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# MC68EC030

*Addendum*

# MC68EC030 32-Bit Embedded Controller User's Manual

**April 17, 1996**

This addendum to the initial release of the MC68EC030 User's provides additional information not included in the original (or corrections to the original text). This document and other information on this product is maintained on the AESOP BBS, which can be reached at (800) 843-3451 (from the U.S. and Canada) or (512) 891-3650. Configure modem for up to 14.4 Kbaud, 8 bits, 1 stop bit, and no parity. Terminal software should support VT100 emulation. Internet access is provided by telneting to pirs.aus.sps.mot.com [129.38.233.1] or through the World Wide Web at http://pirs.aus.sps.mot.com.

Incorporate the following information into the manual. This addendum contain information on junction temperatures for the pin grid array package and 132-lead ceramic surface mount package. A pinout and the case package is also given for the 132-lead ceramic surface mount and 144-lead TQFP (PV Suffix) package.

The following tables define the maximum junction temperature for the PPGA and FE packages for the MC68EC030.

**Maximum Junction Temperature for PPGA Package**

$T_J$ Max. = 115 °C

Maximum ambient temperature (°C) vs. airflow and rated frequency—PPGA without heatsink.

| Frequency MHz | PD Max. at $T_J$ Max. Watts | Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|---|---|
| | | 0* | 100 | 200 | 400 | 500 |
| 40 | 1.55 | 65 | 72 | 75 | 79 | 81 |
| 33.33 | 1.40 | 70 | 76 | 79 | 83 | 84 |
| 25 | 1.25 | 75 | 80 | 83 | 86 | 88 |
| 20 | 1.15 | 78 | 83 | 85 | 89 | 90 |
| 16.67 | 1.10 | 80 | 84 | 86 | 90 | 91 |

Typical junction temperature (°C) for operations at $T_A$ Max. above—PPGA without heatsink.

| Frequency MHz | $P_D$ Typical Watts | Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|---|---|
| | | 0* | 100 | 200 | 400 | 500 |
| 40 | 0.95 | 96 | 98 | 99 | 101 | 102 |
| 33.33 | 0.85 | 97 | 100 | 101 | 102 | 103 |
| 25 | 0.75 | 99 | 101 | 102 | 104 | 104 |
| 20 | 0.65 | 99 | 101 | 102 | 104 | 104 |
| 16.67 | 0.60 | 99 | 101 | 102 | 104 | 104 |

Maximum Power Dissipation vs. Frequency—PPGA Package

| Frequency MHz | $P_D$ Max. at $T_A$ = 0° Watts |
|---|---|
| 40 | 1.80 |
| 33.33 | 1.60 |
| 25 | 1.40 |
| 20 | 1.30 |
| 16.67 | 1.20 |

Theta $J_A$ vs. Airflow—PPGA Package without heatsink (estimated)

| Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|
| 0* | 100 | 200 | 400 | 500 |
| 32 | 28 | 26 | 23 | 22 |

* Natural Convection

**Maximum Junction Temperature for FE package—without heatsink**

$T_J$ Max. = 115 °C

Maximum ambient temperature (°C) vs. airflow and rated frequency—FE without heatsink.

| Frequency MHz | PD Max. at $T_J$ Max. Watts | Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|---|---|
| | | 0* | 100 | 200 | 400 | 500 |
| 40 | 1.55 | 44 | 61 | 72 | 76 | 78 |
| 33.33 | 1.40 | 51 | 66 | 76 | 80 | 81 |
| 25 | 1.25 | 58 | 71 | 80 | 84 | 85 |
| 20 | 1.15 | 62 | 75 | 83 | 86 | 87 |
| 16.67 | 1.10 | 64 | 77 | 84 | 88 | 89 |

Typical junction temperature (°C) for operations at $T_A$ Max. above—FE without heatsink.

| Frequency MHz | $P_D$ Typical Watts | Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|---|---|
| | | 0* | 100 | 200 | 400 | 500 |
| 40 | 0.95 | 87 | 94 | 98 | 100 | 101 |
| 33.33 | 0.85 | 90 | 96 | 100 | 101 | 102 |
| 25 | 0.75 | 92 | 98 | 101 | 103 | 103 |
| 20 | 0.65 | 92 | 98 | 101 | 103 | 103 |
| 16.67 | 0.60 | 92 | 98 | 101 | 103 | 103 |

