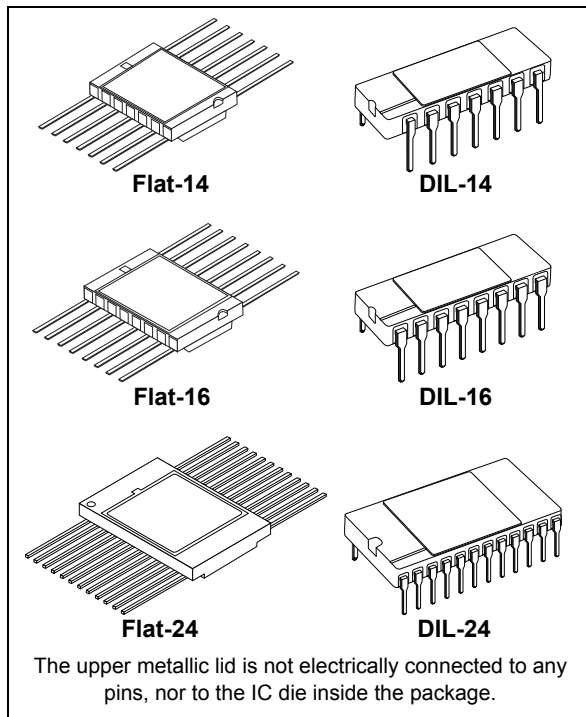


**Rad-hard, high voltage, CMOS logic series**

Datasheet - production data



- 50 ns typical propagation delays
- 100 nA max 25 °C input current
- 100 % tested 20 V quiescent current
- 5-10-15 V parametric testing
- Hermetic packages
- Rad-hard 100 kRad TID at 11rad/sec dose rate
- SEL-SEU immune to 72 MeV/cm<sup>2</sup>/mg LET ions
- ESCC qualified

**Description**

The HCC40xxx and HCC45xxx series are composed of 70 types of high voltage CMOS functions, offering a set of highly noise tolerant gates, Flip-Flops, multiplexers, counters, bus interfaces, and several other functions. The radiation hardness, single event latch-up (SEL), single event upset (SEU) immunity, and the housing in hermetic packages of all types of both series make them usable in the most difficult environmental conditions.

The complete specification of each type is available from the European Space Components Coordination (ESCC) web site: <https://spacecomponents.org/>. ST guarantees full compliance of qualified parts with these ESCC detailed specifications.

**Features**

- 3 to 20 V max operating voltage
- Buffered inputs and outputs
- Standardized symmetrical outputs characteristic

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# 1 HCC family overview

Table 1. Device summary

| Part number | Description  | Radiation level | Agency qualification | EPPL     | ESCC specification | Package            |
|-------------|--|-----------------|----------------------|----------|--------------------|--------------------|
| HCC4001B    | Rad-hard quad 2-input NOR gate                     | 100 krad (Si)   | ESCC                 | Y        | 9201/041           | Flat-14 and DIL-14 |
| HCC4002B    | Rad-hard dual 4-input NOR gate                     |                 |                      | -        | 9201/042           |                    |
| HCC4008B    | Rad-hard 4-bit full adder                          |                 |                      | Y        | 9202/039           | Flat-16 and DIL-16 |
| HCC4011B    | Rad-hard quad 2-input NAND gate                    |                 |                      | -        | 9201/043           | Flat-14 and DIL-14 |
| HCC4012B    | Rad-hard dual 4-input NAND gate                    |                 |                      | Y        | 9201/044           |                    |
| HCC4013B    | Rad-hard dual D Flip-Flop                          |                 |                      | Y        | 9203/023           | Flat-16 and DIL-16 |
| HCC4014B    | Rad-hard 8-stage static synchronous shift register |                 |                      |          | 9306/014           |                    |
| HCC4015B    | Rad-hard dual 4-stage static shift register        |                 |                      |          | 9306/015           |                    |
| HCC4017B    | Rad-hard decade counter/divider                    |                 |                      | 9204/020 | -                  | Flat-16 and DIL-16 |
| HCC4018B    | Rad-hard presettable divide-by N counter           |                 |                      | 9204/021 |                    |                    |
| HCC4019B    | Rad-hard quad AND/OR select gate                   |                 |                      | 9202/051 | Y                  | Flat-16 and DIL-14 |
| HCC4020B    | Rad-hard 14-stage binary/ripple counter            |                 |                      | 9204/022 |                    |                    |
| HCC4021B    | Rad-hard 8-stage static shift register             |                 |                      | 9306/016 |                    |                    |
| HCC4022B    | Rad-hard divide-by-8 counter/divider               |                 |                      | 9204/023 | -                  | Flat-14 and DIL-14 |
| HCC4023B    | Rad-hard triple 3-input NAND gate                  |                 |                      | 9201/045 | Y                  |                    |
| HCC4024B    | Rad-hard 7-stage binary/ripple counter             |                 |                      | 9204/024 | -                  | Flat-16 and DIL-16 |
| HCC4025B    | Rad-hard triple 3-input NOR gate                   |                 |                      | 9201/046 | Y                  |                    |
| HCC4027B    | Rad-hard dual J-K master-slave Flip-Flop           |                 |                      | 9203/022 | Y                  | Flat-16 and DIL-16 |
| HCC4028B    | Rad-hard BCD-to-decimal decoder                    |                 |                      | 9205/010 |                    |                    |
| HCC4029B    | Rad-hard presettable up/down counter               |                 |                      | 9204/025 | Y                  | Flat-14 and DIL-14 |
| HCC4030B    | Rad-hard quad exclusive OR gate                    |                 |                      | 9201/047 | Y                  |                    |



Table 1. Device summary (continued)

| Part number | Description  | Radiation level | Agency qualification | EPPL               | ESCC specification | Package            |
|-------------|--|-----------------|----------------------|--------------------|--------------------|--------------------|
| HCC4034B    | Rad-hard 8-stage static bidirectional bus register | 100 krad (Si)   | ESCC                 | -                  | 9306/025           | Flat-24 and DIL-24 |
| HCC4040B    | Rad-hard 12-stage binary/ripple counter            |                 |                      | Y                  | 9204/026           | Flat-16 and DIL-16 |
| HCC4041UB   | Rad-hard quad true/complement buffer               |                 |                      | -                  | 9202/040           | Flat-14 and DIL-14 |
| HCC4042B    | Rad-hard quad clocked D latch                      |                 |                      |                    |                    |                    |
| HCC4043B    | Rad-hard quad 3-state NOR R/S latch                |                 |                      |                    |                    |                    |
| HCC4044B    | Rad-hard quad 3-state NAND R/S latch               |                 |                      |                    |                    |                    |
| HCC4046B    | Rad-hard micropower phase locker loop              |                 |                      | Y                  | 9202/044           | Flat-16 and DIL-16 |
| HCC4047B    | Rad-hard monostable/astable multivibrator          |                 |                      |                    |                    |                    |
| HCC4049UB   | Rad-hard hex inverting buffer/converter            |                 |                      |                    |                    |                    |
| HCC4050B    | Rad-hard hex non-inverting buffer/converter        |                 |                      |                    |                    |                    |
| HCC4051B    | Rad-hard single 8-channel analog mux/demux         |                 |                      | -                  | 9202/048           | Flat-16 and DIL-16 |
| HCC4052B    | Rad-hard different 4-channel analog mux/demux      |                 |                      |                    |                    |                    |
| HCC4053B    | Rad-hard triple 2-channel analog mux/demux         |                 |                      |                    |                    |                    |
| HCC4060B    | Rad-hard 14-stage counter/divider AND oscillator   |                 |                      | Y                  | 9204/052           | Flat-14 and DIL-14 |
| HCC4063B    | Rad-hard 4-bit magnitude comparator                |                 |                      |                    |                    |                    |
| HCC4066B    | Rad-hard quad bilateral switch                     |                 |                      |                    |                    |                    |
| HCC4067B    | Rad-hard single 16-channel analog mux/demux        |                 |                      |                    |                    |                    |
| HCC4068B    | Rad-hard 8-input NAND/AND gate                     |                 |                      | -                  | 9201/061           | Flat-24 and DIL-24 |
| HCC4069UB   | Rad-hard hex inverter                              |                 |                      |                    |                    |                    |
| HCC4070B    | Rad-hard quad exclusive OR gate                    |                 |                      |                    |                    |                    |
| HCC4071B    | Rad-hard quad 2-input OR gate                      |                 |                      |                    |                    |                    |
| HCC4072B    | Rad-hard dual 4-input OR gate                      | Y               | 9201/063             | Flat-14 and DIL-14 |                    |                    |
| HCC4073B    | Rad-hard triple 3-input AND gate                   |                 |                      |                    |                    |                    |
| HCC4075B    | Rad-hard triple 3-input OR gate                    |                 |                      |                    |                    |                    |



