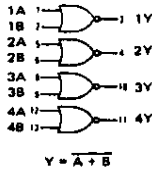
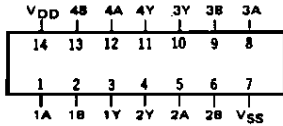


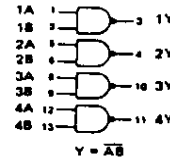
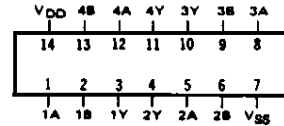
**SCL4001UB**

UNBUFFERED QUAD TWO INPUT NOR GATE



**SCL4011UB**

UNBUFFERED QUAD TWO INPUT NAND GATE



**STATIC CHARACTERISTICS: ( V<sub>SS</sub> = 0 V )**

| PARAMETER                                   | CONDITIONS   | V <sub>DD</sub><br>(Vdc) | T <sub>LOW</sub> * |      | + 25°C |        |      | T <sub>HIGH</sub> ** |     | UNIT             |
|---|--|--------------------------|--------------------|------|--------|--------|------|----------------------|-----|------------------|
|   |  |                          | MIN                | MAX  | MIN    | TYP    | MAX  | MIN                  | MAX |                  |
| QUIESCENT DEVICE<br>CURRENT I <sub>DD</sub> | V <sub>IN</sub> = V <sub>SS</sub> OR V <sub>DD</sub> | 5                        |                    | 0.05 |        | 0.0005 | 0.05 |                      | 1.5 | μA <sub>dc</sub> |
|   |  | 10                       |                    | 0.1  |        | 0.001  | 0.1  |                      | 3.0 |                  |
|   |  | 15                       |                    | 0.2  |        | 0.002  | 0.2  |                      | 6.0 |                  |

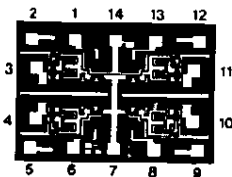
Note: \*T<sub>LOW</sub> = -55°C for C / H devices, -40°C for E / S devices, \*\*T<sub>HIGH</sub> = +125°C for C / H devices, +85°C for E / S devices.

**DYNAMIC CHARACTERISTICS: ( CL = 50pF, TA = 25°C )**

| PARAMETER   | V <sub>DD</sub><br>Vdc | MINIMUM | TYPICAL | MAXIMUM | UNIT |
|---|------------------------|---------|---------|---------|------|
| PROPAGATION DELAY<br>TIME t <sub>PLH</sub> , t <sub>PHL</sub> | 5                      |         | 60      | 120     | ns   |
|   | 10                     |         | 30      | 60      |      |
|   | 15                     |         | 25      | 50      |      |
| OUTPUT TRANSITION<br>TIME t <sub>TLH</sub> , t <sub>THL</sub> | 5                      |         | 100     | 200     | ns   |
|   | 10                     |         | 50      | 100     |      |
|   | 15                     |         | 40      | 80      |      |

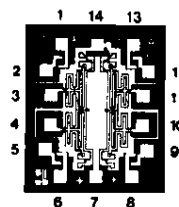
**DIE DRAWING**

SCL4001UB  
62 x 44 mils



**DIE DRAWING**

SCL4011UB  
43 x 52 mils



Note: Refer to "SCL4000B SERIES FAMILY SPECIFICATIONS" for remaining Dynamic & Static Characteristics, and, for recommended and maximum operating conditions.

**SCL4000B SERIES CERDIP PRODUCT FLOW**

This product flow applies to all 14, 16, and 24 lead ceramic dual-in-line packaged products with a glass-frit hermetic seal (Cerdip).

