# M200/210 Series

## Frequency Multipliers


## FEATURES

- 200MHz to 650MHz Output Frequency
- Low 3ps (rms) Typical Phase Jitter
- Low 1.5nsec Skew (Fout to Fref) Maximum
- 10% Frequency Lock Range
- Multiplication Factors from 2 to 255
- Single Ended and Differential Input Models
- ECL/PECL Differential Outputs
- Single Supply Operation
- Extended Temperature Range Models Available

## APPLICATIONS

- High-end RISC-based Computers
- Telecom Transmission
- Base Station
- ATE
- Datacom

## DESCRIPTION

The M200/210 Series is a family of Phase-Locked Frequency Multipliers that range in output frequencies from 200MHz to 650MHz. These low-skew, low-noise devices accept either single-ended or differential inputs and are ideally suited to applications where an environmentally remote or stabilized reference is available as a low frequency source for multiplication.

The M200/210 Frequency Multiplier Series was developed specifically to meet tough performance requirements found in today's high-end RISC-based Computers, Telecom Transmission, Base Station, ATE, and Datacom applications.

Packaged in small, 24-pin double-wide metal DIP packages, the M200/210 Series devices are available with either ECL or PECL differential outputs and operate from a single supply (+5V for PECL and -5V for ECL).

Standard models are specified for 0°C to +70°C operation. Extended temperature range models are available for -25°C to +85°C operation (L models) and for -55°C to +125°C operation (M models).

ISO 9001 Registered

## SPECIFICATIONS

*Specifications @ $T_A$ = +25°C, $-V_{EE}$ = -5V for "E", $+V_{CC}$ = +5V for "P", unless otherwise indicated.*

| PARAMETER | Min | Typ | Max | Units |
|---|---|---|---|---|
| Output Frequency Range | 200 | | 650 | MHz |
| Input Frequency Range | 1 | | 80 | MHz |
| Multiplication Factor | 2 | | 255 | |
| Frequency Lock Range | 1 | 10 | | % |
| Input Impedence (Note 4) | 450 | 500 | 550 | Ω |
| Input Voltage Levels: M200E | | ECL, Single Ended | | |
| M200P | | PECL, Single Ended | | |
| M210E | | ECL, Differntial | | |
| M210P | | PECL, Differential | | |
| Output Configuration (Note 1): | | | | |
| M200/210E | | Differential ECL | | |
| M200/210P | | Differential PECL | | |
| Skew (Fout to Fref) | | | 1.5 | nsec |
| Rise/Fall Time (20% to 80%) | | | 575 | psec |
| Output Voltage Levels: | | | | |
| M200/210E | | ECL compatible | | |
| M200/210P | | PECL compatible | | |
| Output Drive (Note 1) | | | 50 | mA |
| Output Symmetry (Note 3) | 45/55 | 50/55 | 55/45 | % |
| Output Phase Jitter (Note 2) | | 3 | 5 | psec (rms) |
| Start Up Time | | 40 | | msec |
| Power Supply Requirements: | | | | |
| M200/210E (-Vee ) | -4.35 | -5.00 | -5.25 | Volts |
| M200/210P (+Vcc ) | +4.35 | +5.00 | +5.25 | Volts |
| Power Supply Current: | | | | |
| M200/210E (-Vee ) | | -350 | | mA |
| M200/210P (+Vcc ) | | +350 | | mA |

Notes: 1. The output is measured with 250Ω termination resistor connected to $V_{EE}$.
2. The output jitter is measured with a maximum input jitter of 20psec p-p.
3. Symmetry is measured at $V_{BB}$ = -1.35V for M200/210E models and $V_{BB}$ = $+V_{CC}$ -1.35V for M200/210P models.
4. The M210 model's input does not contain pulldown resistors thereby providing a high impedance to the differential input source. The termination resistors should be located as close to the input pins as possible. The differential input voltage should not exceed 1.0V.