Maximum Power Dissipation vs. Frequency—FE Package

| Frequency MHz | $P_D$ Max. at $T_A$ = 0° Watts |
|---|---|
| 40 | 1.80 |
| 33.33 | 1.60 |
| 25 | 1.40 |
| 20 | 1.30 |
| 16.67 | 1.20 |

Theta $J_A$ vs. Airflow—FE Package without heatsink (estimated)

| Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|
| 0* | 100 | 200 | 400 | 500 |
| 46 | 35 | 28 | 25 | 24 |

* Natural Convection

**Maximum Junction Temperature for FE package—with heatsink**

$T_J$ Max. = 115 °C

Maximum ambient temperature (°C) vs. airflow and rated frequency—FE with heatsink.

| Frequency MHz | PD Max. at TJ Max. Watts | Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|---|---|
| | | 0* | 100 | 200 | 400 | 500 |
| 40 | 1.55 | 61 | 76 | 84 | 86 | 87 |
| 33.33 | 1.40 | 66 | 80 | 87 | 88 | 90 |
| 25 | 1.25 | 71 | 84 | 90 | 91 | 93 |
| 20 | 1.15 | 75 | 86 | 92 | 93 | 94 |
| 16.67 | 1.10 | 77 | 88 | 93 | 94 | 95 |

Typical junction temperature (°C) for operations at $T_A$ Max. above—FE with heatsink.

| Frequency MHz | $P_D$ Typical Watts | Air Flow in linear feet/minute | | | | |
|---|---|---|---|---|---|---|
| | | 0* | 100 | 200 | 400 | 500 |
| 40 | 0.95 | 94 | 100 | 103 | 104 | 104 |
| 33.33 | 0.85 | 96 | 101 | 104 | 105 | 105 |
| 25 | 0.75 | 98 | 103 | 105 | 106 | 106 |
| 20 | 0.65 | 98 | 103 | 105 | 106 | 106 |
| 16.67 | 0.60 | 98 | 103 | 105 | 106 | 106 |

Maximum Power Dissipation vs. Frequency—FE Package

| Frequency MHz | $P_D$ Max. at $T_A$ = 0° Watts |
|---|---|
| 40 | 1.80 |
| 33.33 | 1.60 |
| 25 | 1.40 |
| 20 | 1.30 |
| 16.67 | 1.20 |

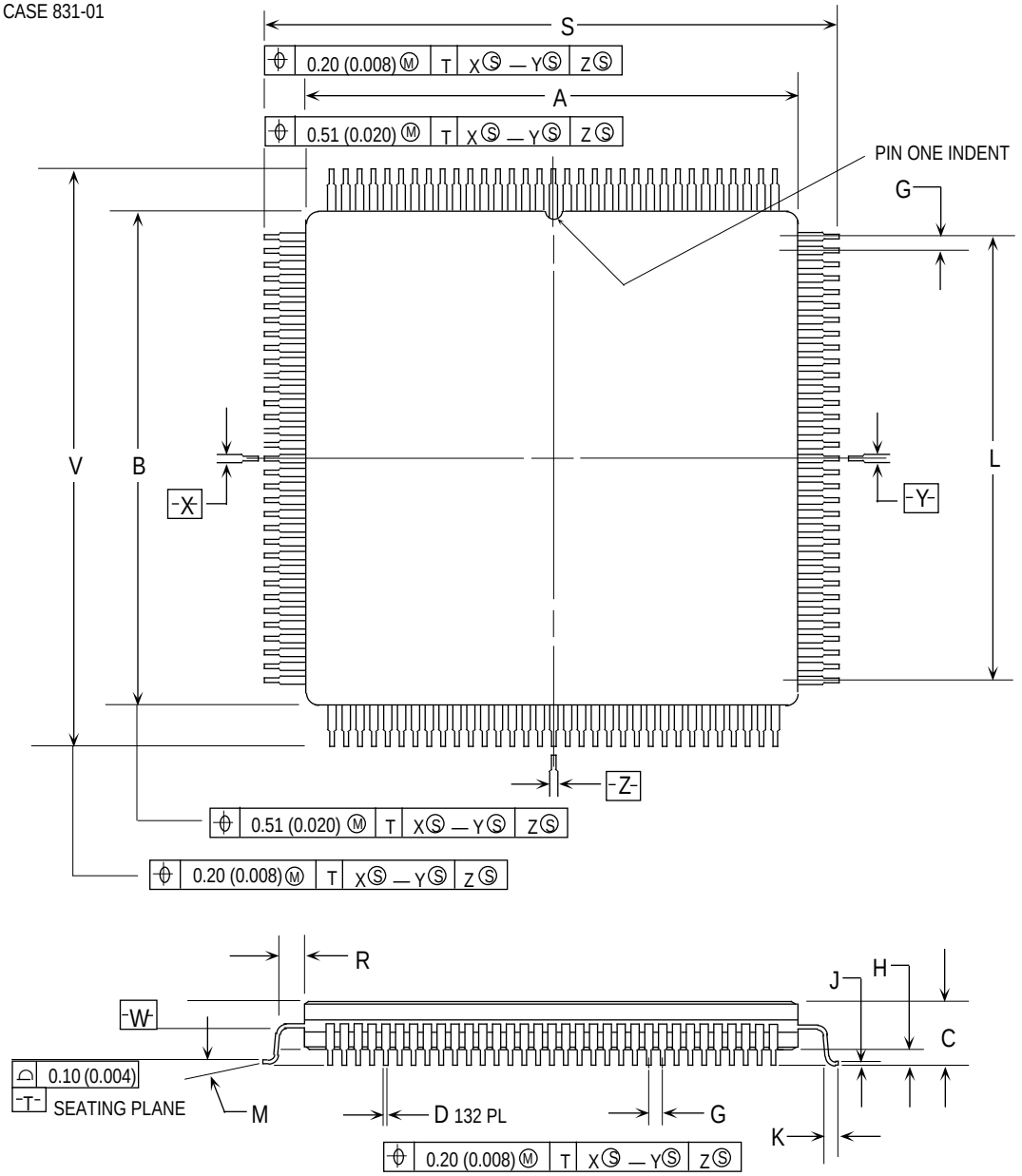
Theta $J_A$ vs. Airflow—FE Package with heatsink (estimated)

