

Logic Diagram

### FEATURES:

- 32-Bit microprocessor
- RAD-PAK® radiation-hardened against natural space radiation
- Total dose hardness:
  - >100 Krad (Si), dependent upon space mission
- Single event effect:
  - $SEL_{TH} = 37-60 \text{ MeV/mg/cm}^2$
  - $SEU_{TH} = 3.4 \text{ MeV/mg/cm}^2$
  - SEU Cross section  $1E-3 \text{ cm}^2/\text{bit}$
- Package:
  - 164 Pin RAD-PAK® quad flat pack
- 8, 16, 32-Bit data types
- 8 general purpose 32-Bit registers
- Hardware debugging support
- Very large address space:
  - 4 gigabyte physical
  - 64 terabyte Virtual
  - 4 gigabyte maximum segment size
- Integrated memory management unit
  - Virtual memory support
  - Four levels of protection
  - Fully compatible with 80C286
- Optimized for system development
  - Pipelined instructions
  - On-chip caches support address translation
  - 32 megabytes/sec bus bandwidth

### DESCRIPTION:

Maxwell Technologies' 80386DX high performance 32-bit microprocessor features a greater than 100 krad (Si) total dose tolerance, dependent upon space mission. It is designed for very high performance and multitasking operating systems. The integrated memory management and protection architecture includes address translation registers, multitasking hardware and a protection mechanism to support operating systems. The 80386DX allows simultaneous running of multiple operations. In addition, the 80386DX is capable of execution at sustained rates of between 3 and 4 million instructions per second. It offers new testability and debugging features, including a self-test and direct access to the page translation cache.

Maxwell Technologies' patented RAD-PAK® packaging technology incorporates radiation shielding in the microcircuit package. It eliminates the need for box shielding while providing the required radiation shielding for a lifetime in orbit or space mission. In a GEO orbit, RAD-PAK provides greater than 100 krad (Si) radiation dose tolerance. This product is available with screening up to Class S.

TABLE 1. 80386DX PIN DESCRIPTION

| PIN   | SYMBOL  | DESCRIPTION                    |
|---|---|--------------------------------|
| 1-7, 9, 10, 12, 13, 16, 17, 20, 21, 24, 146-149, 152-154, 156-159, 161-163  | A16-A11, A9, A10, A7, A8, A5, A6, A3, A4, A2, A31-A28, A27-A25, A23-A22, A20-A18  | Address Bus                    |
| 8, 18, 19, 22, 23, 25, 28-30, 33, 36, 38-40, 47, 48, 65, 66, 68, 73, 76, 77, 82, 84, 86, 88, 103, 106, 107, 114, 125, 126, 129, 130, 133, 134, 145, 155, 160, 164 | NC  | Not Connected                  |
| 11, 15, 27, 32, 35, 43, 51, 53, 55, 57, 61, 70, 92, 95, 100, 111, 118, 122, 138, 142, 151   | V <sub>SS</sub>   | Ground                         |
| 14, 26, 31, 34, 44, 50, 52, 54, 56, 58, 62, 69, 91, 96, 99, 110, 117, 137, 141, 150,  | V <sub>CC</sub>   | Power Supply                   |
| 37  | INTR  | Interrupt Request              |
| 41  | NMI   | Non-Maskable Interrupt Request |
| 42  | PEREQ   | Processor Extension Request    |
| 45  | ERROR   | Error Status                   |
| 46  | RESET   | Reset                          |
| 49  | BUSY  | Busy Status                    |
| 59  | LOCK  | Bus Lock                       |
| 60  | W/R   | Write/ Read                    |
| 63  | M/I $\bar{O}$   | Memory I/O                     |
| 64  | D/C   | Data Control                   |
| 67, 71, 72, 74  | BE $\bar{2}$ , BE $\bar{0}$ , BE $\bar{3}$ , BE $\bar{1}$   | Byte Enables                   |
| 78  | BS16  | Bus Size 16                    |
| 75  | NA  | Next Address                   |
| 79  | HOLD  | Bus Hold Request               |
| 80  | CLK2  | CPU Clock 2                    |
| 81  | ADS   | Address Status                 |
| 83  | READY   | Bus Ready Input                |
| 85, 87, 89, 90, 93, 94, 97, 98, 102, 104, 105, 108, 109, 112, 113, 115, 116, 119, 120, 121, 123, 124, 127, 128, 131, 132, 135, 136, 139, 140, 143, 144,           | D1, D2, D4, D0, D6, D3, D8, D5, D7, D10, D9, D12, D11, D14, D13, D15, D16, D18, D17, D20, D22, D19, D24, D21, D25, D23, D27, D26, D29, D28, D31, D30, | Data Bus                       |
| 101   | HLDA  | Bus Hold Acknowledge           |

TABLE 2. 80386DX ABSOLUTE MAXIMUM RATINGS

| PARAMETER                             | SYMBOL        | MIN  | MAX            | UNIT |
|---------------------------------------|---------------|------|----------------|------|
| Supply Voltage with Respect to Ground | $V_{SS}$      | -0.5 | 6.5            | V    |
| Voltage on other pins                 |               | -0.5 | $V_{CC} + 0.5$ | V    |
| Thermal Impedance                     | $\Theta_{JC}$ | --   | 1.79           | °C/W |
| Operating Temperature Range (Ambient) | $T_A$         | -55  | 125            | °C   |
| Storage Temperature Range (Ambient)   | $T_S$         | -65  | 150            | °C   |

