



## LOW VOLTAGE, 1:18 CLOCK DISTRIBUTION CHIP

## MPC942C

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 50Ω 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 12Ω 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**



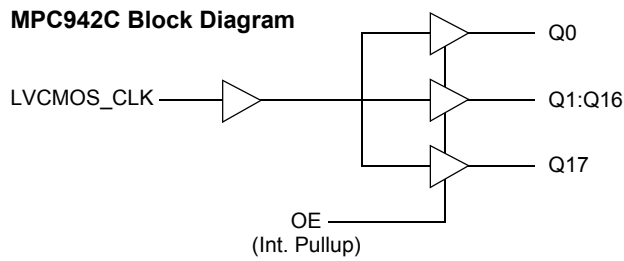
**FA SUFFIX**  
32-LEAD TQFP PACKAGE  
CASE 873A-03



**AC SUFFIX**  
32-LEAD TQFP PACKAGE  
**Pb-FREE PACKAGE**  
CASE 873A-03

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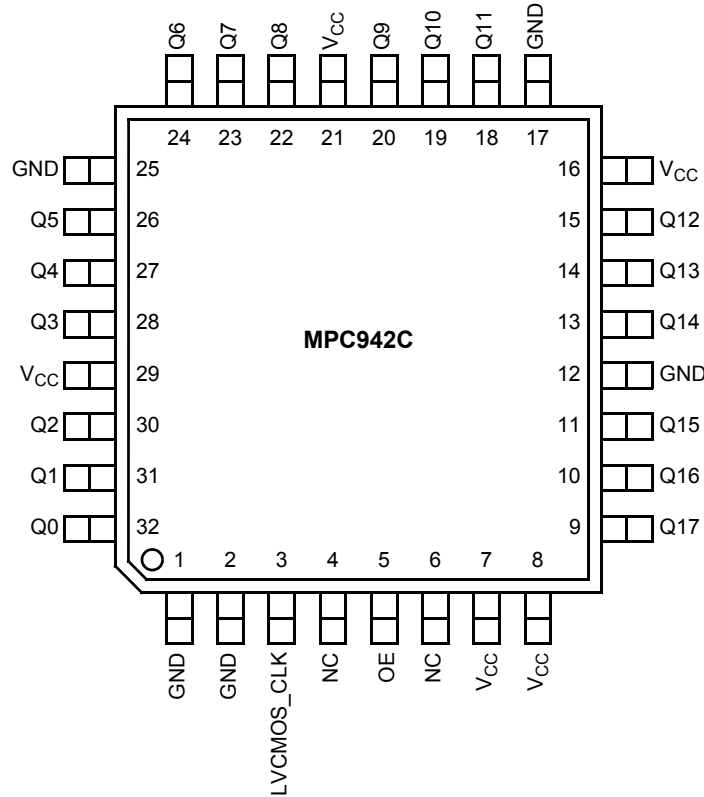
**LOGIC DIAGRAM**



**FUNCTION TABLE**

OE	Output
0	HIGH IMPEDANCE
1	OUTPUTS ENABLED

**Pinout: 32-Lead (Top View)**



**Table 1. Absolute Maximum Ratings**

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

**Table 2. 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	
$C_{PD}$	Power Dissipation Capacitance		14		pF	Per Output
$Z_{OUT}$	Output Impedance		12		$\Omega$	
$I_{CC}$	Maximum Quiescent Supply Current		0.5		mA	

**Table 3. 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	

**Table 4. DC Characteristics** ( $T_A = 0^\circ$  to  $70^\circ\text{C}$ ,  $V_{CCI} = 3.3\text{V} \pm 5\%$ ,  $V_{CCO} = 3.3\text{V} \pm 5\%$ )