| <b>Product Flow Step</b> | <b>Mil Grade Cerdip<br/>Suffix CL</b>                      | <b>Enhanced Cerdip<br/>Suffix C+</b>                       | <b>Standard Cerdip<br/>Suffix C</b> |
|--------------------------|--|--|-------------------------------------|
| Wafer Fabrication        | Identical Circuit Design and Wafer Fabrication Processes   |  |                                     |
| Wafer Probe              | 100% Probe with Identical Test Programs                    |  |                                     |
| Optical Inspection       | 100% to Mil Std 883 Method 2010 B                          |  |                                     |
| QC Optical Inspection    | Mil Std 883 Method 2010 B 0.65% AQL II                     |  |                                     |
| Die Attach               | Glass  |  |                                     |
| Temperature Cycle        | 100% Ten Cycles -65°C to +150 C                            |  |                                     |
| Centrifuge               | 100% 30kg Method 2001 Y1 Direction                         |  |                                     |
| Tin Plate                | 400 to 1000 Microns  | 300 to 800 Microns   | 300 to 800 Microns                  |
| Solder Dip               | 200 Microns  | Not Applicable   | Not Applicable                      |
| Marking                  | Markem 7224 White  |  |                                     |
| Fine Leak                | 100% to Mil Std 883 Method 1014 B                          |  |                                     |
| Gross Leak               | 100% to Mil Std 883 Method 1014 C                          |  |                                     |
| Test                     | 100% DC at 25°C  |  |                                     |
| Burn-in                  | 100% Static Burn-in<br>168 Hours at 125°C<br>Or Equivalent | 100% Static Burn-in<br>168 Hours at 125°C<br>Or Equivalent | Not Applicable                      |
| Post Test                | 100% DC at 25°C  | 100% DC at 25°C  | Not Applicable                      |
| QC Inspection            | DC at 25°C<br>LTPD 3% C=0<br>PDA 10%                       | DC at 25°C<br>LTPD 3% C=0<br>PDA 10%                       | Not Applicable                      |
| High Temperature Test    | 100% DC at 125°C   | Not Applicable   | Not Applicable                      |
| QC Inspection            | DC at 55°C<br>DC at 125°C<br>LTPD 3% C=0                   | Not Applicable   | Not Applicable                      |
| Final QC Inspection      | Fine and Gross Leak LTPD 5% C=0                            |  |                                     |
|                          | DC at 25°C 0.065% AQL II                                   |  |                                     |
|                          | Visual Inspection 0.65% AQL II                             |  |                                     |

**Product Flow Comparison - BCL vs 883**

This product flow chart compares the *R&E SCL4000BCL* product flow to an 883 fully compliant product flow.

| <b>Product Flow Step</b> | <b>SCL4xxxBCL</b>                                      | <b>883</b>      |
|--------------------------|--|-----------------|
| Wafer Fabrication        | Identical Circuit Design and Wafer Fabrication Process |                 |
| Wafer Probe              | 100% Probe with Identical Test Programs                |                 |
| Assembly                 | Glass Die Attach                                       | Gold Die Attach |
| Test                     | 100% DC at 25°C with Identical Test Programs           |                 |
| Post Room PDA            | 10%  | 5%              |
| High LTPD                | 3%   | 2%              |
| -55 C Production Test    | Not Performed  | 100%            |
| -55 C LTPD               | 5%   | 2%              |
| AC Production Test       | Not Performed  | 100%            |
| AC LTPD                  | Not Performed  | 2%              |
| Final Visual             | Sampled  | 100%            |
| Group Testing            | Not Performed  | A, B, C, D      |

**LTPD Sample Plans**

| <b>Plan</b> | <b>Sample Size</b> | <b>Allowable Rejects</b> |
|-------------|--------------------|--------------------------|
| 2%          | 116                | 0                        |
| 3%          | 76                 | 0                        |
| 5%          | 45                 | 0                        |

**SCL4000B SERIES FAMILY SPECIFICATIONS****ABSOLUTE MAXIMUM RATINGS:** (VOLTAGE REFERENCED TO  $V_{SS}$ )

| PARAMETER                           |          | CONDITIONS             | UNITS |
|-------------------------------------|----------|------------------------|-------|
| DC SUPPLY VOLTAGE                   | $V_{DD}$ | -0.5 to +18            | Vdc   |
| INPUT VOLTAGE                       | $V_{IN}$ | -0.5 to $V_{DD} + 0.5$ | Vdc   |
| DC INPUT CURRENT<br>(ANY ONE INPUT) | $I_{IN}$ | +/- 10                 | mAdc  |
| POWER DISSIPATION                   | $P_T$    | 300                    | mW    |
| STORAGE TEMPERATURE RANGE           | $T_S$    | -65 to +150            | °C    |

**RECOMMENDED OPERATING CONDITIONS:** (VOLTAGE REFERENCED TO  $V_{SS}$ )

| PARAMETER                   |          | CONDITIONS  | UNITS |
|-----------------------------|----------|-------------|-------|
| DC SUPPLY VOLTAGE           | $V_{DD}$ | 3 to 15     | Vdc   |
| OPERATING TEMPERATURE RANGE | $T_A$    |             |       |
| CERAMIC FRIT PACKAGE        |          | -55 to +125 | °C    |
| DIE IN WAFFLE PACK          |          | -55 to +125 |       |
| EPOXY MOLDED PACKAGE        |          | -40 to +85  |       |