TABLE 3. DELTA LIMITS

| PARAMETER | VARIATION                          |
|-----------|------------------------------------|
| $I_{CC}$  | ±10% of specified value in Table 4 |
| $I_{LI}$  | ±10% of specified value in Table 4 |
| $I_{LO}$  | ±10% of specified value in Table 4 |

TABLE 4. 80386DX RECOMMENDED OPERATING CONDITIONS

| PARAMETER                   | SYMBOL    | MIN            | MAX  | UNIT |
|-----------------------------|-----------|----------------|------|------|
| Digital Supply Voltage      | $V_{CC}$  | 4.75           | 5.25 | V    |
| Input Low Voltage           | $V_{IL}$  | --             | 0.8  | V    |
| Input High Voltage          | $V_{IH}$  | 2.0            | --   | V    |
| CLK2 Input Low Voltage      | $V_{ILC}$ | --             | 0.8  | V    |
| CLK2 Input High Voltage     | $V_{IHC}$ | $V_{CC} - 0.8$ | --   | V    |
| Operating Temperature Range | $T_A$     | -55            | +125 | °C   |

TABLE 5. 80386DX DC ELECTRICAL CHARACTERISTICS

( $V_{CC} = +5V \pm 5\%$ ;  $T_A = -55^\circ C$  TO  $+125^\circ C$ , UNLESS OTHERWISE SPECIFIED)

| PARAMETER              | SYMBOL   | CONDITION   | MIN | MAX  | UNIT    |
|------------------------|----------|---|-----|------|---------|
| Input Leakage Current  | $I_{LI}$ | All pins except $\overline{BS16}$ , $\overline{PEREQ}$ , $\overline{BUSY}$ , and $\overline{ERROR}$<br>$0V \leq V_{IN} \leq V_{CC}$ | -15 | +15  | $\mu A$ |
| Output Leakage Current | $I_{LO}$ | $0.45V \leq V_{OUT} \leq V_{CC}$  | -15 | +15  | $\mu A$ |
| Output Low Voltage     | $V_{OL}$ | $I_{OL} = 4 \text{ mA}$ : A2 - A31, D0 - D31  | --  | 0.45 | V       |
|                        |          | $I_{OL} = 5 \text{ mA}$ : BE0 - BE3, W/R, D/C, M/I/O, LOCK, ADS, HLDA   | --  | 0.45 |         |
| Output High Voltage    | $V_{OH}$ | $I_{OH} = 1 \text{ mA}$ : A2 - A31, D0 - D31  | 2.4 | --   | V       |
|                        |          | $I_{OH} = 0.9 \text{ mA}$ : BE0 - BE3, W/R, D/C, M/I/O, LOCK, ADS, HLDA   | 2.4 | --   |         |

TABLE 5. 80386DX DC ELECTRICAL CHARACTERISTICS

 $(V_{CC} = +5V \pm 5\%; T_A = -55^\circ C \text{ TO } +125^\circ C, \text{ UNLESS OTHERWISE SPECIFIED})$ 

| PARAMETER                             | SYMBOL    | CONDITION                           | MIN | MAX  | UNIT    |
|---------------------------------------|-----------|-------------------------------------|-----|------|---------|
| Power Supply Current                  | $I_{CC}$  | CLK2 = 32 MHz with 16 MHz Processor | --  | 460  | mA      |
|                                       |           | CLK2 = 32 MHz with 20 MHz Processor | --  | 550  |         |
|                                       |           | CLK2 = 32 MHz with 25 MHz Processor | --  | 680  |         |
| Input Leakage Current                 | $I_{IH}$  | PEREQ Pin <sup>1</sup>              | --  | 200  | $\mu A$ |
|                                       | $I_{IL}$  | BS16, BUSY, ERROR Pins <sup>2</sup> | --  | -400 | $\mu A$ |
| CLK2 Capacitance <sup>3</sup>         | $C_{CLK}$ | $F_C = 1 \text{ MHz}$               | --  | 20   | pF      |
| Input or I/O Capacitance <sup>1</sup> | $C_{IN}$  | $F_C = 1 \text{ MHz}$               | --  | 20   | pF      |
| Output Capacitance <sup>1</sup>       | $C_{OUT}$ | $F_C = 1 \text{ MHz}$               | --  | 25   | pF      |

1.  $V_{IH} = 2.4V$ . PEREQ input has an internal pulldown resistor.
2.  $V_{IL} = 0.45V$ . BS16, BUSY and ERROR inputs have an internal pulldown resistor.
3. Guaranteed by design.

TABLE 6. 80386DX AC ELECTRICAL CHARACTERISTICS

 $(V_{CC} = +5V \pm 10\%; V_{PP} = V_{SS}; T_A = -55^\circ C \text{ TO } +125^\circ C, \text{ UNLESS OTHERWISE SPECIFIED})$ 

