

## Low Voltage 1:18 Clock Distribution Chip

The MPC942 is a 1:18 low voltage clock distribution chip with 2.5V or 3.3V LVCMOS output capabilities. The device is offered in two versions; the MPC942C has an LVCMOS input clock while the MPC942P has a LVPECL input clock. The 18 outputs are 2.5V or 3.3V LVCMOS compatible and feature the drive strength to drive 50 $\Omega$  series or parallel terminated transmission lines. With output-to-output skews of 200ps, the MPC942 is ideal as a clock distribution chip for the most demanding of synchronous systems. The 2.5V outputs also make the device ideal for supplying clocks for a high performance Pentium II™ microprocessor based design.

- LVCMOS/LVTTL Clock Input
- 2.5V LVCMOS Outputs for Pentium II Microprocessor Support
- 150ps Maximum Targeted Output-to-Output Skew
- Maximum Output Frequency of 250MHz @ 3.3 V<sub>CC</sub>
- 32-Lead TQFP Packaging
- Single 3.3V or 2.5V Supply

With a low output impedance ( $\approx 12\Omega$ ), in both the HIGH and LOW logic states, the output buffers of the MPC942 are ideal for driving series terminated transmission lines. With an output impedance of 12 $\Omega$  the MPC942 can drive two series terminated transmission lines from each output. This capability gives the MPC942 an effective fanout of 1:36. The MPC942 provides enough copies of low skew clocks for most high performance synchronous systems.

The LVCMOS/LVTTL input of the MPC942C provides a more standard LVCMOS interface. The OE pins will place the outputs into a high impedance state. The OE pin has an internal pullup resistor.

The MPC942 is a single supply device. The V<sub>CC</sub> power pins require either 2.5V or 3.3V. The 32-lead TQFP package was chosen to optimize performance, board space and cost of the device. The 32-lead TQFP has a 7x7mm body size with a conservative 0.8mm pin spacing.

**MPC942C**

**LOW VOLTAGE  
1:18 CLOCK  
DISTRIBUTION CHIP**



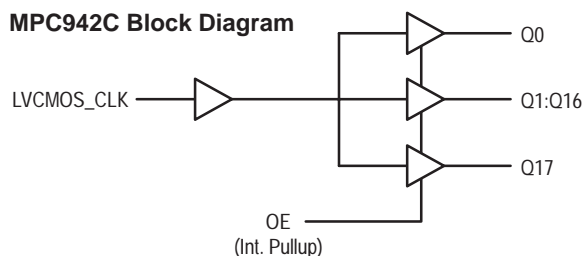
**FA SUFFIX**  
32-LEAD TQFP PACKAGE  
CASE 873A-02

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# MPC942C

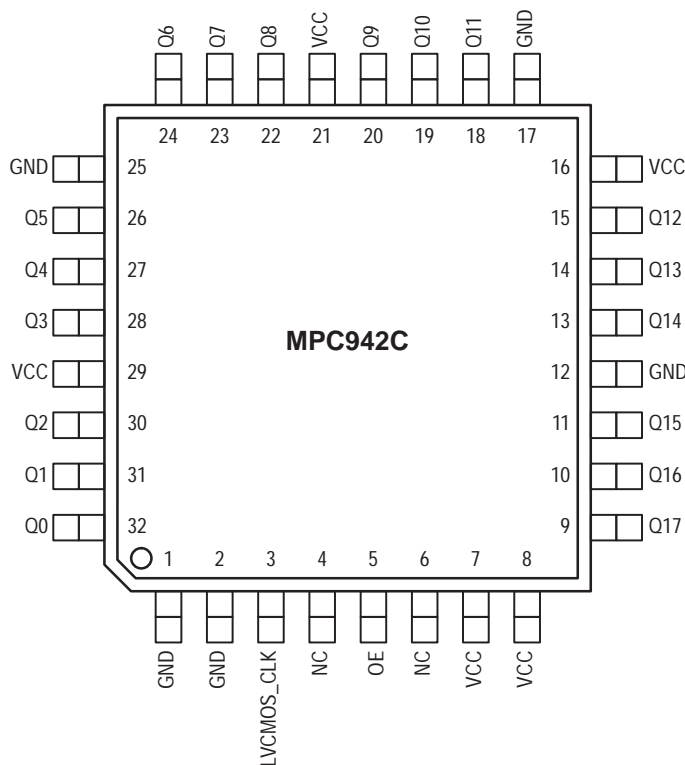
## LOGIC DIAGRAM



## FUNCTION TABLE

OE	Output
0	HIGH IMPEDANCE
1	OUTPUTS ENABLED

## Pinout: 32-Lead (Top View)



## ABSOLUTE MAXIMUM RATING

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage	-0.3	3.6	V
V <sub>I</sub>	Input Voltage	-0.3	V <sub>CC</sub> + 0.3	V
I <sub>IN</sub>	Input Current		±20	mA
T <sub>Stor</sub>	Storage Temperature Range	-40	125	°C