| Air Flow in linear feet / minute | | | | |
|---|---|---|---|---|
| 0* | 100 | 200 | 400 | 500 |
| 35 | 25 | 20 | 19 | 18 |

* Natural Convection

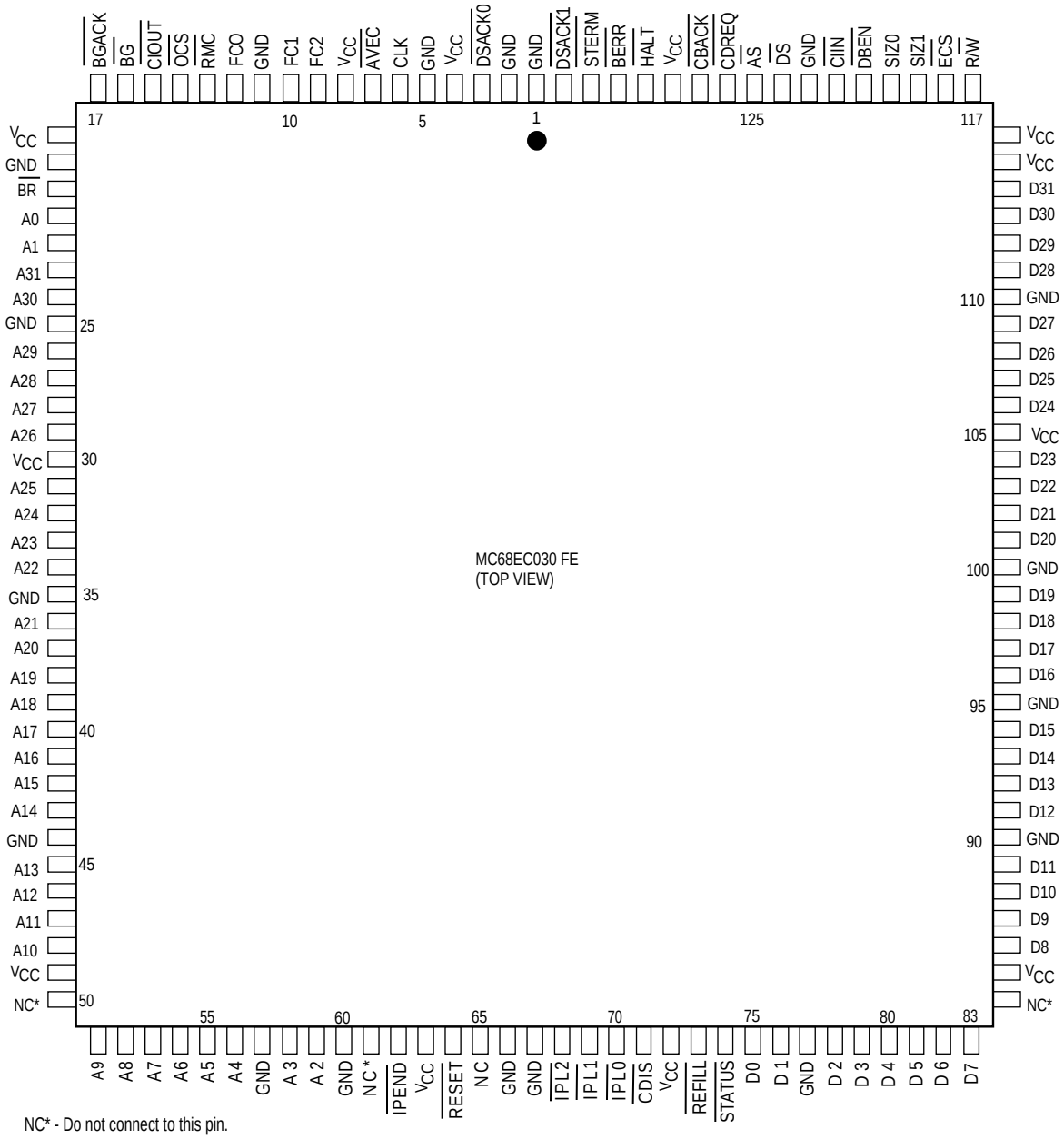
The following figures provide a pinout and the mechanical dimensions for the 132-Lead Surface Mount (FE Suffix) and 144-Lead Thin Quad Flat Pack TQFP (PV Suffix).