| PARAMETER                   | SYMBOL   | CONDITION              | MIN | MAX | UNIT |     |
|-----------------------------|----------|------------------------|-----|-----|------|-----|
| Operating Frequency         | --       | Half of CLK2 Frequency |     |     | MHz  |     |
|                             |          |                        | -16 | 4   |      | 16  |
|                             |          |                        | -20 | 4   |      | 20  |
|                             |          |                        | -25 | 4   |      | 25  |
| CLK2 Period                 | $t_1$    |                        |     |     | ns   |     |
|                             |          |                        | -16 | 31  |      | 125 |
|                             |          |                        | -20 | 25  |      | 125 |
|                             |          |                        | -25 | 20  |      | 125 |
| CLK2 High Time              | $t_{2a}$ | at 2V                  |     |     | ns   |     |
|                             |          |                        | -16 | 9   |      | --  |
|                             |          |                        | -20 | 8   |      | --  |
|                             |          |                        | -25 | 7   |      | --  |
| CLK2 High Time <sup>1</sup> | $t_{2b}$ | at $(V_{CC} - 0.8V)$   |     |     | ns   |     |
|                             |          |                        | -16 | 5   |      | --  |
|                             |          |                        | -20 | 5   |      | --  |
|                             |          |                        | -25 | 4   |      | --  |
| CLK2 Low Time               | $t_{3a}$ | at 2V                  |     |     | ns   |     |
|                             |          |                        | -16 | 9   |      | --  |
|                             |          |                        | -20 | 8   |      | --  |
|                             |          |                        | -25 | 7   |      | --  |
| CLK2 Low Time <sup>1</sup>  | $t_{3b}$ | at $(V_{CC} - 0.8V)$   |     |     | ns   |     |
|                             |          |                        | -16 | 7   |      | --  |
|                             |          |                        | -20 | 6   |      | --  |
|                             |          |                        | -25 | 5   |      | --  |

TABLE 6. 80386DX AC ELECTRICAL CHARACTERISTICS  
 ( $V_{CC} = +5V \pm 10\%$ ;  $V_{PP} = V_{SS}$ ;  $T_A = -55^\circ C$  TO  $+125^\circ C$ , UNLESS OTHERWISE SPECIFIED)

| PARAMETER  | SYMBOL   | CONDITION                                | MIN | MAX | UNIT |
|--|----------|--|-----|-----|------|
| CLK2 Fall Time <sup>1</sup>                                  | $t_4$    | $(V_{CC} - 0.8V)$ to $0.8V$              |     |     | ns   |
| -16  |          |  | --  | 8   |      |
| -20  |          |  | --  | 8   |      |
| -25  |          |  | --  | 7   |      |
| CLK2 Rise Time <sup>1</sup>                                  | $t_5$    | $0.8V$ to $(V_{CC} - 0.8V)$              |     |     | ns   |
| -16  |          |  | --  | 8   |      |
| -20  |          |  | --  | 8   |      |
| -25  |          |  | --  | 7   |      |
| A2 - A31 Valid Delay   | $t_6$    | $C_L = 120pF$ ( $C_L = 50pF$ for 25 MHz) |     |     | ns   |
| -16  |          |  | 4   | 36  |      |
| -20  |          |  | 4   | 30  |      |
| -25  |          |  | 4   | 21  |      |
| A2 - A31 Float Delay <sup>1, 2</sup>                         | $t_7$    |  |     |     | ns   |
| -16  |          |  | 4   | 40  |      |
| -20  |          |  | 4   | 32  |      |
| -25  |          |  | 4   | 30  |      |
| BE0 - BE3, LOCK Valid Delay                                  | $t_8$    | $C_L = 75pF$ ( $C_L = 50pF$ for 25 MHz)  |     |     | ns   |
| -16  |          |  | 4   | 36  |      |
| -20  |          |  | 4   | 30  |      |
| -25  |          |  | 4   | 24  |      |
| BE0 - BE3, LOCK Float Delay <sup>1, 2</sup>                  | $t_9$    |  |     |     | ns   |
| -16  |          |  | 4   | 40  |      |
| -20  |          |  | 4   | 32  |      |
| -25  |          |  | 4   | 30  |      |
| W/R, M/I $\bar{O}$ , D/C and ADS Valid Delay                 | $t_{10}$ | $C_L = 75pF$ ( $C_L = 50pF$ for 25 MHz)  |     |     | ns   |
| -16  |          |  | 6   | 33  |      |
| -20  |          |  | 6   | 28  |      |
| -25  |          |  | 4   | 21  |      |
| W/R, M/I $\bar{O}$ , D/C and ADS Float Delay <sup>1, 2</sup> | $t_{11}$ |  |     |     | ns   |
| -16  |          |  | 6   | 35  |      |
| -20  |          |  | 6   | 30  |      |
| -25  |          |  | 4   | 30  |      |
| D0 - D31 Valid Delay   | $t_{12}$ | $C_L = 120pF$ ( $C_L = 50pF$ for 25 MHz) |     |     | ns   |
| -16  |          |  | 4   | 48  |      |
| -20  |          |  | 4   | 38  |      |
| -25  |          |  | 7   | 27  |      |
| D0 - D31 Float Delay <sup>1, 2</sup>                         | $t_{13}$ |  |     |     | ns   |
| -16  |          |  | 4   | 35  |      |
| -20  |          |  | 4   | 27  |      |
| -25  |          |  | 4   | 22  |      |
| HLDA Valid Delay   | $t_{14}$ | $C_L = 75pF$ ( $C_L = 50pF$ for 25 MHz)  |     |     | ns   |
| -16  |          |  | 6   | 323 |      |
| -20  |          |  | 6   | 28  |      |
| -25  |          |  | 4   | 22  |      |

TABLE 6. 80386DX AC ELECTRICAL CHARACTERISTICS  
 ( $V_{CC} = +5V \pm 10\%$ ;  $V_{PP} = V_{SS}$ ;  $T_A = -55^\circ C$  TO  $+125^\circ C$ , UNLESS OTHERWISE SPECIFIED)

