Technical Summary

Dual UHF/VHF PLL Frequency Synthesizers with DACs and Voltage Multipliers

BiCMOS

MC145225
MC145230

32 1

FU SUFFIX
TQFP
Very–Small 5 x 5 mm Body
CASE 873C

ORDERING INFORMATION

MC145225FU	1.2 GHz/400 MHz
MC145230FU	2.6 GHz/400 MHz

The MC145225 and MC145230 are advanced dual frequency synthesizers containing sophisticated very–low voltage and low–power circuitry. Each device supports two independent loops with a single input reference and operates down to 1.8 V. Phase noise reduction circuitry is incorporated into each device.

The MC145225 is capable of direct usage up to 1.2 GHz on the main loop and up to 400 MHz on the secondary loop. The MC145230 is capable of direct usage up to 2.6 GHz on the main loop and up to 400 MHz on the secondary loop. Each device has a 32/33 prescaler for the main loop and an 8/9 prescaler for the secondary loop. Lock detection circuitry for each loop is muxed to a single output.

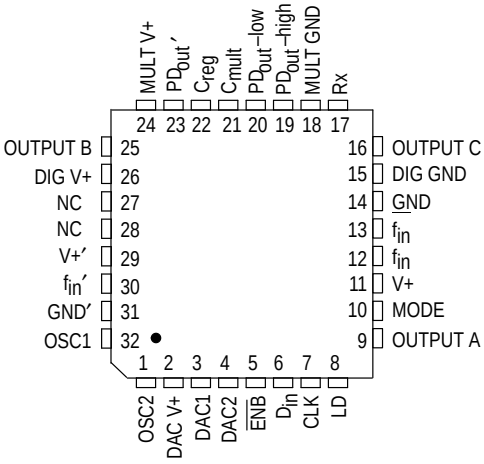
Two 8–bit DACs are powered through a dedicated pin. The DAC supply range is 1.8 to 3.6 V; this voltage may differ from the main supply.

An on–chip voltage multiplier supplies power to the phase/frequency detectors. Thus, in a 2–volt application, the detectors are supplied with 4–volt power. The current source/sink phase/frequency detector for the main loop is designed to achieve faster lock times than a conventional detector. Both high and low current outputs are available along with a MOSFET switch to adjust the external low–pass filter response.

There are several levels of standby which are controllable with a one–byte transfer through the serial port. Either of the PLLs and/or the reference oscillator may be independently placed in the low–power standby state. In addition, any of the phase/frequency detector outputs may be placed in the floating state to facilitate modulation of the external VCOs. Either DAC may be placed in standby via a four–byte transfer.

- Operating Frequency
  - MC145225 — Main Loop: 100 to 1200 MHz
    Secondary Loop: 10 to 400 MHz
  - MC145230 — Main Loop: 500 to 2600 MHz
    Secondary Loop: 10 to 400 MHz
- Operating Supply Voltage: 1.8 to 3.6 V
- Supply Current, Both Loops Active — MC145225: 5 mA
  MC145230: 7 mA
- Standby Current, All Systems Shut Down: 30 μA
- Maximum Phase Detector Output Current:
  - ≤ 2.5 V supply — PD_{out}–high: 2 mA, PD_{out}–low: 0.5 mA
  - > 2.5 V supply — PD_{out}–high: 4 mA, PD_{out}–low: 1 mA
- Two Independent 8–Bit DACs with Separate Supply Pin (Up to 3.6 V)
- Glitch–Free Lock Detect Output with Adjustable Lock Indication Window
- Operating Temperature: – 40 to 85°C
- Independent R Counters Allow Independent Step Sizes for Each Loop
- Main Loop Divider Range: 992 to 262,143
- Secondary Loop Divider Range: 56 to 65,535
- Reference Counters Divider Range: 10 to 65,535
- Three General–Purpose Outputs: Push–Pull, Three–State, and Open–Drain
- Direct Interface to Motorola SPI Data Port up to 10 Mbps