PARAMETRIC LIMITS ARE GUARANTEED FOR  $V_{DD} = 5, 10, \text{ AND } 15 \text{ Vdc}$ . WHERE LOW POWER IS REQUIRED, THE SUPPLY VOLTAGE, CONSISTENT WITH REQUIRED SPEED SHOULD BE USED. FOR INCREASED NOISE IMMUNITY AND SPEED HIGHER SUPPLY VOLTAGES SHOULD BE SPECIFIED. THE LOWER LIMIT OF SUPPLY REGULATION IS 3 Vdc OR AS DETERMINED BY REQUIRED SYSTEM SPEED, NOISE IMMUNITY, OR INTERFACE REQUIREMENTS. THE UPPER LIMIT IS 15Vdc OR AS DETERMINED BY POWER DISSIPATION RESTRICTIONS OR INTERFACE REQUIREMENTS. UNUSED INPUTS MUST BE CONNECTED TO  $V_{DD}$ ,  $V_{SS}$  OR ANOTHER INPUT. ALWAYS USE PRECAUTIONS TO PROTECT AGAINST STATIC CHARGES.

## SCL4000B SERIES FAMILY SPECIFICATIONS

### ELECTRICAL SPECIFICATIONS

PARAMETRIC LIMITS LISTED HERE ARE GUARANTEED FOR THE ENTIRE SCL4000B SERIES FAMILY UNLESS OTHERWISE SPECIFIED ON THE DEVICE DATA SHEETS.