Table 1. Device summary (continued)

| Part number | Description   | Radiation level | Agency qualification | EPPL               | ESCC specification | Package            |
|-------------|---|-----------------|----------------------|--------------------|--------------------|--------------------|
| HCC4076B    | Rad-hard 4-bit D-type register                          | 100 krad (Si)   | ESCC                 | Y                  | 9306/022           | Flat-16 and DIL-16 |
| HCC4077B    | Rad-hard quad exclusive NOR gate                        |                 |                      | -                  | 9201/055           |                    |
| HCC4078B    | Rad-hard 8-input NOR/OR gate                            |                 |                      |                    | 9201/062           |                    |
| HCC4081B    | Rad-hard quad 2-input AND gate                          |                 |                      |                    | 9201/052           | Flat-14 and DIL-14 |
| HCC4082B    | Rad-hard dual 4-input AND gate                          |                 |                      |                    | 9201/066           |                    |
| HCC4093B    | Rad-hard quad 2-input NAND Schmitt trigger              |                 |                      |                    | 9409/002           |                    |
| HCC4094B    | Rad-hard 8-stage shift-and-store bus register           |                 |                      |                    | 9306/026           |                    |
| HCC4098B    | Rad-hard dual monostable multivibrator                  |                 |                      |                    | 9206/003           | Flat-16 and DIL-16 |
| HCC40103B   | Rad-hard presettable 8-bit binary down counter          |                 |                      |                    | 9204/036           |                    |
| HCC40106B   | Rad-hard hex schmitt trigger                            |                 |                      |                    | 9409/005           |                    |
| HCC40107B   | Rad-hard dual 2-input NAND buffer/driver                |                 |                      |                    | 9401/013           | Flat-14 and DIL-14 |
| HCC40109B   | Rad-hard quad low-to-high voltage level shifter         |                 |                      |                    | 9407/003           |                    |
| HCC40161B   | Rad-hard binary counter with asynchronous clear         |                 |                      |                    | 9204/054           |                    |
| HCC40174B   | Rad-hard hex D Flip-Flop                                |                 |                      |                    | 9203/038           | Flat-16 and DIL-16 |
| HCC40193B   | Rad-hard presettable 4-bit binary up-down counter       |                 |                      |                    | 9204/041           |                    |
| HCC4503B    | Rad-hard hex buffer 3-state non-inverter                |                 |                      |                    | 9401/030           |                    |
| HCC4512B    | Rad-hard 8-channel data select with 3-state output      |                 |                      |                    | 9408/006           |                    |
| HCC4514B    | Rad-hard 4-bit Latch / 4-to-16 line decoder output high |                 |                      |                    | 9408/012           | Flat-24 and DIL-24 |
| HCC4515B    | Rad-hard 4-bit Latch / 4-to-16 line decoder output low  |                 |                      |                    | 9205/011           |                    |
| HCC4516B    | Rad-hard presettable 4-bit binary up/down counter       |                 |                      |                    | 9204/045           |                    |
| HCC4520B    | Rad-hard dual binary up-down counter                    |                 | 9204/028             |                    |                    |                    |
| HCC4532B    | Rad-hard 8-input priority encoder                       |                 | 9202/065             | Flat-16 and DIL-16 |                    |                    |
| HCC4538B    | Rad-hard dual precision monostable multivibrator        |                 | 9207/007             |                    |                    |                    |
| HCC4555B    | Rad-hard dual 1-of-4 decoder/demux output high          |                 | 9408/011             |                    |                    |                    |



Table 1. Device summary (continued)

| Part number | Description                                   | Radiation level | Agency qualification | EPPL | ESCC specification | Package            |
|-------------|---|-----------------|----------------------|------|--------------------|--------------------|
| HCC4556B    | Rad-hard dual 1-of-4 decoder/demux output low |                 |                      | -    | 9408/025           | Flat-16 and DIL-16 |

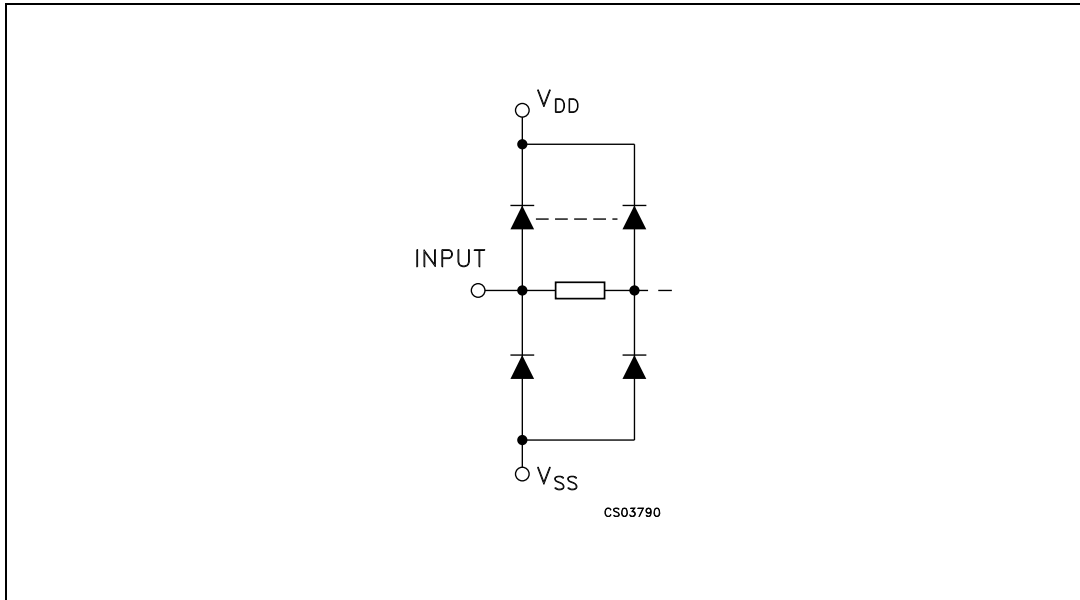
*Note:* Contact the ST sales office for information about the specific conditions for other CMOS4000 part numbers and products in die form.





## 2 Input equivalent circuit diagram

Figure 1. Input equivalent circuit diagram



### 3 Maximum ratings

Stressing the device above the rating listed in the “absolute maximum ratings” table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**Table 2. Absolute maximum ratings**

| Symbol    | Parameter                     | Value                  | Unit |
|-----------|-------------------------------|------------------------|------|
| $V_{DD}$  | Supply voltage                | -0.5 to 22             | V    |
| $V_I$     | DC input voltage              | -0.5 to $V_{DD} + 0.5$ | V    |
| $I_I$     | DC input current              | $\pm 10$               | mA   |
| $P_D$     | Power dissipation per package | 200                    | mW   |
| $T_{OP}$  | Operating temperature         | -55 to +125            | °C   |
| $T_{STG}$ | Storage temperature           | -65 to +150            | °C   |

*Note:* All voltage values are referred to  $V_{SS}$  pin voltage.