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**DC CHARACTERISTICS** ( $T_A = 0^\circ$  to  $70^\circ\text{C}$ ,  $V_{CCI} = 2.5\text{V} \pm 5\%$ ,  $V_{CCO} = 2.5\text{V} \pm 5\%$ )

Symbol	Characteristic	Min	Typ	Max	Unit	Condition
$V_{IH}$	Input HIGH Voltage	2.0		$V_{CCI}$	V	
$V_{IL}$	Input LOW Voltage			0.8	V	
$V_{OH}$	Output HIGH Voltage	2.0			V	$I_{OH} = -16\text{ mA}$
$V_{OL}$	Output LOW Voltage			0.5	V	$I_{OL} = 16\text{ mA}$
$I_{IN}$	Input Current			$\pm 200$	$\mu\text{A}$	
$C_{IN}$	Input Capacitance		4.0		pF	
CPD	Power Dissipation Capacitance		14		pF	Per Output
$Z_{OUT}$	Output Impedance		12		$\Omega$	
$I_{CC}$	Maximum Quiescent Supply Current		0.5		mA	

**AC CHARACTERISTICS** ( $T_A = 0^\circ$  to  $70^\circ\text{C}$ ,  $V_{CCI} = 2.5\text{V} \pm 5\%$ ,  $V_{CCO} = 2.5\text{V} \pm 5\%$ )

Symbol	Characteristic	Min	Typ	Max	Unit	Condition
$F_{max}$	Maximum Frequency			200	MHz	
$t_{PLH}$	Propagation Delay	1.5		2.8	ns	
$t_{sk(o)}$	Output-to-Output Skew			200	ps	
$t_{sk(pr)}$	Part-to-Part Skew			1.3	ns	Notes 1, 2
$t_{sk(pr)}$	Part-to-Part Skew			600	ps	Notes 1, 3
$d_t$	Duty Cycle	45		55	%	
$t_r, t_f$	Output Rise/Fall Time	0.2		1.0	ns	

**DC CHARACTERISTICS** ( $T_A = 0^\circ$  to  $70^\circ\text{C}$ ,  $V_{CCI} = 3.3\text{V} \pm 5\%$ ,  $V_{CCO} = 3.3\text{V} \pm 5\%$ )

Symbol	Characteristic	Min	Typ	Max	Unit	Condition
$V_{IH}$	Input HIGH Voltage	2.4		$V_{CCI}$	V	
$V_{IL}$	Input LOW Voltage			0.8	V	
$V_{OH}$	Output HIGH Voltage	2.4			V	$I_{OH} = -20\text{ mA}$
$V_{OL}$	Output LOW Voltage			0.5	V	$I_{OL} = 20\text{ mA}$
$I_{IN}$	Input Current			$\pm 200$	$\mu\text{A}$	
$C_{IN}$	Input Capacitance		4.0		pF	
CPD	Power Dissipation Capacitance		14		pF	Per Output
$Z_{OUT}$	Output Impedance		12		$\Omega$	
$I_{CC}$	Maximum Quiescent Supply Current		0.5		mA	