#### STATIC CHARACTERISTICS: ( $V_{SS} = 0\text{ V}$ )

| PARAMETER  | CONDITIONS  | $V_{DD}$<br>(Vdc) | $T_{LOW}^*$ |           | +25°C |               |           | $T_{HIGH}^{**}$ |           | UNIT          |     |               |
|--|---|-------------------|-------------|-----------|-------|---------------|-----------|-----------------|-----------|---------------|-----|---------------|
|  |   |                   | MIN         | MAX       | MIN   | TYP           | MAX       | MIN             | MAX       |               |     |               |
| QUIESCENT DEVICE CURRENT $I_{DD}$<br>GATES<br><br>BUFFERS, FLIP-FLOPS<br><br>MSI | $V_{IN} = V_{SS}$ OR $V_{DD}$<br>ALL VALID INPUT COMBINATIONS.  | 5                 |             | 0.05      |       | 0.0005        | 0.05      |                 | 1.5       | $\mu\text{A}$ |     |               |
|  |   | 10                |             | 0.1       |       | 0.001         | 0.1       |                 | 3.0       |               |     |               |
|  |   | 15                |             | 0.2       |       | 0.002         | 0.2       |                 | 6.0       |               |     |               |
|  |   |                   |             | 5         |       | 1.0           |           | 0.005           | 1.0       |               | 30  | $\mu\text{A}$ |
|  |   |                   |             | 10        |       | 2.0           |           | 0.01            | 2.0       |               | 60  |               |
|  |   |                   |             | 15        |       | 4.0           |           | 0.02            | 4.0       |               | 120 |               |
|  |   |                   |             | 5         |       | 5             |           | 0.05            | 5         |               | 150 | $\mu\text{A}$ |
|  |   |                   |             | 10        |       | 10            |           | 0.1             | 10        |               | 300 |               |
|  |   |                   |             | 15        |       | 20            |           | 0.2             | 20        |               | 600 |               |
| HIGH-LEVEL OUTPUT VOLTAGE $V_{OH}$   | $V_{IN} = V_{SS}$ OR $V_{DD}$<br>$ I_O  \leq 1\mu\text{A}$  | 5                 | 4.99        |           | 4.99  | 5             |           | 4.95            |           | Vdc           |     |               |
|  |   | 10                | 9.99        |           | 9.99  | 10            |           | 9.95            |           |               |     |               |
|  |   | 15                | 14.99       |           | 14.99 | 15            |           | 14.95           |           |               |     |               |
| LOW-LEVEL OUTPUT VOLTAGE $V_{OL}$  | $V_{IN} = V_{SS}$ OR $V_{DD}$<br>$ I_O  \leq 1\mu\text{A}$  | 5                 |             | 0.01      |       | 0             | 0.01      |                 | 0.05      | Vdc           |     |               |
|  |   | 10                |             | 0.01      |       | 0             | 0.01      |                 | 0.05      |               |     |               |
|  |   | 15                |             | 0.01      |       | 0             | 0.01      |                 | 0.05      |               |     |               |
| MINIMUM INPUT HIGH VOLTAGE $V_{IH}$  | $V_O = 0.5\text{V}$ OR $4.5\text{V}$<br>$V_O = 1.0\text{V}$ OR $9.0\text{V}$<br>$V_O = 1.5\text{V}$ OR $13.5\text{V}$ | 5                 |             | 3.5       |       | 2.75          | 3.5       |                 | 3.5       | Vdc           |     |               |
|  |   | 10                |             | 7.0       |       | 5.5           | 7.0       |                 | 7.0       |               |     |               |
|  |   | 15                |             | 11.0      |       | 8.25          | 11.0      |                 | 11.0      |               |     |               |
| MAXIMUM INPUT LOW VOLTAGE $V_{IL}$   | $V_O = 0.5\text{V}$ OR $4.5\text{V}$<br>$V_O = 1.0\text{V}$ OR $9.0\text{V}$<br>$V_O = 1.5\text{V}$ OR $13.5\text{V}$ | 5                 | 1.5         |           | 1.5   | 2.25          |           | 1.5             |           | Vdc           |     |               |
|  |   | 10                | 3.0         |           | 3.0   | 4.5           |           | 3.0             |           |               |     |               |
|  |   | 15                | 4.0         |           | 4.0   | 6.75          |           | 4.0             |           |               |     |               |
| INPUT CURRENT $I_{IN}$   | $V_{IN} = 0$ OR $15\text{ V}$   | 15                |             | $\pm 0.1$ |       | $\pm 10^{-5}$ | $\pm 0.1$ |                 | $\pm 1.0$ | $\mu\text{A}$ |     |               |
| OUTPUT LOW CURRENT (B REV) $I_{OL}$<br>$V_{IN} = V_{SS}$ OR $V_{DD}$             | $V_{OL} = 0.4\text{V}$<br>$V_{OL} = 0.5\text{V}$<br>$V_{OL} = 1.5\text{V}$  | 5                 | 0.64        |           | 0.51  | 1.25          |           | 0.36            |           | mA            |     |               |
|  |   | 10                | 1.6         |           | 1.3   | 3.25          |           | 0.9             |           |               |     |               |
|  |   | 15                | 4.2         |           | 3.4   | 10            |           | 2.4             |           |               |     |               |
| OUTPUT HIGH CURRENT (B REV) $I_{OH}$<br>$V_{IN} = V_{SS}$ OR $V_{DD}$            | $V_{OH} = 4.6\text{V}$<br>$V_{OH} = 9.5\text{V}$<br>$V_{OH} = 13.5\text{V}$   | 5                 | -0.64       |           | -0.51 | -1.25         |           | -0.36           |           | mA            |     |               |
|  |   | 10                | -1.6        |           | -1.3  | -3.25         |           | -0.9            |           |               |     |               |
|  |   | 15                | -4.2        |           | -3.4  | -10           |           | -2.4            |           |               |     |               |
| OUTPUT HIGH CURRENT† $I_{OH}$<br>$V_{IN} = V_{SS}$ OR $V_{DD}$                   | $V_{OH} = 4.6\text{V}$<br>$V_{OH} = 9.5\text{V}$<br>$V_{OH} = 13.5\text{V}$   | 5                 | -0.25       |           | -0.2  |               |           | -0.14           |           | mA            |     |               |
|  |   | 10                | -0.62       |           | -0.5  |               |           | -0.35           |           |               |     |               |
|  |   | 15                | -1.8        |           | -1.5  |               |           | -1.1            |           |               |     |               |

**SCL4000B SERIES FAMILY SPECIFICATIONS**

**STATIC CHARACTERISTICS†: (V<sub>SS</sub> = 0 V)**

| PARAMETER                                     | CONDITIONS                     | V <sub>DD</sub><br>(Vdc) | T <sub>LOW</sub> * |      | +25°C |      |      | T <sub>HIGH</sub> ** |      | UNITS |
|---|--------------------------------|--------------------------|--------------------|------|-------|------|------|----------------------|------|-------|
|   |                                |                          | MIN                | MAX  | MIN   | TYP  | MAX  | MIN                  | MAX  |       |
| MINIMUM INPUT HIGH<br>VOLTAGE V <sub>IH</sub> | V <sub>O</sub> = 0.5V OR 4.5V  | 5                        |                    | 4.0  |       | 2.75 | 4.0  |                      | 4.0  | Vdc   |
|   | V <sub>O</sub> = 1.0V OR 9.0V  | 10                       |                    | 8.0  |       | 5.5  | 8.0  |                      | 8.0  |       |
|   | V <sub>O</sub> = 1.5V OR 13.5V | 15                       |                    | 12.0 |       | 8.25 | 12.0 |                      | 12.0 |       |
| MAXIMUM INPUT LOW<br>VOLTAGE V <sub>IL</sub>  | V <sub>O</sub> = 0.5V OR 4.5V  | 5                        | 1.0                |      | 1.0   | 2.25 |      | 1.0                  |      | Vdc   |
|   | V <sub>O</sub> = 1.0V OR 9.0V  | 10                       | 2.0                |      | 2.0   | 4.5  |      | 2.0                  |      |       |
|   | V <sub>O</sub> = 1.5V OR 13.5V | 15                       | 3.0                |      | 3.0   | 6.75 |      | 3.0                  |      |       |