#### 3.1 Recommended operating conditions

**Table 3. Recommended operating conditions**

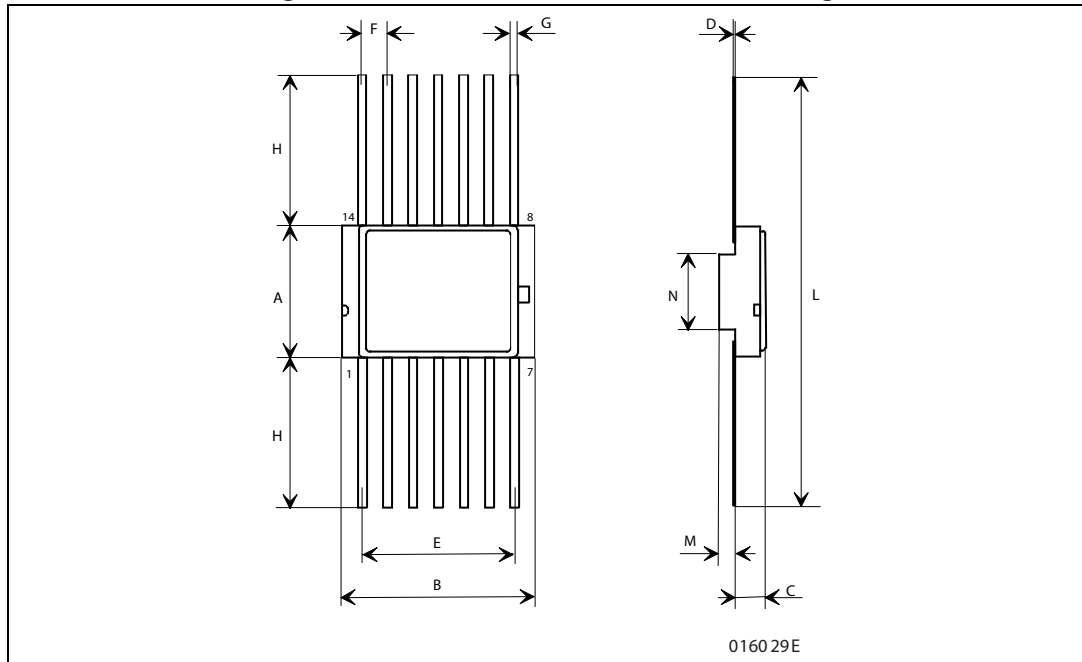
| Symbol   | Parameter             | Value         | Unit |
|----------|-----------------------|---------------|------|
| $V_{DD}$ | Supply voltage        | 20            | V    |
| $V_I$    | Input voltage         | 0 to $V_{DD}$ | V    |
| $T_{OP}$ | Operating temperature | -55 to +125   | °C   |

## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 4.1 Ceramic Flat-14 package

Figure 2. Ceramic Flat-14 mechanical drawing



1. The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package. Connecting unused pins or metal lid to ground or to the power supply does not affect the electrical characteristics.

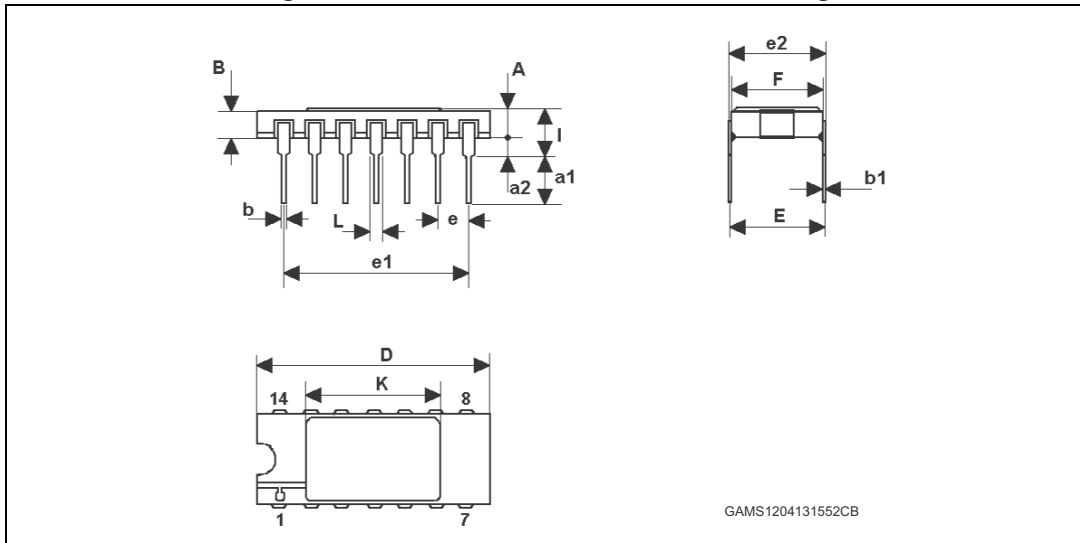
Table 4. Ceramic Flat-14 mechanical data

| Ref | Dimensions  |       |       |                       |       |       |
|-----|-------------|-------|-------|-----------------------|-------|-------|
|     | Millimeters |       |       | Inches <sup>(1)</sup> |       |       |
|     | Min         | Typ   | Max   | Min                   | Typ   | Max   |
| A   | 6.75        | 6.91  | 7.06  | 0.266                 | 0.272 | 0.278 |
| B   | 9.76        | 9.95  | 10.14 | 0.384                 | 0.392 | 0.399 |
| C   | 1.49        |       | 1.95  | 0.059                 |       | 0.077 |
| D   | 0.10        | 0.127 | 0.15  | 0.004                 | 0.005 | 0.006 |
| E   | 7.50        | 7.62  | 7.75  | 0.295                 | 0.300 | 0.305 |
| F   |             | 1.27  |       |                       | 0.050 |       |
| G   | 0.38        | 0.43  | 0.48  | 0.015                 | 0.017 | 0.019 |
| H   |             | 6.0   |       |                       | 0.236 |       |
| L   | 18.75       | en    | 22.0  | 0.738                 | en    | 0.866 |
| M   |             | 0.38  |       |                       | 0.015 |       |
| N   |             | 4.31  |       |                       | 0.170 |       |

1. Values in inches are rounded to three decimal digits.

## 4.2 Ceramic DIL-14 package

Figure 3. Ceramic DIL-14 mechanical drawing



1. The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package. Connecting unused pins or metal lid to ground or to the power supply does not affect the electrical characteristics.