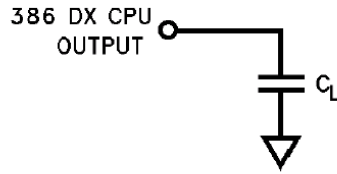
| PARAMETER                                      | SYMBOL   | CONDITION | MIN            | MAX            | UNIT |
|--|----------|-----------|----------------|----------------|------|
| N/A Setup Time<br>-16<br>-20<br>-25            | $t_{15}$ |           | 11<br>9<br>7   | --<br>--<br>-- | ns   |
| N/A Hold Time<br>-16<br>-20<br>-25             | $t_{16}$ |           | 14<br>14<br>3  | --<br>--<br>-- | ns   |
| BS16 Setup Time<br>-16<br>-20<br>-25           | $t_{17}$ |           | 13<br>13<br>7  | --<br>--<br>-- | ns   |
| BS16 Hold Time<br>-16<br>-20<br>-25            | $t_{18}$ |           | 21<br>21<br>3  | --<br>--<br>-- | ns   |
| READY Setup Time<br>-16<br>-20<br>-25          | $t_{19}$ |           | 21<br>12<br>9  | --<br>--<br>-- | ns   |
| READY Hold Time<br>-16<br>-20<br>-25           | $t_{20}$ |           | 4<br>4<br>4    | --<br>--<br>-- | ns   |
| D0 - D31 Read Setup Delay<br>-16<br>-20<br>-25 | $t_{21}$ |           | 11<br>11<br>6  | --<br>--<br>-- | ns   |
| D0 - D31 Read Hold Delay<br>-16<br>-20<br>-25  | $t_{22}$ |           | 6<br>6<br>5    | --<br>--<br>-- | ns   |
| HOLD Setup Time<br>-16<br>-20<br>-25           | $t_{23}$ |           | 26<br>17<br>15 | --<br>--<br>-- | ns   |
| HOLD Hold Time<br>-16<br>-20<br>-25            | $t_{24}$ |           | 5<br>5<br>3    | --<br>--<br>-- | ns   |
| RESET Setup Time<br>-16<br>-20<br>-25          | $t_{25}$ |           | 10<br>10<br>10 | --<br>--<br>-- | ns   |

TABLE 6. 80386DX AC ELECTRICAL CHARACTERISTICS  
 ( $V_{CC} = +5V \pm 10\%$ ;  $V_{PP} = V_{SS}$ ;  $T_A = -55^\circ C$  TO  $+125^\circ C$ , UNLESS OTHERWISE SPECIFIED)

| PARAMETER   | SYMBOL   | CONDITION | MIN           | MAX            | UNIT |
|---|----------|-----------|---------------|----------------|------|
| RESET Hold Time<br>-16<br>-20<br>-25                            | $t_{26}$ |           | 4<br>4<br>3   | --<br>--<br>-- | ns   |
| NMI, INTR Setup Time <sup>3</sup><br>-16<br>-20<br>-25          | $t_{27}$ |           | 16<br>16<br>6 | --<br>--<br>-- | ns   |
| NMI, INTR Hold Time <sup>3</sup><br>-16<br>-20<br>-25           | $t_{28}$ |           | 16<br>16<br>6 | --<br>--<br>-- | ns   |
| REREQ, ERROR, BUSY Setup Time <sup>3</sup><br>-16<br>-20<br>-25 | $t_{29}$ |           | 16<br>14<br>6 | --<br>--<br>-- | ns   |
| REREQ, ERROR, BUSY Hold Time <sup>3</sup><br>-16<br>-20<br>-25  | $t_{30}$ |           | 5<br>5<br>5   | --<br>--<br>-- | ns   |

1. Guaranteed by design.
2. Float condition occurs when maximum when output current becomes less than ILO in magnitude.
3. These inputs are allowed to be asynchronous to CLK2. The setup and hold specifications are given for testing purposes, to assure recognition within a specific CLK2 period.

FIGURE 1. AC TEST LOADS



$C_L = 120$  pF on A2-A31, D0-D31  
 $C_L = 75$  pF on BE0#-BE3#, W/R#, M/IO#, D/C#, ADS#,  
 LOCK#, HLDA  
 $C_L$  includes all parasitic capacitances.