## ORDERING INFORMATION

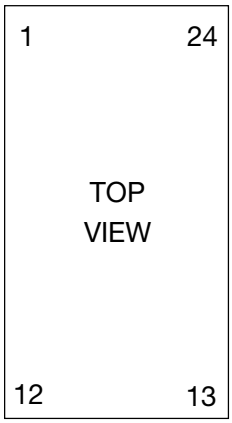
**Part Number** **M200P622.080-032K**

Select M200 for single-ended input or
M210 for differential input configuration:
Select device output format:
Specify "E" for ECL or "P" for PECL
Specify frequency in MHz xxx.xxxx:
Specify multiplication factor:
002 through 255
Add suffix:
"K" for 0°C to +70°C operation
"L" for -25°C to +85°C operation
"M" for -55°C to +125°C operation

## ABSOLUTE MAX RATINGS

Operating Temp. Range (Case) ..... -55°C to +125°C
Specified Temp. Range
M2X0X-XXX.XX-XXXK ..... 0°C to +70°C
M2X0X-XXX.XX-XXXL ..... -25°C to +85°C
M2X0X-XXX.XX-XXXM ..... -55°C to +125°C
Storage Temp. Range (Ambient) ..... -55°C to +125°C
Supply M102/210E ..... -7.0 to 0Volts
Supply M102/210P ..... 0 to +7.0Volts
Output Current ..... 50mA Max

## PIN CONFIGURATIONS




### M200E Model

| | | | |
|---|---|---|---|
| 1. | Ground | 24. | Ground |
| 2. | Fin | 23. | Ground |
| 3. | Ground | 22. | Ground |
| 4. | -5 Volts | 21. | Ground |
| 5. | Ground | 20. | -5 Volts |
| 6. | -5 Volts | 19. | NC |
| 7. | Ground | 18. | -5 Volts |
| 8. | -5 Volts | 17. | Ground |
| 9. | Ground | 16. | -5 Volts |
| 10. | Osc. Out $\overline{Q}$ | 15. | Test Point |
| 11. | Osc. Out Q | 14. | -5 Volts |
| 12. | Ground | 13. | Ground |

### M200P Model

| | | | |
|---|---|---|---|
| 1. | Ground | 24. | Ground |
| 2. | Fin | 23. | Ground |
| 3. | Ground | 22. | Ground |
| 4. | Ground | 21. | Ground |
| 5. | +5 Volts | 20. | Ground |
| 6. | Ground | 19. | NC |
| 7. | +5 Volts | 18. | Ground |
| 8. | Ground | 17. | +5 Volts |
| 9. | +5 Volts | 16. | Ground |
| 10. | Osc. Out $\overline{Q}$ | 15. | Test Point |
| 11. | Osc. Out Q | 14. | Ground |
| 12. | +5 Volts | 13. | +5 Volts |

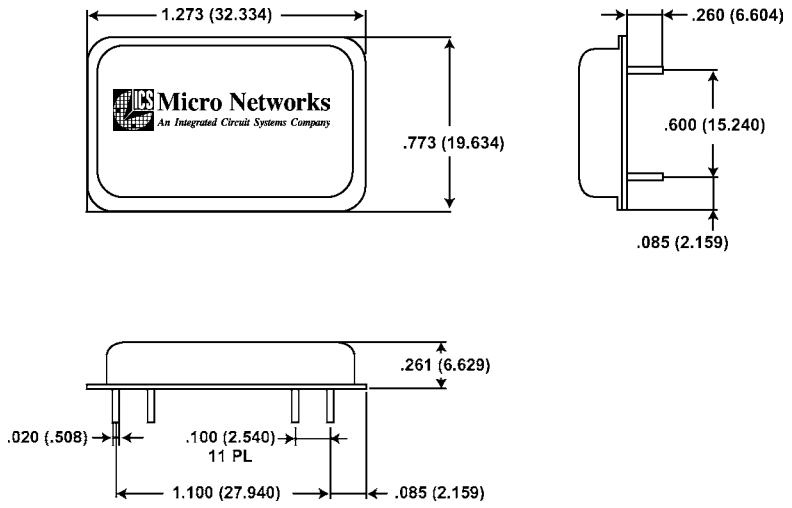
### M210E Model

| | | | |
|---|---|---|---|
| 1. | Ground | 24. | -5 Volts |
| 2. | Fin | 23. | Ground |
| 3. | $\overline{Fin}$ | 22. | Ground |
| 4. | -5 Volts | 21. | Ground |
| 5. | Ground | 20. | -5 Volts |
| 6. | -5 Volts | 19. | NC |
| 7. | Ground | 18. | -5 Volts |
| 8. | -5 Volts | 17. | Ground |
| 9. | Ground | 16. | -5 Volts |
| 10. | Osc. Out $\overline{Q}$ | 15. | Test Point |
| 11. | Osc. Out Q | 14. | -5 Volts |
| 12. | Ground | 13. | Ground |