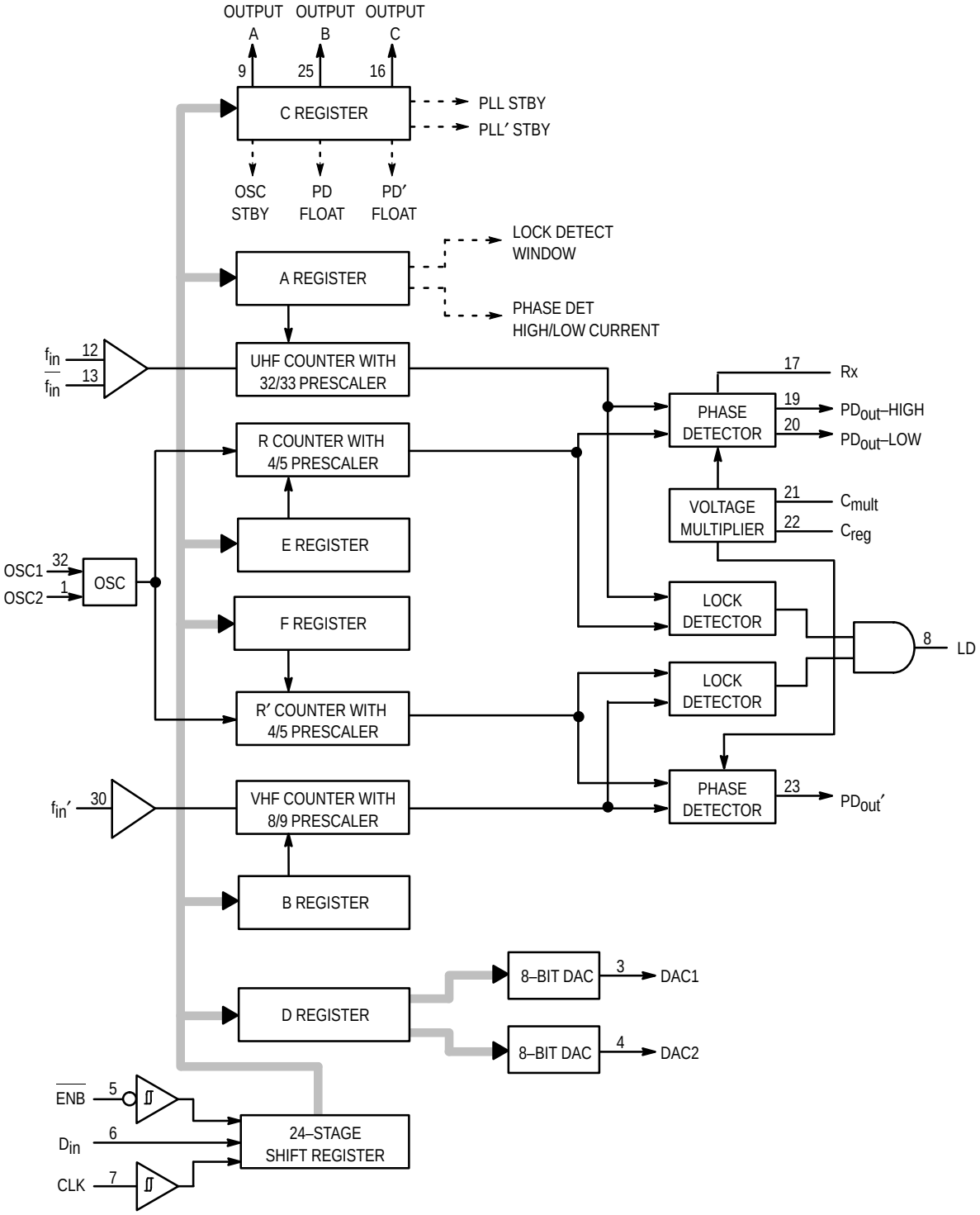
PIN ASSIGNMENT



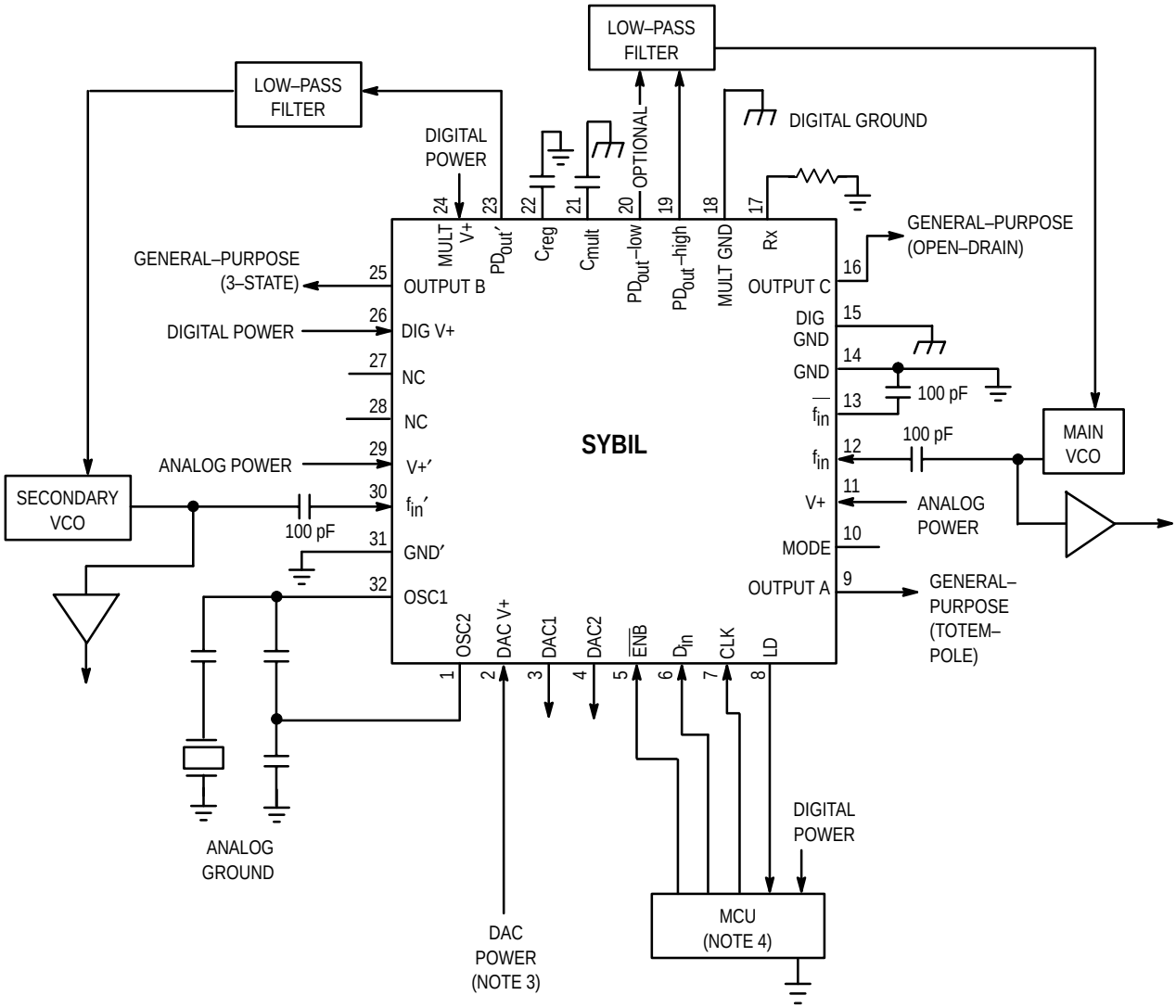
NC = NO CONNECT

REV 1
1/97 TN97011600

BLOCK DIAGRAM

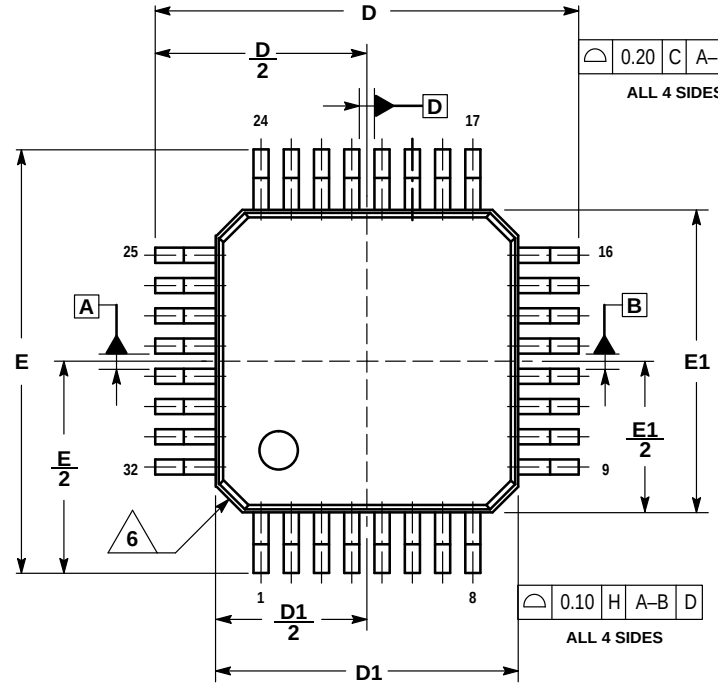


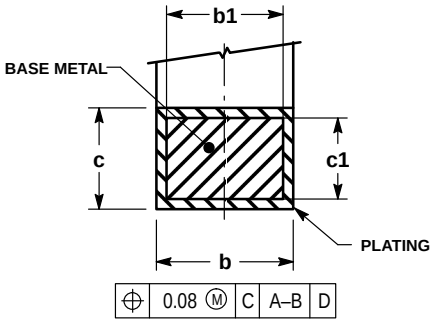
APPLICATION CIRCUIT



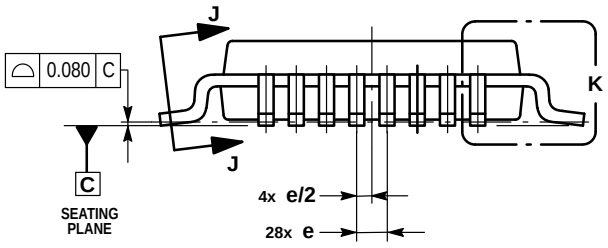
NOTES:
1. Digital and analog GND must be the same potential.
2. Digital and analog power must be the same potential: 1.8 to 3.6 V.
3. DAC power may be any potential between 1.8 V and 3.6 V.