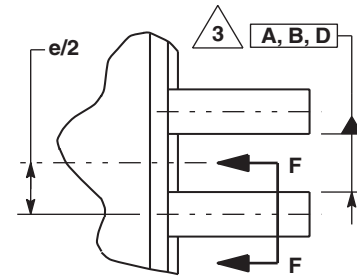
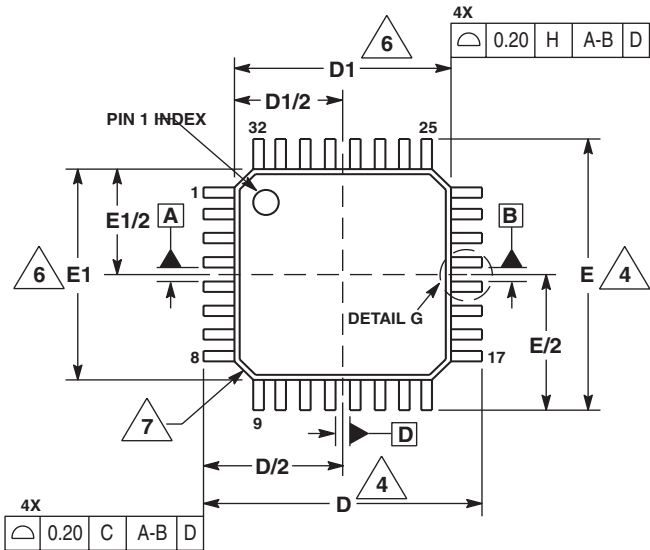
Symbol	Characteristic	Min	Typ	Max	Unit	Condition
$V_{IH}$	Input HIGH Voltage	2.4		$V_{CCI}$	V	
$V_{IL}$	Input LOW Voltage			0.8	V	
$V_{OH}$	Output HIGH Voltage	2.4			V	$I_{OH} = -20\text{ mA}$
$V_{OL}$	Output LOW Voltage			0.5	V	$I_{OL} = 20\text{ mA}$
$I_{IN}$	Input Current			$\pm 200$	$\mu\text{A}$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

**Table 5. 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	

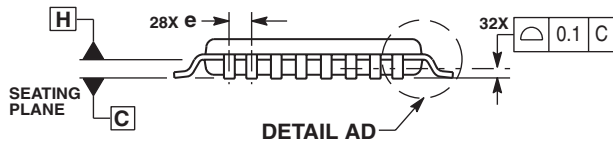
1. Tested using standard input levels, production tested @ 133 MHz.
2. Across temperature and voltage ranges, includes output skew.
3. For a specific temperature and voltage, includes output skew.

PACKAGE DIMENSIONS

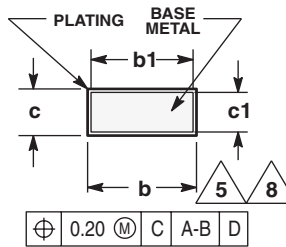


DETAIL G

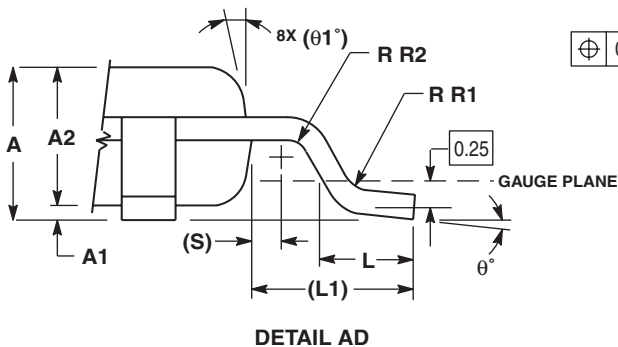
- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
  2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
  3. DATUMS A, B, AND D TO BE DETERMINED AT DATUM PLANE H.
  4. DIMENSIONS D AND E TO BE DETERMINED AT SEATING PLANE C.
  5. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08-mm. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND ADJACENT LEAD OR PROTRUSION: 0.07-mm.
  6. 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.
  7. EXACT SHAPE OF EACH CORNER IS OPTIONAL.
  8. THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.1-mm AND 0.25-mm FROM THE LEAD TIP.



DETAIL AD



SECTION F-F



DETAIL AD

DIM	MILLIMETERS	
	MIN	MAX
A	1.40	1.60
A1	0.05	0.15
A2	1.35	1.45
b	0.30	0.45
b1	0.30	0.40
c	0.09	0.20
c1	0.09	0.16
D	9.00 BSC	
D1	7.00 BSC	
e	0.80 BSC	
E	9.00 BSC	
E1	7.00 BSC	
L	0.50	0.70
L1	1.00 REF	
q	0°	7°
q1	12 REF	
R1	0.08	0.20
R2	0.08	---
S	0.20 REF	

CASE 873A-03  
 ISSUE B  
 LQFP PLASTIC PACKAGE

**MPC942C**

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