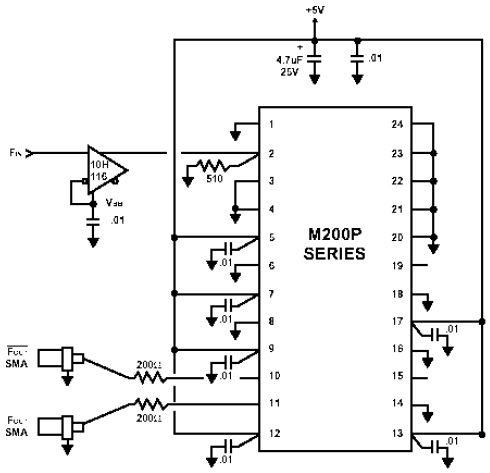
### M210P Model

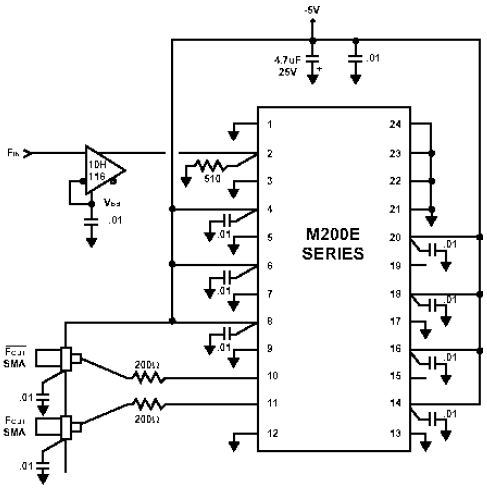
| | | | |
|---|---|---|---|
| 1. | +5 Volts | 24. | Ground |
| 2. | $\overline{Fin}$ | 23. | Ground |
| 3. | Fin | 22. | Ground |
| 4. | Ground | 21. | Ground |
| 5. | +5 Volts | 20. | Ground |
| 6. | Ground | 19. | NC |
| 7. | +5 Volts | 18. | Ground |
| 8. | Ground | 17. | +5 Volts |
| 9. | +5 Volts | 16. | Ground |
| 10. | Osc. Out $\overline{Q}$ | 15. | Test Point |
| 11. | Osc. Out Q | 14. | Ground |
| 12. | +5 Volts | 13. | +5 Volts |

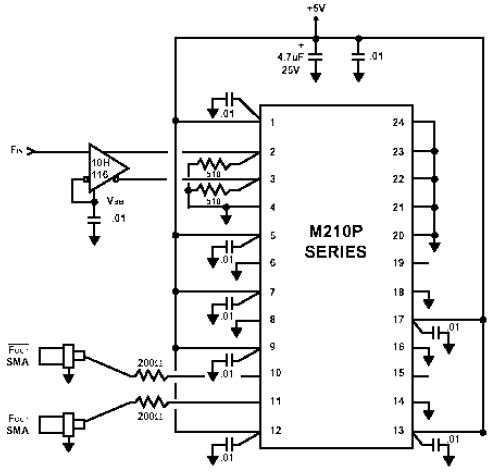
## PACKAGE OUTLINES

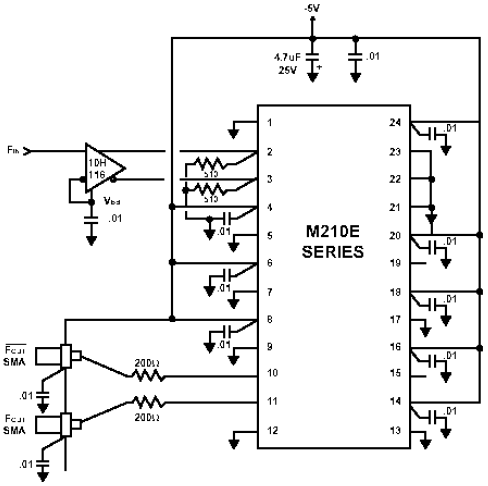


## APPLICATION CIRCUITS



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