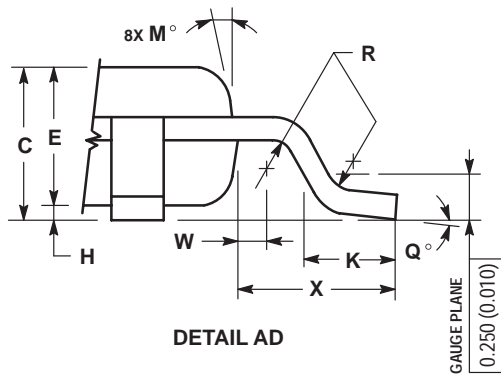
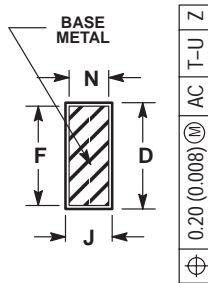
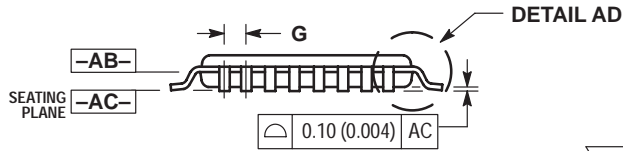
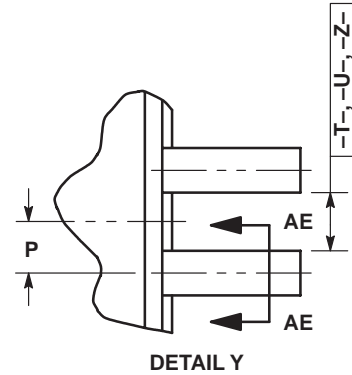
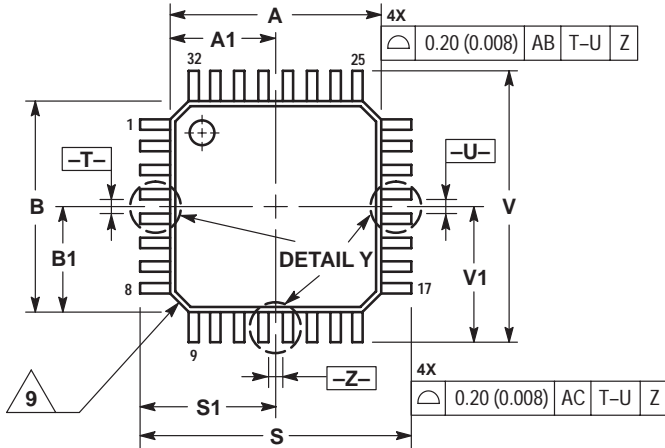
**AC CHARACTERISTICS** ( $T_A = 0^\circ$  to  $70^\circ\text{C}$ ,  $V_{CCI} = 3.3\text{V} \pm 5\%$ ,  $V_{CCO} = 3.3\text{V} \pm 5\%$ )

Symbol	Characteristic	Min	Typ	Max	Unit	Condition
$F_{max}$	Maximum Frequency			250	MHz	
$t_{PLH}$	Propagation Delay	1.3		2.3	ns	Note 1
$t_{sk(o)}$	Output-to-Output Skew			200	ps	
$t_{sk(pr)}$	Part-to-Part Skew			1.0	ns	Notes 1, 2
$t_{sk(pr)}$	Part-to-Part Skew			500	ps	Notes 1, 3
$d_t$	Duty Cycle	45		55	%	
$t_r, t_f$	Output Rise/Fall Time	0.2		1.0	ns	

1. Tested using standard input levels, production tested @ 133 MHz.
2. Across temperature and voltage ranges, includes output skew.
3. For a specific temperature and voltage, includes output skew.

OUTLINE DIMENSIONS

FA SUFFIX  
TQFP PACKAGE  
CASE 873A-02  
ISSUE A



- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: MILLIMETER.
  - DATUM PLANE -AB- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
  - DATUMS -T-, -U-, AND -Z- TO BE DETERMINED AT DATUM PLANE -AB-.
  - DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -AC-.
  - DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.250 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -AB-.
  - DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL NOT CAUSE THE D DIMENSION TO EXCEED 0.520 (0.020).
  - MINIMUM SOLDER PLATE THICKNESS SHALL BE 0.0076 (0.0003).
  - EXACT SHAPE OF EACH CORNER MAY VARY FROM DEPICTION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	7.000 BSC	0.276 BSC		
A1	3.500 BSC	0.138 BSC		
B	7.000 BSC	0.276 BSC		
B1	3.500 BSC	0.138 BSC		
C	1.400	1.600	0.055	0.063
D	0.300	0.450	0.012	0.018
E	1.350	1.450	0.053	0.057
F	0.300	0.400	0.012	0.016
G	0.800 BSC	0.031 BSC		
H	0.050	0.150	0.002	0.006
J	0.090	0.200	0.004	0.008
K	0.500	0.700	0.020	0.028
M	12° REF	12° REF		
N	0.090	0.160	0.004	0.006
P	0.400 BSC	0.016 BSC		
Q	1°	5°	1°	5°
R	0.150	0.250	0.006	0.010
S	9.000 BSC	0.354 BSC		
S1	4.500 BSC	0.177 BSC		
V	9.000 BSC	0.354 BSC		
V1	4.500 BSC	0.177 BSC		
W	0.200 REF	0.008 REF		
X	1.000 REF	0.039 REF		

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