FIGURE 2. CLK2 TIMING

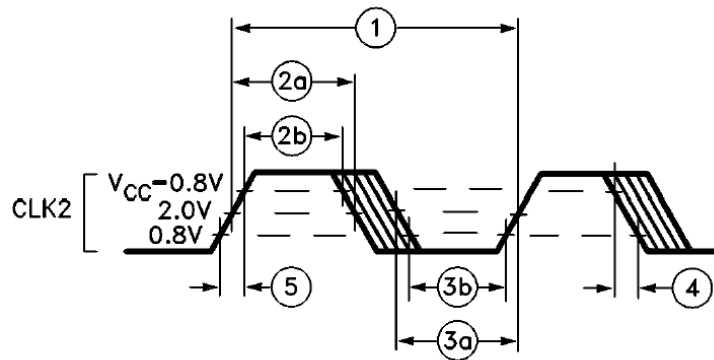




FIGURE 3. INPUT SETUP AND HOLD TIME

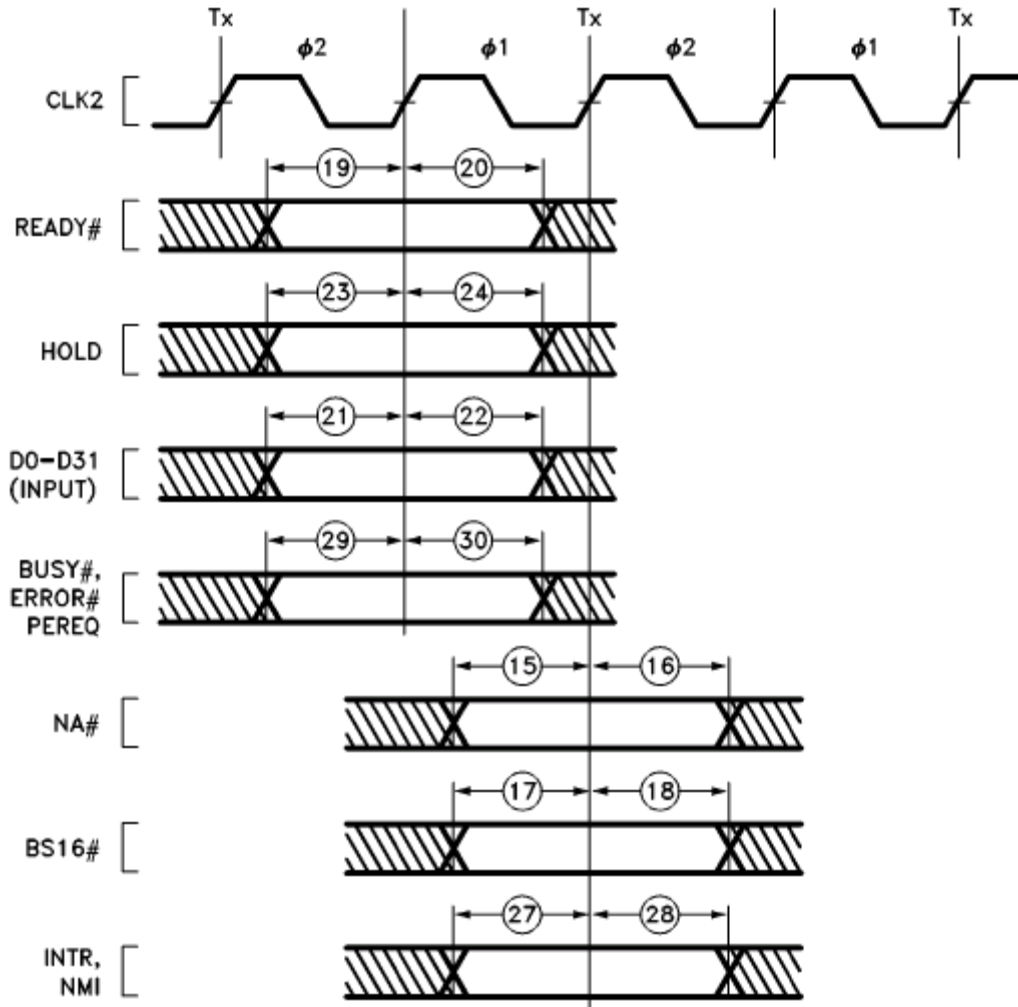


FIGURE 4. OUTPUT VALID DELAY TIMING

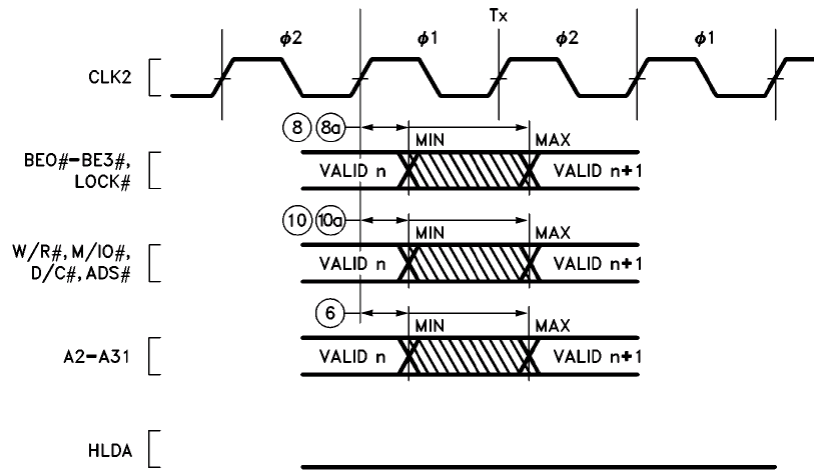


FIGURE 5. WRITE DATA VALID DELAY TIMING (25 MHz)

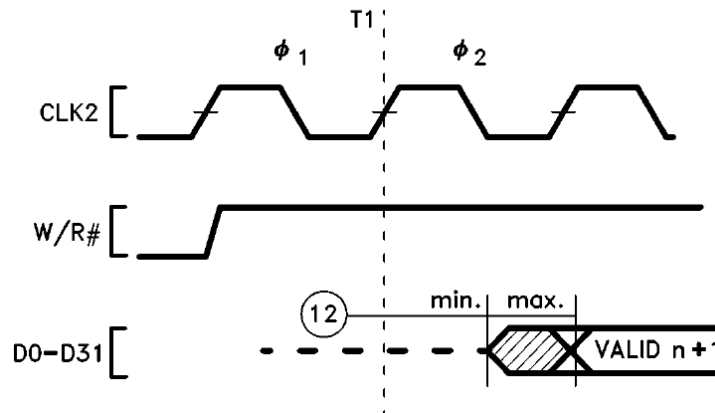


FIGURE 6. WRITE DATA HOLD TIMING (25 MHz)

