VCC = VCCQ = VCCO = 3.0V to 5.25V

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VCC	Power Supply Voltage	3.0	—	3.8	V	VCC = VCCQ = VCCO
ICC	Power Supply Current (VCC)	—	—	68	mA	
ICCQ	Power Supply Current (VCCQ)	—	—	9	mA	
ICCO	Power Supply Current (VCCO)	—	—	18	mA	PECL outputs FOUT & $\overline{\text{FOUT}}$ are open

**PECL DC ELECTRICAL CHARACTERISTICS**

VCC = VCCQ = VCCO = 3.0V to 5.25V

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VO	Output Voltage Swing	0.55	0.85	1.15	V	Peak-to-Peak
VOH	Output HIGH Voltage	VCC – 1.075	—	VCC – 0.800	V	FOUT & $\overline{\text{FOUT}}$ loaded with 50Ω to VCC – 2.0V
VOL	Output LOW Voltage	VCC – 1.860	—	VCC – 1.570	V	FOUT & $\overline{\text{FOUT}}$ loaded with 50Ω to VCC – 2.0V
VIH	Input HIGH Voltage <sup>(1)</sup>	VCC – 1.165	—	VCC – 0.880	V	
VIL	Input LOW Voltage <sup>(1)</sup>	VCC – 1.810	—	VCC – 1.475	V	

**NOTE:**

1. Forcing voltage at XTAL1 and XTAL2

**TTL DC ELECTRICAL CHARACTERISTICS**

VCC = VCCQ = VCCO = 3.0V to 5.25V

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VIH	Input HIGH Voltage	2.0	—	—	V	
VIL	Input LOW Voltage	—	—	0.8	V	
IiH	Input HIGH Current	—	—	20 100	μA	VIN = 2.7V VIN = VCC
IiL	Input LOW Current	—	—	–0.2	mA	VIN = 0.5V
VIK	Input Clamp Voltage	—	—	–1.2	V	IIN = –18mA

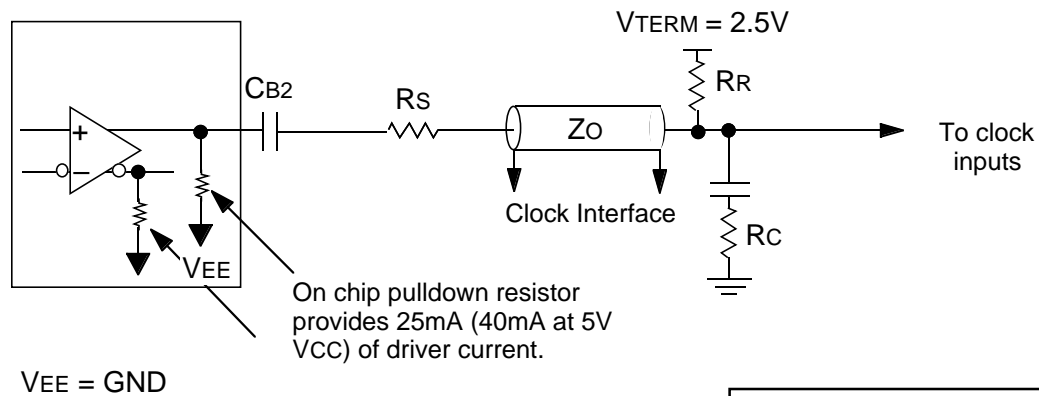
**AC ELECTRICAL CHARACTERISTICS**

VCC = VCCQ = VCCO = 3.0V to 5.25V

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t <sub>JIT</sub>	Jitter	—	—	10	ps	RMS
PPW	Duty Cycle	45%	50%	55%		<500MHz
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Time (20% to 80%)	100 100	300 300	500 500	ps	—

**APPLICATION**

AC Coupled Load

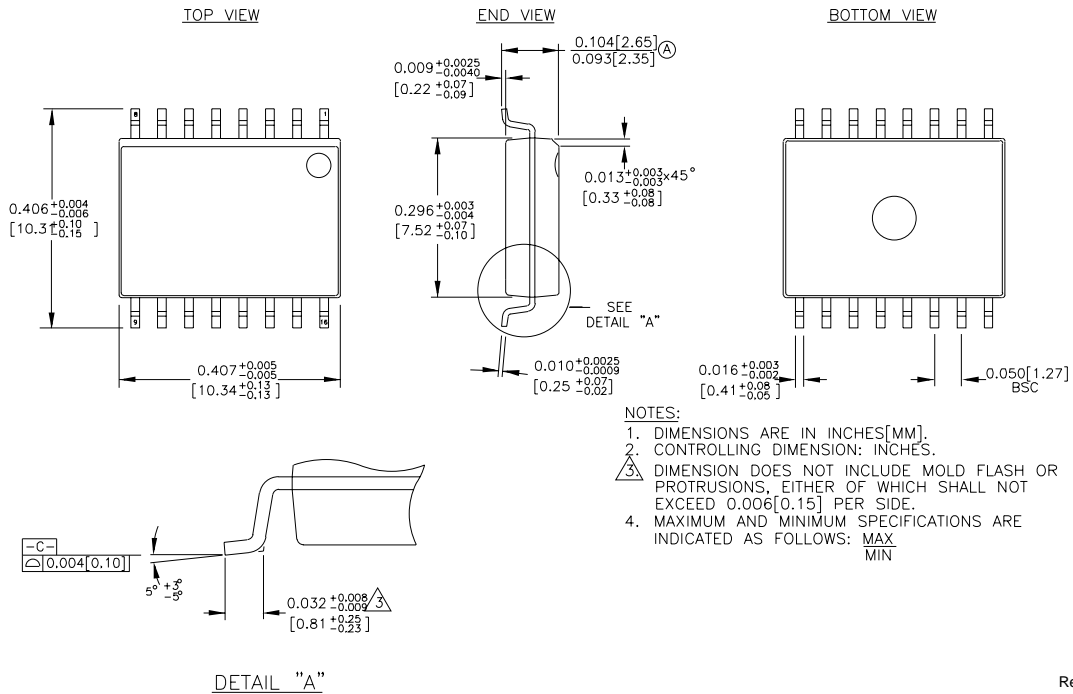


CB2	=	10nF	±20%
RS	=	6.8 Ohm	±5%
RC	=	20 Ohm	±1%
RR	=	5 KOhm	±5%
Zo	=	20 Ohm	±2 Ohm

**PRODUCT ORDERING CODE**

Odering Code	Package Type	Operating Range
SY89424VZC	Z16-1	Commercial
SY89424VZCTR	Z16-1	Commercial

**16 LEAD SOIC .300" WIDE (Z16-1)**



Rev. 03

**MICREL-SYNERGY 3250 SCOTT BOULEVARD SANTA CLARA CA 95054 USA**

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