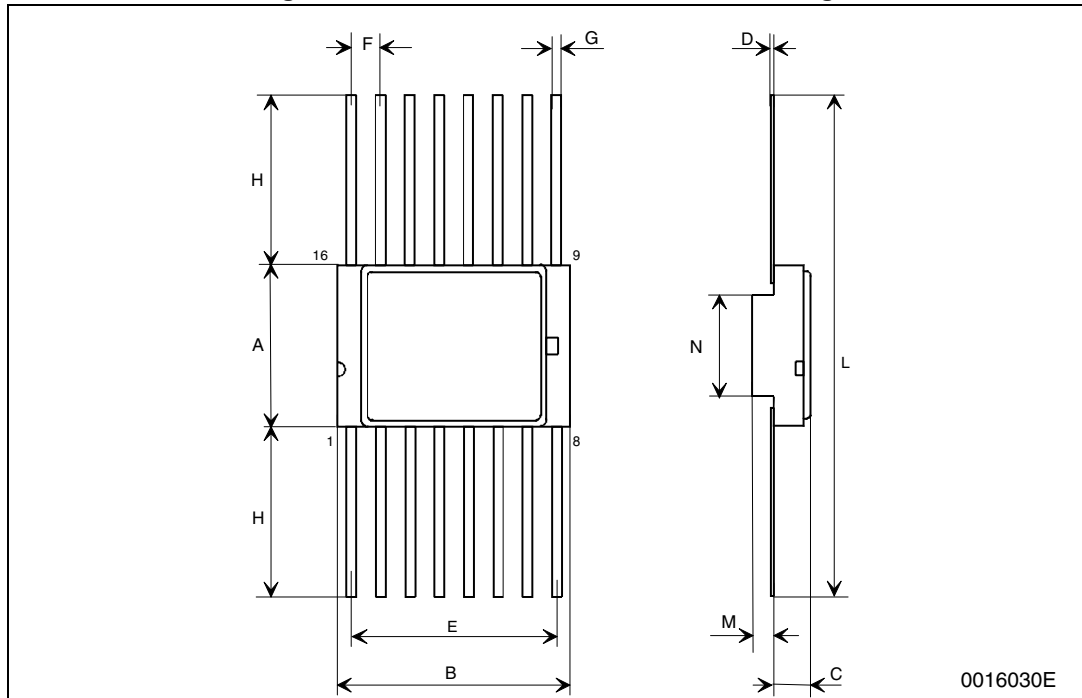
Table 5. Ceramic DIL-14 mechanical data

| Ref | Dimensions  |       |        |                       |       |         |
|-----|-------------|-------|--------|-----------------------|-------|---------|
|     | Millimeters |       |        | Inches <sup>(1)</sup> |       |         |
|     | Min         | Typ   | Max    | Min                   | Typ   | Max     |
| A   | 2.1         |       | 2.54   | 0.083                 |       | 0.100   |
| a1  | 3.00        |       | 3.70   | 0.118                 |       | 0.146   |
| a2  | 0.63        | 0.88  | 1.14   | 0.025                 | 0.035 | 0.045   |
| B   | 1.82        | 2.03  | 2.39   | 0.072                 | 0.080 | 0.094   |
| b   | 0.40        | 0.45  | 0.50   | 0.016                 | 0.018 | 0.020   |
| b1  | 0.20        | 0.254 | 0.30   | 0.008                 | 0.010 | 0.012   |
| D   | 18.79       | 19.00 | 19.20  | 0.740                 | 0.748 | 0.756   |
| E   | 7.36        | 7.62  | 7.87   | 0.290                 | 0.300 | 0.310   |
| e   |             | 2.54  |        |                       | 0.100 |         |
| e1  | 15.11       | 15.24 | 15.37  | 0.595                 | 0.600 | 0.605   |
| e2  | 7.62        | 7.87  | 8.12   | 0.300                 | 0.310 | 0.320   |
| F   | 7.11        |       | 7.75   | 0.280                 |       | 0.305   |
| I   |             |       | 3.70   |                       |       | 0.146   |
| K   | 10.90       |       | 12.1 n | 0.429                 |       | 0.476 n |
| L   | 1.14        | 1.27  | 1.5    |                       | 0.050 | 0.059   |

1. Values in inches are rounded to three decimal digits.

### 4.3 Ceramic Flat-16 package

Figure 4. Ceramic Flat-16 mechanical drawing



1. The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package. Connecting unused pins or metal lid to ground or to the power supply does not affect the electrical characteristics.

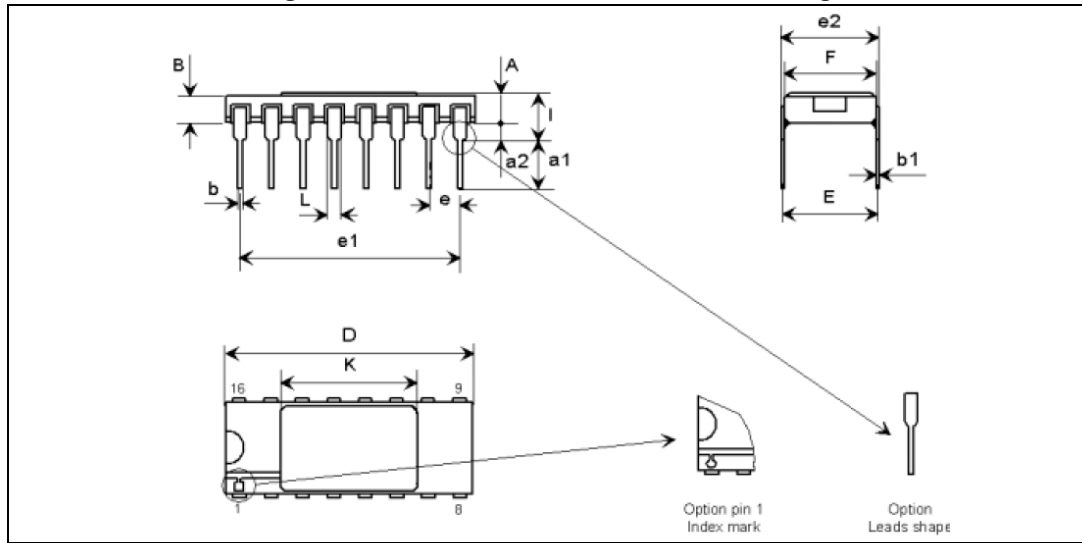
Table 6. Ceramic Flat-16 mechanical data

| Ref | Dimensions  |       |       |                       |       |       |
|-----|-------------|-------|-------|-----------------------|-------|-------|
|     | Millimeters |       |       | Inches <sup>(1)</sup> |       |       |
|     | Min         | Typ   | Max   | Min                   | Typ   | Max   |
| A   | 6.75        | 6.91  | 7.06  | 0.266                 | 0.272 | 0.278 |
| B   | 9.76        | 9.94  | 10.14 | 0.384                 | 0.391 | 0.399 |
| C   | 1.49        |       | 1.95  | 0.059                 |       | 0.077 |
| D   | 0.102       | 0.127 | 0.152 | 0.004                 | 0.005 | 0.006 |
| E   | 8.76        | 8.89  | 9.01  | 0.345                 | 0.350 | 0.355 |
| F   |             | 1.27  |       |                       | 0.050 |       |
| G   | 0.38        | 0.43  | 0.48  | 0.015                 | 0.017 | 0.019 |
| H   | 6.0         |       |       | 0.236                 |       |       |
| L   | 18.75       | en    | 22.0  | 0.738                 | en    | 0.866 |
| M   | 0.33        | 0.38  | 0.43  | 0.013                 | 0.015 | 0.017 |
| N   |             | 4.31  |       |                       | 0.170 |       |

1. Values in inches are rounded to three decimal digits.

### 4.4 Ceramic DIL-16 package

Figure 5. Ceramic DIL-16 mechanical drawing



1. The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package. Connecting unused pins or metal lid to ground or to the power supply does not affect the electrical characteristics.

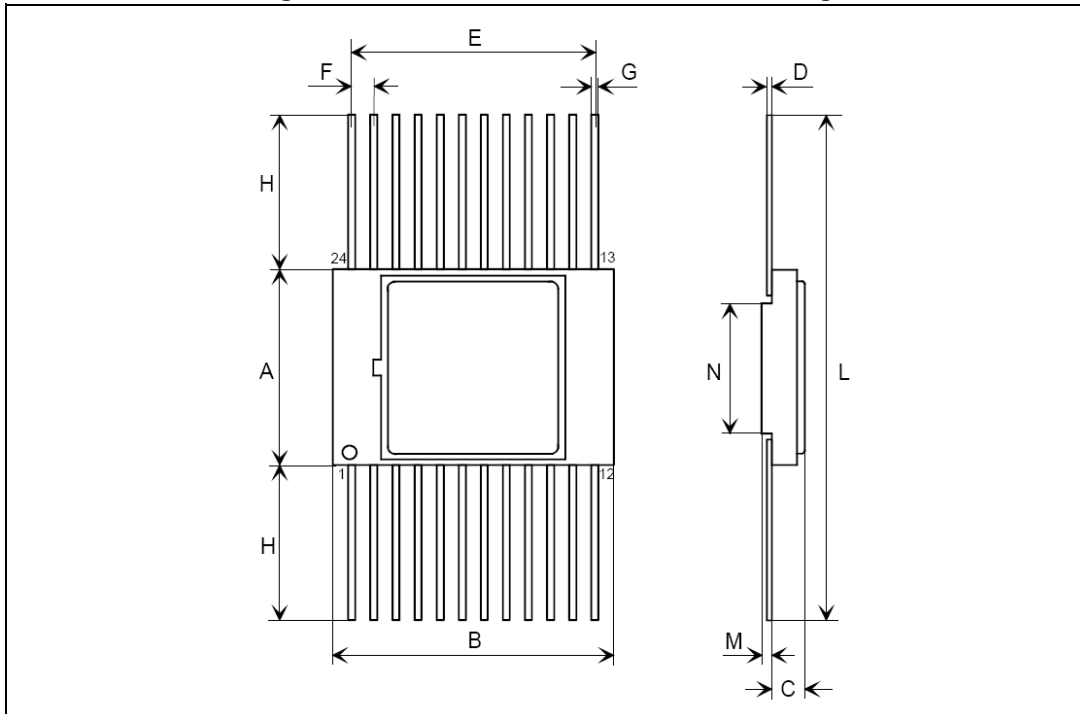
Table 7. Ceramic DIL-16 mechanical data

| Ref | Dimensions  |       |       |                       |       |       |
|-----|-------------|-------|-------|-----------------------|-------|-------|
|     | Millimeters |       |       | Inches <sup>(1)</sup> |       |       |
|     | Min         | Typ   | Max   | Min                   | Typ   | Max   |
| A   | 2.10        |       | 2.71  | 0.083                 |       | 0.107 |
| a1  | 3.00        |       | 3.70  | 0.118                 |       | 0.146 |
| a2  | 0.63        | 0.88  | 1.14  | 0.025                 | 0.035 | 0.045 |
| B   | 1.82        |       | 2.39  | 0.072                 |       | 0.094 |
| b   | 0.40        | 0.45  | 0.50  | 0.016                 | 0.018 | 0.020 |
| b1  | 0.20        | 0.254 | 0.30  | 0.008                 | 0.010 | 0.012 |
| D   | 20.06       | 20.32 | 20.58 | 0.790                 | 0.800 | 0.810 |
| E   | 7.36        | 7.62  | 7.87  | 0.290                 | 0.300 | 0.310 |
| e   |             | 2.54  |       |                       | 0.100 |       |
| e1  | 17.65       | 17.78 | 17.90 | 0.695                 | 0.700 | 0.705 |
| e2  | 7.62        | 7.87  | 8.12  | 0.300                 | 0.310 | 0.320 |
| F   | 7.29        | 7.49  | 7.70  | 0.287                 | 0.295 | 0.303 |
| I   |             |       | 3.83  |                       |       | 0.151 |
| K   | 10.90       |       | 12.10 | 0.429                 |       | 0.476 |
| L   | 1.14        |       | 1.50  | 0.045                 |       | 0.059 |