4. The following are MCUs with SPI (Serial Peripheral Interface) rated down to a 1.8 V supply: MC68HC05C4A, MC68HC05C8A, and MC68HC05C12. See publication SG165/D for the latest information.

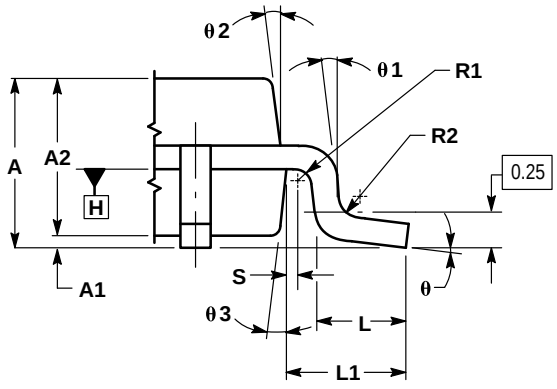
FU SUFFIX
TQFP (THIN QUAD FLAT PACKAGE)
CASE 873C–01





SECTION J–J





DETAIL K

NOTES:
1. DIMENSIONS ARE IN MILLIMETERS. AND TOLERANCING PER ASME Y14.5M, 1994.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DATUMS A, B, AND D TO BE DETERMINED WHERE THE LEADS EXIT THE PLASTIC BODY AT DATUM PLANE H.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 mm PER SIDE. D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS INCLUDING MOLD MISMATCH.
5. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08 mm. DAMBAR CAN NOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN A PROTRUSION AND AN ADJACENT LEAD IS 0.07 mm.
6. EXACT SHAPE OF CORNERS MAY VARY.

	MILLIMETERS	
DIM	MIN	MAX
A	—	1.60
A1	0.05	0.15
A2	1.35	1.45
b	0.18	0.27
b1	0.17	0.23
c	0.10	0.20
c1	0.09	0.16
D	7.00 BSC	
D1	5.00 BSC	
E	7.00 BSC	
E1	5.00 BSC	
e	0.50 BSC	
L	0.45	0.75
L1	1.00 REF	
R1	0.08	—
R2	0.08	0.20
S	0.20	—
θ	0°	7°
θ1	0°	—
θ2	11°	13°
θ3	11°	13°

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