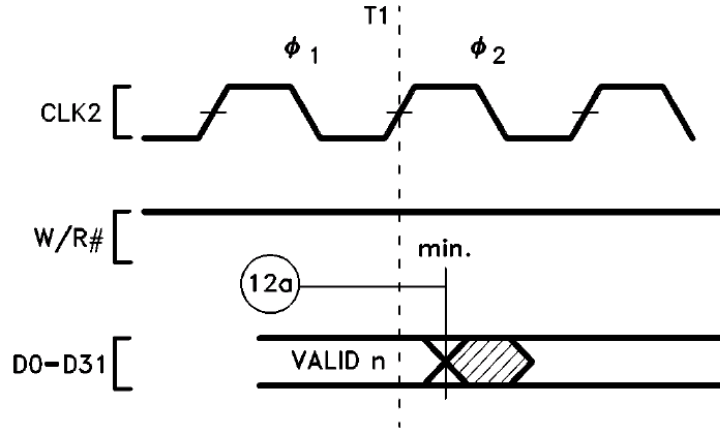


FIGURE 7. WRITE DATA VALID DELAY TIMING (20 MHz)

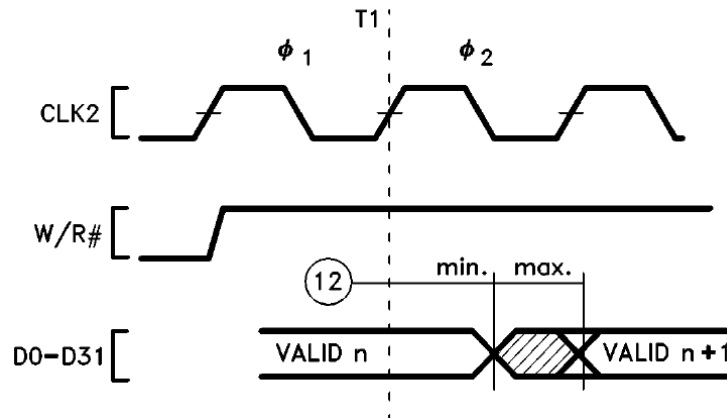
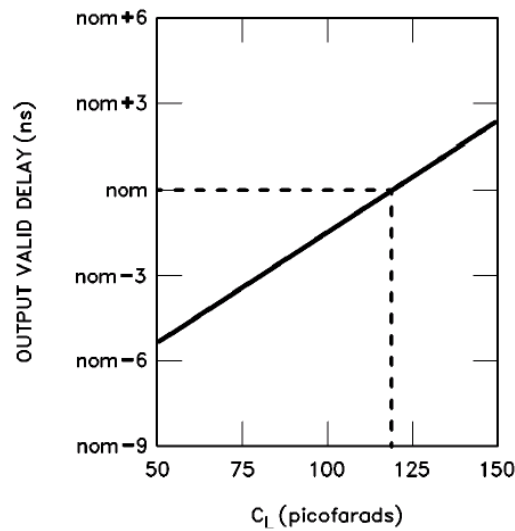
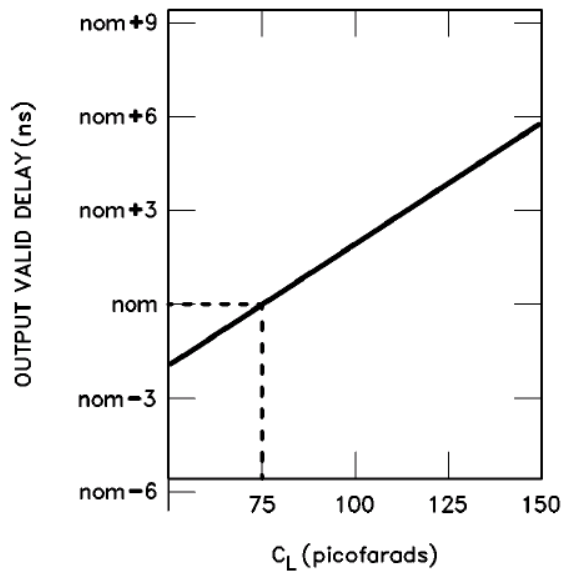


FIGURE 8. TYPICAL OUTPUT VALID DELAY VERSUS LOAD CAPACITANCE AT MAXIMUM OPERATING TEMPERATURE ( $C_L = 120$  pF)



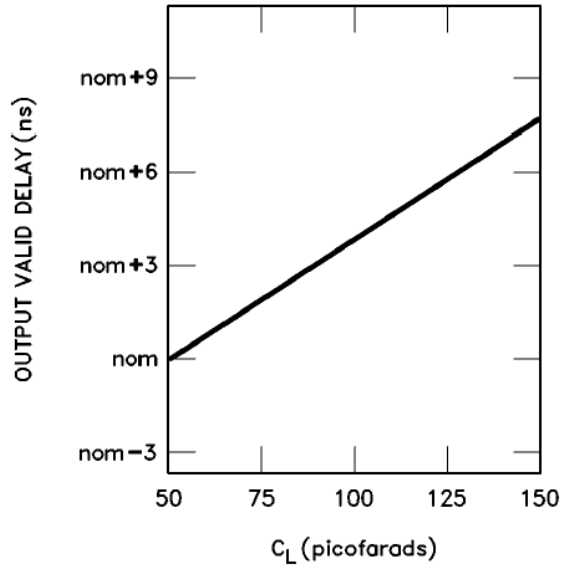
**NOTE:**  
This graph will not be linear outside of the  $C_L$  range shown.