1. Values in inches are rounded to three decimal digits.

### 4.5 Ceramic Flat-24 package

Figure 6. Ceramic Flat-24 mechanical drawing



1. The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package. Connecting unused pins or metal lid to ground or to the power supply does not affect the electrical characteristics.

Table 8. Ceramic Flat-24 mechanical data

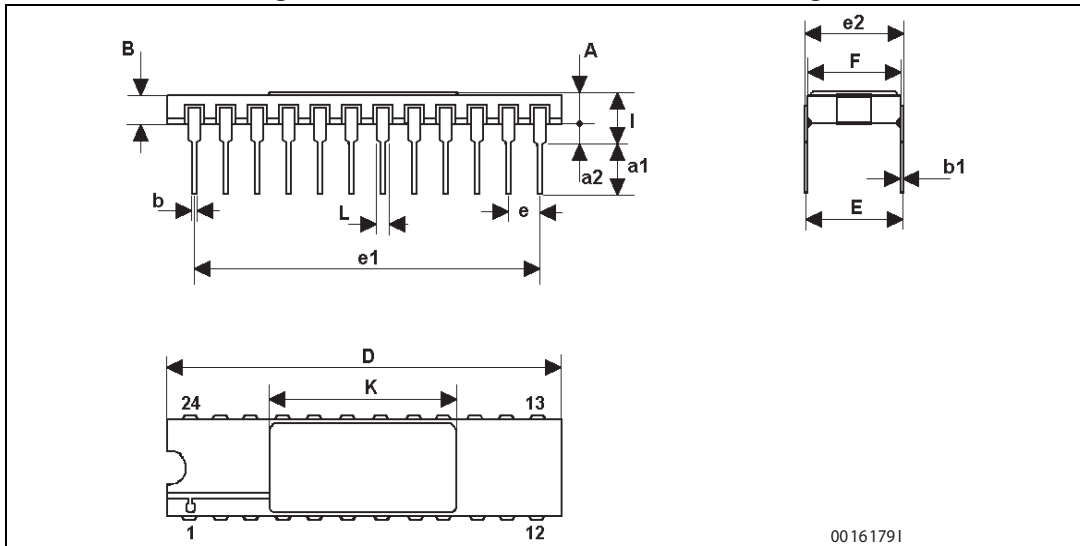
| Ref | Dimensions  |       |       |                       |       |       |
|-----|-------------|-------|-------|-----------------------|-------|-------|
|     | Millimeters |       |       | Inches <sup>(1)</sup> |       |       |
|     | Min         | Typ   | Max   | Min                   | Typ   | Max   |
| A   | 10.70       | 11.00 | 11.30 | 0.421                 | 0.433 | 0.445 |
| B   | 15.30       | 15.49 | 15.70 | 0.602                 | 0.610 | 0.618 |
| C   | 1.45        |       | 1.90  | 0.057                 |       | 0.075 |
| D   | 0.23        | 0.254 | 0.30  | 0.009                 | 0.010 | 0.012 |
| E   | 13.84       | 13.97 | 14.10 | 0.545                 | 0.550 | 0.555 |
| F   | 1.22        | 1.27  | 1.32  | 0.048                 | 0.050 | 0.052 |
| G   | 0.45        | 0.508 | 0.55  | 0.018                 | 0.020 | 0.022 |
| H   | 7.25        |       | 8.25  | 0.285                 |       | 0.325 |
| L   | 25.00       |       | 28.00 | 0.984                 |       | 1.102 |
| M   | 0.45        | 0.508 | 0.55  | 0.018                 | 0.020 | 0.022 |
| N   |             | 7.01  |       |                       | 0.276 |       |

1. Values in inches are rounded to three decimal digits.



### 4.6 Ceramic DIL-24 package

Figure 7. Ceramic DIL-24 mechanical drawings



1. The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package. Connecting unused pins or metal lid to ground or to the power supply does not affect the electrical characteristics.

Table 9. Ceramic DIL-24 mechanical data

| Ref | Dimensions  |       |       |                       |       |       |
|-----|-------------|-------|-------|-----------------------|-------|-------|
|     | Millimeters |       |       | Inches <sup>(1)</sup> |       |       |
|     | Min         | Typ   | Max   | Min                   | Typ   | Max   |
| A   | 2.159       | 1.931 | 2.387 | 0.085                 | 0.076 | 0.094 |
| a1  | 1.270       | 1.016 | 1.524 | 0.050                 | 0.040 | 0.060 |
| a2  | 0.307       | 0.274 | 0.340 | 0.012                 | 0.011 | 0.013 |
| B   | 1.270       |       |       | 0.050                 |       |       |
| b1  | 0.457       | 0.407 | 0.507 | 0.018                 | 0.016 | 0.020 |
| b2  | .254        | 0.229 | 0.304 | 0.010                 | 0.009 | 0.012 |
| C   | 2.466       | 2.205 | 2.727 | 0.097                 | 0.087 | 0.107 |
| D   | 30.48       | 30.17 | 30.78 | 1.200                 | 1.188 | 1.212 |
| E   | 15.24       | 14.98 | 15.49 | 0.600                 | 0.590 | 0.610 |
| e   | 2.540       | 2.410 | 2.670 | 0.100                 | 0.095 | 0.105 |
| e3  | 27.94       | 27.81 | 28.06 | 1.100                 | 1.095 | 1.105 |
| F   | 15.11       | 14.85 | 15.36 | 0.595                 | 0.585 | 0.605 |
| K   | 12.80       | 12.60 | 13.00 | 0.504                 | 0.496 | 0.512 |
| K1  | 12.80       | 12.60 | 13.00 | 0.504                 | 0.496 | 0.512 |
| L   | 3.300       | 3.000 | 3.800 | 0.130                 | 0.118 | 0.150 |