FE SUFFIX PACKAGE
CASE 831-01



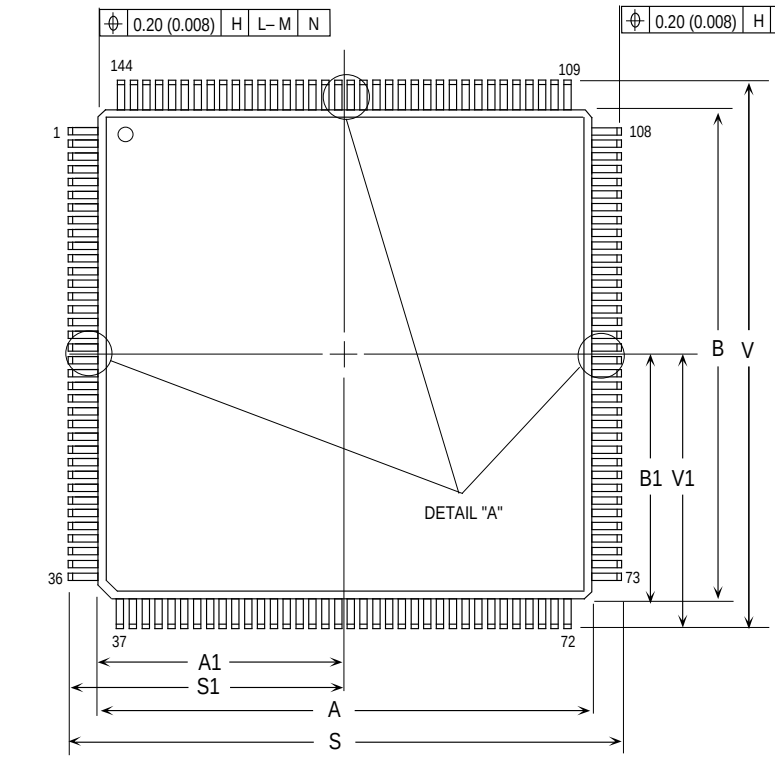

| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 21.85 | 22.86 | 0.860 | 0.900 |
| B | 21.85 | 22.86 | 0.860 | 0.900 |
| C | 3.94 | 4.31 | 0.155 | 0.170 |
| D | 0.204 | 0.292 | 0.0080 | 0.0115 |
| G | 0.64 BSC | | 0.025 BSC | |
| H | 0.64 | 0.88 | 0.025 | 0.035 |
| J | 0.13 | 0.20 | 0.005 | 0.008 |
| K | 0.51 | 0.76 | 0.020 | 0.030 |
| L | 20.32 REF | | 0.800 REF | |
| M | 0° | 8° | 0° | 8° |
| R | 0.64 | — | 0.025 | — |
| S | 27.31 | 27.55 | 1.075 | 1.085 |
| V | 27.31 | 27.55 | 1.075 | 1.085 |