FIGURE 9. TYPICAL OUTPUT VALID DELAY VERSUS LOAD CAPACITANCE AT MAXIMUM OPERATING TEMPERATURE ( $C_L = 75$  pF)



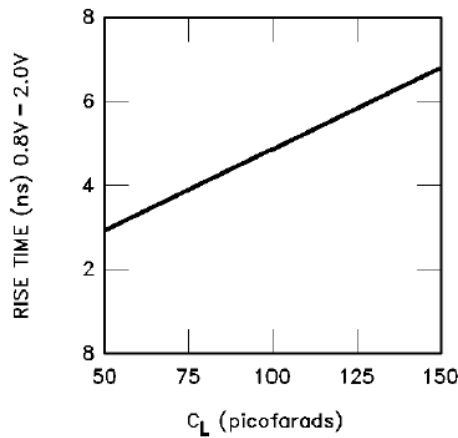
**NOTE:**  
This graph will not be linear outside of the  $C_L$  range shown.

FIGURE 10. TYPICAL OUTPUT VALID DELAY VERSUS LOAD CAPACITANCE AT MAXIMUM OPERATING TEMPERATURE ( $C_L = 50$  pF)



**NOTE:**  
This graph will not be linear outside of the  $C_L$  range shown.

FIGURE 11. TYPICAL OUTPUT RISE TIME VERSUS LOAD CAPACITANCE AT MAXIMUM OPERATING TEMPERATURE



**NOTE:**  
This graph will not be linear outside of the  $C_L$  range shown.

FIGURE 12. OUTPUT FLOAT DELAY AND HLDA AND DELAY TIMING

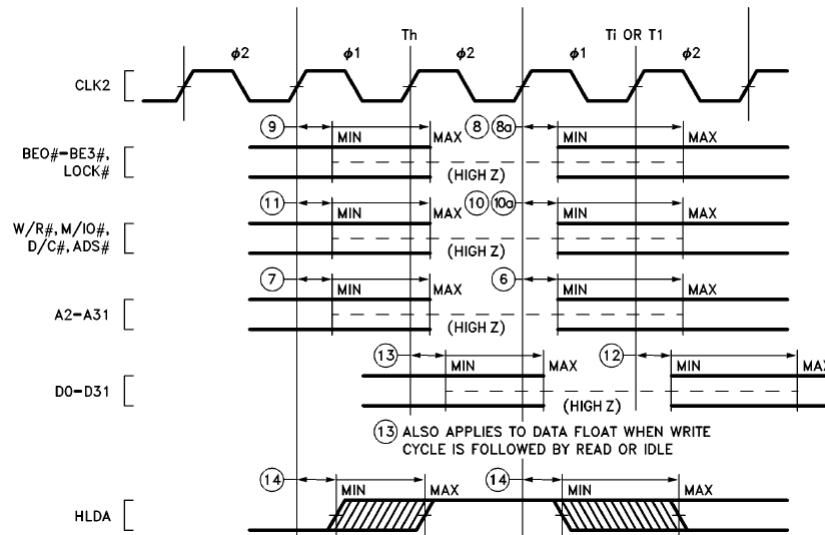
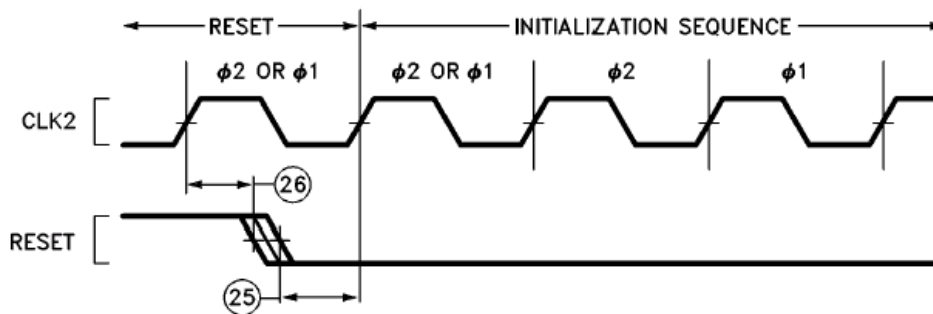
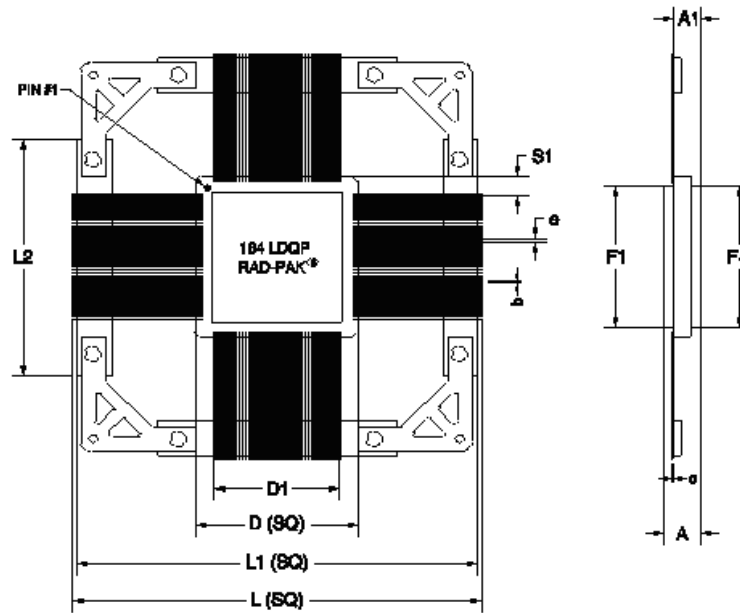


FIGURE 13. RESET SETUP AND HOLD TIMING, AND INTERNAL PHASE



The second internal processor phase following RESET high-to-low transition (provided  $t_{25}$  and  $t_{26}$  are met) is  $\phi 2$ .