1. Values in inches are rounded to three decimal digits.

# 5 Order codes

Table 10. Ordering information

| Order code | ESCC detailed specification | Quality level | Comment                           | Package | Lead finish        | Marking <sup>(1)</sup> | Mass (g) | EPPL | Packing    |
|------------|-----------------------------|---------------|-----------------------------------|---------|--------------------|------------------------|----------|------|------------|
| HCC4001BK  | 9201/041/01 or 02           | ESCC flight   | Specify ESCC variant number in PO | Flat-14 | Gold or solder dip | 920104101 or 02        | 0.70     | Y    | Strip pack |
| HCC4001BD  | 9201/041/03 or 04           |               |                                   | DIL-14  |                    | 920104103 or 04        | 2.20     |      |            |
| HCC4002BK  | 9201/042/01 or 02           |               |                                   | Flat-14 |                    | 920104201 or 02        | 0.70     |      |            |
| HCC4002BD  | 9201/042/03 or 04           |               |                                   | DIL-14  |                    | 920104203 or 04        | 2.20     |      |            |
| HCC4008BK  | 9202/039/01 or 02           |               |                                   | Flat-16 |                    | 920203901 or 02        | 0.70     |      |            |
| HCC4008BD  | 9202/039/08 or 09           |               |                                   | DIL-16  |                    | 920203908 or 09        | 2.20     | -    |            |
| HCC4011BK  | 9201/043/01 or 02           |               |                                   | Flat-14 |                    | 920104301 or 02        | 0.70     |      |            |
| HCC4011BD  | 9201/043/03 or 04           |               |                                   | DIL-14  |                    | 920104303 or 04        | 2.20     |      |            |
| HCC4012BK  | 9201/044/01 or 02           |               |                                   | Flat-14 |                    | 920104401 or 02        | 0.70     |      |            |
| HCC4012BD  | 9201/044/03 or 04           |               |                                   | DIL-14  |                    | 920104403 or 04        | 2.20     |      |            |
| HCC4013BK  | 9203/023/01 or 02           |               |                                   | Flat-14 |                    | 920302301 or 02        | 0.70     | Y    |            |
| HCC4013BD  | 9203/023/03 or 04           |               |                                   | DIL-14  |                    | 920302303 or 04        | 2.20     | -    |            |
| HCC4014BK  | 9306/014/01 or 02           |               |                                   | Flat-16 |                    | 930601401 or 02        | 0.70     | Y    |            |
| HCC4014BD  | 9306/014/08 or 09           |               |                                   | DIL-16  |                    | 930601408 or 09        | 2.20     | -    |            |
| HCC4015BK  | 9306/015/01 or 02           |               |                                   | Flat-16 |                    | 930601501 or 02        | 0.70     | Y    |            |
| HCC4015BD  | 9306/015/08 or 09           |               |                                   | DIL-16  |                    | 930601508 or 09        | 2.20     | -    |            |
| HCC4017BK  | 9204/020/01 or 02           |               |                                   | Flat-16 |                    | 920402001 or 02        | 0.70     | Y    |            |
| HCC4017BD  | 9204/020/08 or 09           |               |                                   | DIL-16  |                    | 920402008 or 09        | 2.20     |      |            |
| HCC4018BK  | 9204/021/01 or 02           |               |                                   | Flat-16 |                    | 920402101 or 02        | 0.70     | -    |            |
| HCC4018BD  | 9204/021/08 or 09           |               |                                   | DIL-16  |                    | 920402108 or 09        | 2.20     |      |            |
| HCC4019BK  | 9202/051/01 or 02           | Flat-16       | 920205101 or 02                   | 0.70    | Y                  |                        |          |      |            |
| HCC4019BD  | 9202/051/08 or 09           | DIL-16        | 920205108 or 09                   | 2.20    | -                  |                        |          |      |            |



Table 10. Ordering information (continued)

| Order code | ESCC detailed specification | Quality level | Comment                           | Package | Lead finish        | Marking <sup>(1)</sup> | Mass (g) | EPPL | Packing    |
|------------|-----------------------------|---------------|-----------------------------------|---------|--------------------|------------------------|----------|------|------------|
| HCC4020BK  | 9204/022/01 or 02           | ESCC flight   | Specify ESCC variant number in PO | Flat-16 | Gold or solder dip | 920402201 or 02        | 0.70     | Y    | Strip pack |
| HCC4020BD  | 9204/022/08 or 09           |               |                                   | DIL-16  |                    | 920402208 or 09        | 2.20     | -    |            |
| HCC4021BK  | 9306/016/01 or 02           |               |                                   | Flat-16 |                    | 930601601 or 02        | 0.70     | Y    |            |
| HCC4021BD  | 9306/016/08 or 09           |               |                                   | DIL-16  |                    | 930601608 or 09        | 2.20     | -    |            |
| HCC4022BK  | 9204/023/01 or 02           |               |                                   | Flat-16 |                    | 920402301 or 02        | 0.70     | -    |            |
| HCC4022BD  | 9204/023/08 or 09           |               |                                   | DIL-16  |                    | 920402308 or 09        | 2.20     | -    |            |
| HCC4023BK  | 9201/045/01 or 02           |               |                                   | Flat-14 |                    | 920104501 or 02        | 0.70     | Y    |            |
| HCC4023BD  | 9201/045/03 or 04           |               |                                   | DIL-14  |                    | 920104503 or 04        | 2.20     | -    |            |
| HCC4024BK  | 9204/024/01 or 02           |               |                                   | Flat-14 |                    | 920402401 or 02        | 0.70     | Y    |            |
| HCC4024BD  | 9204/024/03 or 04           |               |                                   | DIL-14  |                    | 920402403 or 04        | 2.20     | -    |            |
| HCC4025BK  | 9201/046/01 or 02           |               |                                   | Flat-14 |                    | 920104601 or 02        | 0.70     | -    |            |
| HCC4025BD  | 9201/046/03 or 04           |               |                                   | DIL-14  |                    | 920104603 or 04        | 2.20     | -    |            |
| HCC4027BK  | 9203/022/01 or 02           |               |                                   | Flat-16 |                    | 920302201 or 02        | 0.70     | Y    |            |
| HCC4027BD  | 9203/022/08 or 09           |               |                                   | DIL-16  |                    | 920302208 or 09        | 2.20     | -    |            |
| HCC4028BK  | 9205/010/01 or 02           |               |                                   | Flat-16 |                    | 920501001 or 02        | 0.70     | Y    |            |
| HCC4028BD  | 9205/010/08 or 09           |               |                                   | DIL-16  |                    | 920501008 or 09        | 2.20     | -    |            |
| HCC4029BK  | 9204/025/01 or 02           |               |                                   | Flat-16 |                    | 920402501 or 02        | 0.70     | Y    |            |
| HCC4029BD  | 9204/025/08 or 09           |               |                                   | DIL-16  |                    | 920402508 or 09        | 2.20     | -    |            |
| HCC4030BK  | 9201/047/01 or 02           |               |                                   | Flat-14 |                    | 920104701 or 02        | 0.70     | Y    |            |
| HCC4030BD  | 9201/047/03 or 04           |               |                                   | DIL-14  |                    | 920104703 or 04        | 2.20     | -    |            |
| HCC4034BK  | 9306/025/01 or 02           | Flat-24       | 930602501 or 02                   | 1.70    | -                  |                        |          |      |            |
| HCC4034BD  | 9306/025/03 or 04           | DIL-24        | 930602503 or 04                   | 5.20    | -                  |                        |          |      |            |
| HCC4040BK  | 9204/026/01 or 02           | Flat-16       | 920402601 or 02                   | 0.70    | Y                  |                        |          |      |            |
| HCC4040BD  | 9204/026/08 or 09           | DIL-16        | 920402608 or 09                   | 2.20    | -                  |                        |          |      |            |
| HCC4041UBK | 9202/040/01 or 02           | Flat-14       | 920204001 or 02                   | 0.70    | -                  |                        |          |      |            |



Table 10. Ordering information (continued)