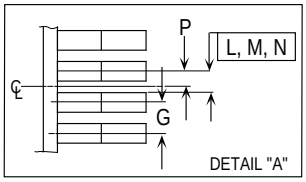
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH
3. DIM A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH OF CERAMIC BODY TOP AND BOTTOM.
4. DATUM PLANE -W- IS LOCATED AT THE UNDERSIDE OF LEADS WHERE LEADS EXIT PACKAGE BODY.
5. DATUMS X-Y AND Z TO BE DETERMINED WHERE CENTER LEADS EXIT PACKAGE BODY AT DATUM -W-.
6. DIM S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
7. DIM A AND B TO BE DETERMINED AT DATUM PLANE -W-.

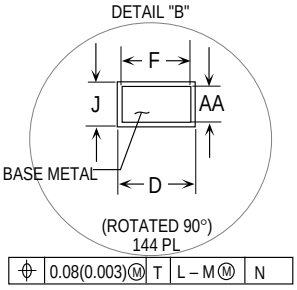


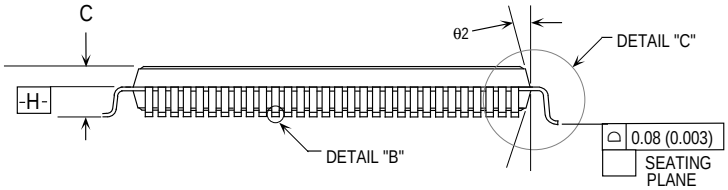

NC* - Do not connect to this pin.