164-PIN RAD-PAK<sup>®</sup> QUAD FLAT PACKAGE

| SYMBOL | DIMENSION |       |       |
|--------|-----------|-------|-------|
|        | Min       | Nom   | Max   |
| A      | 0.118     | 0.132 | 0.146 |
| b      | 0.007     | 0.008 | 0.013 |
| c      | 0.004     | 0.006 | 0.009 |
| D      | 1.138     | 1.150 | 1.167 |
| D1     | 1.000 BSC |       |       |
| e      | 0.025 BSC |       |       |
| S1     | 0.013     | 0.071 | --    |
| F1     | 0.890     | 0.895 | 0.900 |
| F4     | 0.880     | 0.890 | 0.899 |
| L      | 2.500     | 2.520 | 2.540 |
| L1     | 2.485     | 2.500 | 2.505 |
| L2     | 1.690     | 1.700 | 1.710 |
| A1     | 0.078     | 0.090 | 0.102 |
| N      | 164       |       |       |

Q164-01

Note: All dimensions in inches

## Important Notice:

These data sheets are created using the chip manufacturer's published specifications. Maxwell Technologies verifies functionality by testing key parameters either by 100% testing, sample testing or characterization.

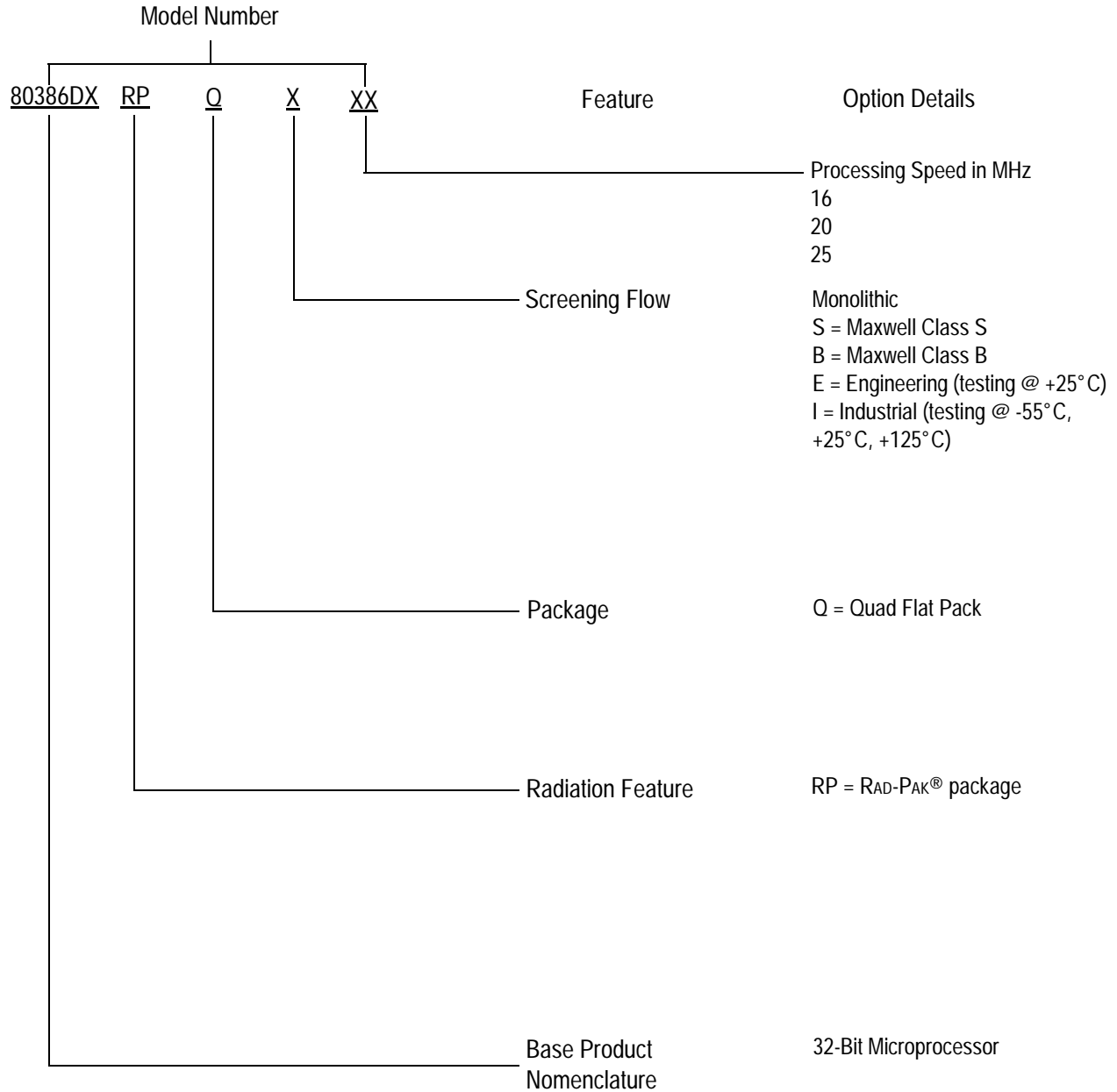
The specifications presented within these data sheets represent the latest and most accurate information available to date. However, these specifications are subject to change without notice and Maxwell Technologies assumes no responsibility for the use of this information.

Maxwell Technologies' products are not authorized for use as critical components in life support devices or systems without express written approval from Maxwell Technologies.

Any claim against Maxwell Technologies must be made within 90 days from the date of shipment from Maxwell Technologies. Maxwell Technologies' liability shall be limited to replacement of defective parts.



## Product Ordering Options



Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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