| Order code | ESCC detailed specification | Quality level | Comment                           | Package | Lead finish        | Marking <sup>(1)</sup> | Mass (g) | EPPL | Packing    |
|------------|-----------------------------|---------------|-----------------------------------|---------|--------------------|------------------------|----------|------|------------|
| HCC4041UBD | 9202/040/03 or 04           | ESCC flight   | Specify ESCC variant number in PO | DIL-14  | Gold or solder dip | 920204003 or 04        | 2.20     |      | Strip pack |
| HCC4042BK  | 9202/041/01 or 02           |               |                                   | Flat-16 |                    | 920204101 or 02        | 0.70     |      |            |
| HCC4042BD  | 9202/041/08 or 09           |               |                                   | DIL-16  |                    | 920204108 or 09        | 2.20     |      |            |
| HCC4043BK  | 9202/042/01 or 02           |               |                                   | Flat-16 |                    | 920204201 or 02        | 0.70     |      |            |
| HCC4043BD  | 9202/042/08 or 09           |               |                                   | DIL-16  |                    | 920204208 or 09        | 2.20     |      |            |
| HCC4044BK  | 9202/043/01 or 02           |               |                                   | Flat-16 |                    | 920204301 or 02        | 0.70     |      |            |
| HCC4044BD  | 9202/043/08 or 09           |               |                                   | DIL-16  |                    | 920204308 or 09        | 2.20     |      |            |
| HCC4046BK  | 9202/044/01 or 02           |               |                                   | Flat-16 |                    | 920204401 or 02        | 0.70     |      |            |
| HCC4046BD  | 9202/044/08 or 09           |               |                                   | DIL-16  |                    | 920204408 or 09        | 2.20     |      |            |
| HCC4047BK  | 9207/003/01 or 02           |               |                                   | Flat-14 |                    | 920700301 or 02        | 0.70     | Y    |            |
| HCC4047BD  | 9207/003/03 or 04           |               |                                   | DIL-14  |                    | 920700303 or 04        | 2.20     | -    |            |
| HCC4049UBK | 9202/045/01 or 02           |               |                                   | Flat-16 |                    | 920204501 or 02        | 0.70     | Y    |            |
| HCC4049UBD | 9202/045/08 or 09           |               |                                   | DIL-16  |                    | 920204508 or 09        | 2.20     | -    |            |
| HCC4050BK  | 9202/046/01 or 02           |               |                                   | Flat-16 |                    | 920204601 or 02        | 0.70     | Y    |            |
| HCC4050BD  | 9202/046/08 or 09           |               |                                   | DIL-16  |                    | 920204608 or 09        | 2.20     | -    |            |
| HCC4051BK  | 9202/047/01 or 02           |               |                                   | Flat-16 |                    | 920204701 or 02        | 0.70     | Y    |            |
| HCC4051BD  | 9202/047/08 or 09           |               |                                   | DIL-16  |                    | 920204708 or 09        | 2.20     | -    |            |
| HCC4052BK  | 9202/048/01 or 02           |               |                                   | Flat-16 |                    | 920204801 or 02        | 0.70     | -    |            |
| HCC4052BD  | 9202/048/08 or 09           |               |                                   | DIL-16  |                    | 920204808 or 09        | 2.20     | -    |            |
| HCC4053BK  | 9202/049/01 or 02           |               |                                   | Flat-16 |                    | 920204901 or 02        | 0.70     | -    |            |
| HCC4053BD  | 9202/049/08 or 09           |               |                                   | DIL-16  |                    | 920204908 or 09        | 2.20     | -    |            |
| HCC4060BK  | 9204/052/01 or 02           |               |                                   | Flat-16 |                    | 920405201 or 02        | 0.70     | -    |            |
| HCC4060BD  | 9204/052/08 or 09           |               |                                   | DIL-16  |                    | 920405208 or 09        | 2.20     | -    |            |
| HCC4063BK  | 9209/001/01 or 02           |               |                                   | Flat-16 |                    | 920900101 or 02        | 0.70     | Y    |            |
| HCC4063BD  | 9209/001/08 or 09           |               |                                   | DIL-16  |                    | 920900108 or 09        | 2.20     | -    |            |



Table 10. Ordering information (continued)

| Order code | ESCC detailed specification | Quality level | Comment                           | Package | Lead finish        | Marking <sup>(1)</sup> | Mass (g) | EPPL | Packing    |
|------------|-----------------------------|---------------|-----------------------------------|---------|--------------------|------------------------|----------|------|------------|
| HCC4066BK  | 9408/005/01 or 02           | ESCC flight   | Specify ESCC variant number in PO | Flat-14 | Gold or solder dip | 940800501 or 02        | 0.70     | Y    | Strip pack |
| HCC4066BD  | 9408/005/03 or 04           |               |                                   | DIL-14  |                    | 940800503 or 04        | 2.20     |      |            |
| HCC4067BK  | 9408/009/01 or 02           |               |                                   | Flat-24 |                    | 940800901 or 02        | 1.70     |      |            |
| HCC4067BD  | 9408/009/03 or 04           |               |                                   | DIL-24  |                    | 940800903 or 04        | 5.20     | -    |            |
| HCC4068BK  | 9201/061/01 or 02           |               |                                   | Flat-14 |                    | 920106101 or 02        | 0.70     |      |            |
| HCC4068BD  | 9201/061/03 or 04           |               |                                   | DIL-14  |                    | 920106103 or 04        | 2.20     |      |            |
| HCC4069UBK | 9401/010/01 or 02           |               |                                   | Flat-14 |                    | 940101001 or 02        | 0.70     | Y    |            |
| HCC4069UBD | 9401/010/03 or 04           |               |                                   | DIL-14  |                    | 940101003 or 04        | 2.20     |      |            |
| HCC4070BK  | 9201/048/01 or 02           |               |                                   | Flat-14 |                    | 920104801 or 02        | 0.70     | -    |            |
| HCC4070BD  | 9201/048/03 or 04           |               |                                   | DIL-14  |                    | 920104803 or 04        | 2.20     |      |            |
| HCC4071BK  | 9201/063/01 or 02           |               |                                   | Flat-14 |                    | 920106301 or 02        | 0.70     | Y    |            |
| HCC4071BD  | 9201/063/03 or 04           |               |                                   | DIL-14  |                    | 920106303 or 04        | 2.20     |      |            |
| HCC4072BK  | 9201/082/01 or 02           |               |                                   | Flat-14 |                    | 920108201 or 02        | 0.70     | -    |            |
| HCC4072BD  | 9201/082/03 or 04           |               |                                   | DIL-14  |                    | 920108203 or 04        | 2.20     |      |            |
| HCC4073BK  | 9201/064/01 or 02           |               |                                   | Flat-14 |                    | 920106401 or 02        | 0.70     | Y    |            |
| HCC4073BD  | 9201/064/03 or 04           |               |                                   | DIL-14  |                    | 920106403 or 04        | 2.20     |      |            |
| HCC4075BK  | 9201/065/01 or 02           |               |                                   | Flat-14 |                    | 920106501 or 02        | 0.70     | -    |            |
| HCC4075BD  | 9201/065/03 or 04           |               |                                   | DIL-14  |                    | 920106503 or 04        | 2.20     |      |            |
| HCC4076BK  | 9306/022/01 or 02           |               |                                   | Flat-16 |                    | 930602201 or 02        | 0.70     | Y    |            |
| HCC4076BD  | 9306/022/08 or 09           |               |                                   | DIL-16  |                    | 930602208 or 09        | 2.20     |      |            |
| HCC4077BK  | 9201/055/01 or 02           | Flat-14       | 920105501 or 02                   | 0.70    |                    |                        |          |      |            |
| HCC4077BD  | 9201/055/03 or 04           | DIL-14        | 920105503 or 04                   | 2.20    | -                  |                        |          |      |            |
| HCC4078BK  | 9201/062/01 or 02           | Flat-14       | 920106201 or 02                   | 0.70    |                    |                        |          |      |            |
| HCC4078BD  | 9201/062/03 or 04           | DIL-14        | 920106203 or 04                   | 2.20    |                    |                        |          |      |            |
| HCC4081BK  | 9201/052/01 or 02           | Flat-14       | 920105201 or 02                   | 0.70    | Y                  |                        |          |      |            |



Table 10. Ordering information (continued)