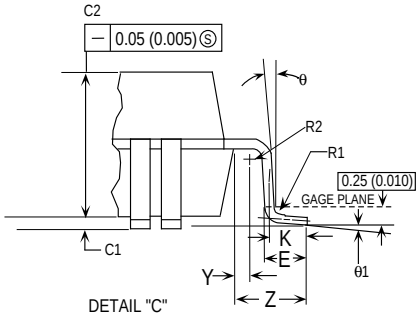
CASE 918-02
144 TQFP



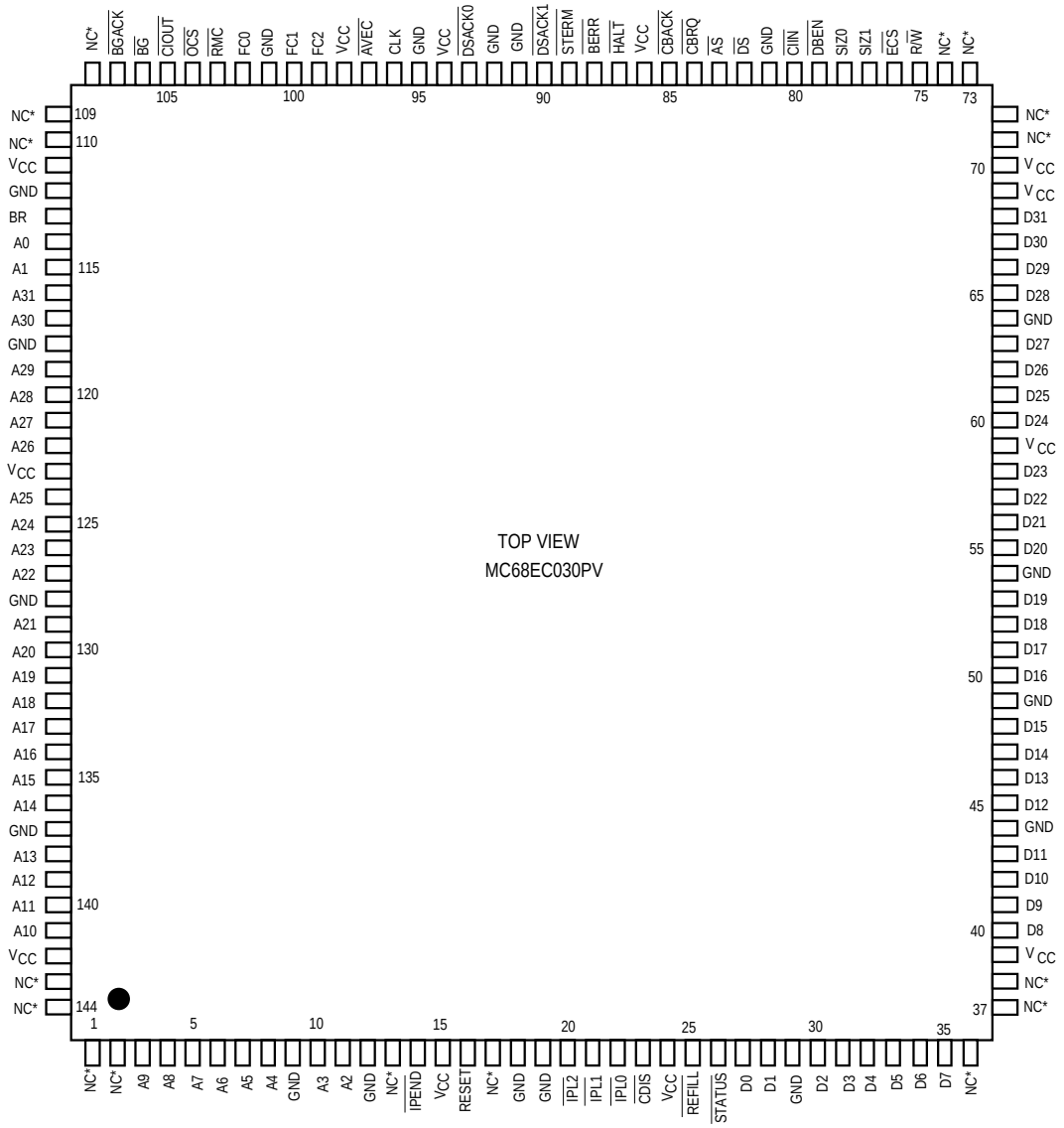




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE **-H-** IS LOCATED AT BOTTOM OF LEAD AND COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS **-L-**, **-M-**, AND **-N-** TO BE DETERMINED AT DATUM PLANE **-H-**.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE **-T-**.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLEPROTRUSION IS 0.25 (0.010 PER SIDE. DIMENSIONS A AND B DO NOT INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM LINE **-H-**.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLEDAMBAR PROTRUSION SHALL NOT CAUSE THE D DIMENSION TO EXCEED 0.35 (0.014).

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 20.00 BSC | | 0.790 BSC | |
| A1 | 10.00 BSC | | 0.394 BSC | |
| B | 20.00 BSC | | 0.790 BSC | |
| B1 | 10.00 BSC | | 0.394 BSC | |
| C | 1.40 | 1.60 | 0.055 | 0.063 |
| C1 | 0.05 | 0.15 | 0.002 | 0.006 |
| C2 | 1.35 | 1.45 | 0.053 | 0.057 |
| D | 0.17 | 0.27 | 0.007 | 0.011 |
| E | 0.45 | 0.75 | 0.018 | 0.030 |
| F | 0.17 | 0.23 | 0.007 | 0.009 |
| G | 0.50 BSC. | | 0.20 BSC. | |
| J | 0.09 | 0.20 | 0.004 | 0.008 |
| K | 0.50 REF | | 0.020 REF | |
| P | 0.25 BSC | | 0.010 BSC | |
| R1 | 0.13 | 0.20 | 0.005 | 0.008 |
| R2 | 0.13 | 0.20 | 0.005 | 0.008 |
| S | 22.00 BSC | | 0.866 BSC | |
| S1 | 11.00 BSC | | 0.433 BSC | |
| V | 22.00 BSC | | 0.866 BSC | |
| V1 | 11.00 BSC | | 0.433 BSC | |
| Y | 0.25 REF | | 0.010 REF | |
| Z | 1.00 REF | | 0.039 REF | |
| AA | 0.09 | 0.16 | 0.004 | 0.006 |
| θ | 0° | | 0° | |
| θ1 | 0° | 7° | 0° | 7° |
| θ2 | 11° | 13° | 11° | 13° |




NC*—Do not connect to this pin.



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