| Order code | ESCC detailed specification | Quality level | Comment                           | Package | Lead finish        | Marking <sup>(1)</sup> | Mass (g) | EPPL | Packing    |   |
|------------|-----------------------------|---------------|-----------------------------------|---------|--------------------|------------------------|----------|------|------------|---|
| HCC4081BD  | 9201/052/03 or 04           | ESCC flight   | Specify ESCC variant number in PO | DIL-14  | Gold or solder dip | 920105203 or 04        | 2.20     | -    | Strip pack |   |
| HCC4082BK  | 9201/066/01 or 02           |               |                                   | Flat-14 |                    | 920106601 or 02        | 0.70     |      |            |   |
| HCC4082BD  | 9201/066/03 or 04           |               |                                   | DIL-14  |                    | 920106603 or 04        | 2.20     |      |            |   |
| HCC4093BK  | 9409/002/01 or 02           |               |                                   | Flat-14 |                    | 940900201 or 02        | 0.70     |      |            | Y |
| HCC4093BD  | 9409/002/03 or 04           |               |                                   | DIL-14  |                    | 940900203 or 04        | 2.20     |      |            | - |
| HCC4094BK  | 9306/026/01 or 02           |               |                                   | Flat-16 |                    | 930602601 or 02        | 0.70     |      |            | Y |
| HCC4094BD  | 9306/026/08 or 09           |               |                                   | DIL-16  |                    | 930602608 or 09        | 2.20     |      |            | - |
| HCC4098BK  | 9206/003/01 or 02           |               |                                   | Flat-16 |                    | 920600301 or 02        | 0.70     |      |            | Y |
| HCC4098BD  | 9206/003/08 or 09           |               |                                   | DIL-16  |                    | 920600308 or 09        | 2.20     |      |            | - |
| HCC40103BK | 9204/036/01 or 02           |               |                                   | Flat-16 |                    | 920403601 or 02        | 0.70     |      |            | Y |
| HCC40103BD | 9204/036/08 or 09           |               |                                   | DIL-16  |                    | 920403608 or 09        | 2.20     |      |            | - |
| HCC40106BK | 9409/005/01 or 02           |               |                                   | Flat-14 |                    | 940900501 or 02        | 0.70     |      |            | Y |
| HCC40106BD | 9409/005/03 or 04           |               |                                   | DIL-14  |                    | 940900503 or 04        | 2.20     |      |            | - |
| HCC40107BK | 9401/013/01 or 02           |               |                                   | Flat-14 |                    | 940101301 or 02        | 0.70     |      |            | Y |
| HCC40107BD | 9401/013/03 or 04           |               |                                   | DIL-14  |                    | 940101303 or 04        | 2.20     |      |            | - |
| HCC40109BK | 9407/003/01 or 02           |               |                                   | Flat-16 |                    | 940700301 or 02        | 0.70     |      |            | Y |
| HCC40109BD | 9407/003/08 or 09           |               |                                   | DIL-16  |                    | 940700308 or 09        | 2.20     |      |            | - |
| HCC40161BK | 9204/054/01 or 02           |               |                                   | Flat-16 |                    | 920405401 or 02        | 0.70     |      |            | Y |
| HCC40161BD | 9204/054/08 or 09           |               |                                   | DIL-16  |                    | 920405408 or 09        | 2.20     |      |            | - |
| HCC40174BK | 9203/038/01 or 02           |               |                                   | Flat-16 |                    | 920303801 or 02        | 0.70     |      |            | Y |
| HCC40174BD | 9203/038/08 or 09           | DIL-16        | 920303808 or 09                   | 2.20    | -                  |                        |          |      |            |   |
| HCC40193BK | 9204/041/01 or 02           | Flat-16       | 920404101 or 02                   | 0.70    | -                  |                        |          |      |            |   |
| HCC40193BD | 9204/041/08 or 09           | DIL-16        | 920404108 or 09                   | 2.20    | -                  |                        |          |      |            |   |
| HCC4503BK  | 9401/030/01 or 02           | Flat-16       | 940103001 or 02                   | 0.70    | Y                  |                        |          |      |            |   |
| HCC4503BD  | 9401/030/08 or 09           | DIL-16        | 940103008 or 09                   | 2.20    | -                  |                        |          |      |            |   |



Table 10. Ordering information (continued)

| Order code | ESCC detailed specification | Quality level | Comment                           | Package | Lead finish        | Marking <sup>(1)</sup> | Mass (g) | EPPL | Packing    |
|------------|-----------------------------|---------------|-----------------------------------|---------|--------------------|------------------------|----------|------|------------|
| HCC4512BK  | 9408/006/01 or 02           | ESCC flight   | Specify ESCC variant number in PO | Flat-16 | Gold or solder dip | 940800601 or 02        | 0.70     | Y    | Strip pack |
| HCC4512BD  | 9408/006/08 or 09           |               |                                   | DIL-16  |                    | 940800608 or 09        | 2.20     |      |            |
| HCC4514BK  | 9408/012/01 or 02           |               |                                   | Flat-24 |                    | 940801201 or 02        | 1.70     |      |            |
| HCC4514BD  | 9408/012/03 or 04           |               |                                   | DIL-24  |                    | 940801203 or 04        | 5.20     |      |            |
| HCC4515BK  | 9205/011/01 or 02           |               |                                   | Flat-24 |                    | 920501101 or 02        | 1.70     |      |            |
| HCC4515BD  | 9205/011/03 or 04           |               |                                   | DIL-24  |                    | 920501103 or 04        | 5.20     |      |            |
| HCC4516BK  | 9204/045/01 or 02           |               |                                   | Flat-16 |                    | 920404501 or 02        | 0.70     |      |            |
| HCC4516BD  | 9204/045/08 or 09           |               |                                   | DIL-16  |                    | 920404508 or 09        | 2.20     |      |            |
| HCC4520BK  | 9204/028/01 or 02           |               |                                   | Flat-16 |                    | 920402801 or 02        | 0.70     |      |            |
| HCC4520BD  | 9204/028/08 or 09           |               |                                   | DIL-16  |                    | 920402808 or 09        | 2.20     |      |            |
| HCC4532BK  | 9202/065/01 or 02           |               |                                   | Flat-16 |                    | 920206501 or 02        | 0.70     |      |            |
| HCC4532BD  | 9202/065/08 or 09           |               |                                   | DIL-16  |                    | 920206508 or 09        | 2.20     |      |            |
| HCC4538BK  | 9207/007/01 or 02           |               |                                   | Flat-16 |                    | 920700701 or 02        | 0.70     |      |            |
| HCC4538BD  | 9207/007/08 or 09           |               |                                   | DIL-16  |                    | 920700708 or 09        | 2.20     |      |            |
| HCC4555BK  | 9408/011/01 or 02           |               |                                   | Flat-16 |                    | 940801101 or 02        | 0.70     |      |            |
| HCC4555BD  | 9408/011/08 or 09           |               |                                   | DIL-16  |                    | 940801108 or 09        | 2.20     |      |            |
| HCC4556BK  | 9408/025/01 or 02           |               |                                   | Flat-16 |                    | 940802501 or 02        | 0.70     |      |            |
| HCC4556BD  | 9408/025/08 or 09           |               |                                   | DIL-16  |                    | 940802508 or 09        | 2.20     |      |            |

1. Specific marking only. Complete marking includes the following:

- ST logo
- ESA logo
- Date code (date the package was sealed) in YYYYWA (year, week number, and week index)
- ESCC part number (as mentioned in above table)
- Country of origin (FR = France)
- Part serial number within the assembly lot

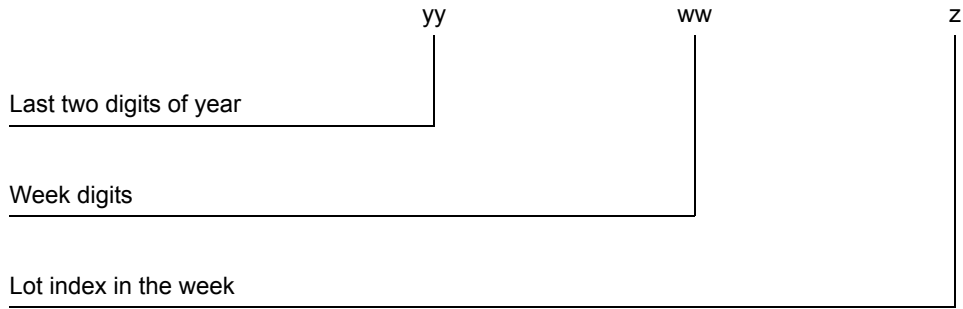
**Note:** -Contact the ST sales office for information about the specific conditions for other CMOS4000 part numbers and products in die form.



## 6 Other information

### 6.1 Data code

The data code for “ESCC flight” is structured as follows: yywwz, where:



### 6.2 Documentation

**Table 11. Documentation provided for ESCC flight**

| Quality level | Documentation                                |
|---------------|--|
| ESCC flight   | Certificate of conformance                   |
|               | 0.1 rad/s radiation verification test report |



## 7 Revision history

**Table 12. Document revision history**

| Date        | Revision | Changes  |
|-------------|----------|--|
| 24-Mar-2010 | 1        | First release  |
| 29-Mar-2010 | 2        | Updated cover page description   |
| 10-Aug-2011 | 3        | Added <i>note 1. on page 12, note 1. on page 13, note 1. on page 14, note 1. on page 15, note 1. on page 16, note 1. on page 17</i> and in the "Pin connections" diagram on the cover page.  |
| 26-Apr-2013 | 4        | Small text change to <i>Description</i> .<br><i>Table 1: Device summary</i> : removed part numbers HCC4016B, HCC4035B, HCC4099B, HCC4502B, and HCC4508B; updated ESCC specification for HCC4098B (9206/003 instead of 9206/002).<br>Added "inches" dimensions to <i>Table 4, Table 5, Table 6, Table 7, Table 8, and Table 9</i> .<br>Updated <i>Table 11: Documentation provided for ESCC flight</i> .<br>Added <i>Section 6: Other information</i> . |

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