**DYNAMIC CHARACTERISTICS: (T<sub>A</sub> = 25 ° C)**

| PARAMETER                         | V <sub>DD</sub><br>(Vdc) | MINIMUM | TYPICAL | MAXIMUM | UNIT |
|-----------------------------------|--------------------------|---------|---------|---------|------|
| INPUT CAPACITANCE C <sub>IN</sub> |                          |         | 7.5     |         | pF   |

**NOTES:**

- \* T<sub>LOW</sub> = -55 °C FOR C, C+, and, HN DEVICES  
-40 °C FOR E, and, S DEVICES
- \*\* T<sub>HIGH</sub> = + 125 °C FOR C, C+, and, HN DEVICES  
+ 85 °C FOR E, and, S DEVICES
- † THIS SPECIFICATION APPLIES ONLY TO THE BELOW LISTED DEVICE TYPES:  
4018B, 4024B, 4029B, 4035B, 4402B, 4412B, 4428B, 4510B, 4512B, 4514B,  
4515B, 4516B, 4527B, 4528B, 4531B, 4555B, 4556B, 4581B, 4582B, 4585B.
- ‡ THIS SPECIFICATION APPLIES ONLY TO THE BELOW LISTED DEVICE TYPES:  
4001UB, 4007UB, 4009UB, 4011UB, 4041UB, 4049UB, 4069UB, 4441UB, 4449UB.

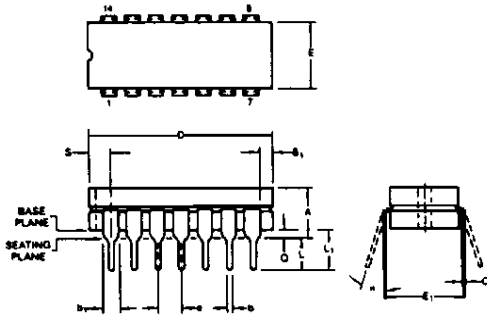
**MARKING INFORMATION**

| <u>SCL</u>          | <u>4xxxB</u>                                    | <u>C</u>                               | .   |
|---------------------|---|--|---|
| <b>Family Type</b>  | <b>Device Type</b>                              | <b>Package Type</b>                    | <b>Screening Level</b>  |
| Standard CMOS Logic | Consists of four numerals & one or two letters. | C = CERDIL<br>E = PDIL<br>S = SMD/SOIC | • = Standard Test<br>+ = Plus Tested Enhanced Screening<br>L = High Reliability Screening |

SCL4000B SERIES PACKAGE SPECIFICATIONS

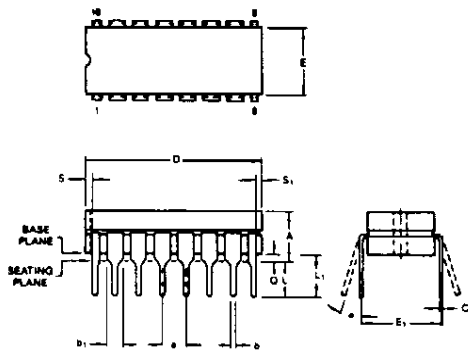
SUFFIX 'C' - CERAMIC GLASS FRIT SEAL DUAL IN LINE (CERDIP)

14 LEAD



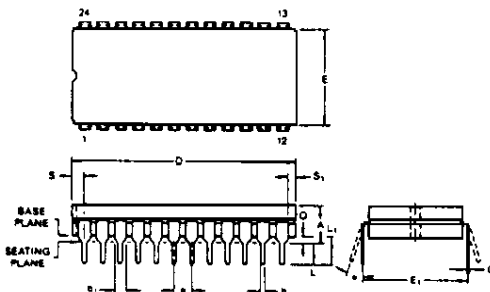
|                | Inches |       | Millimeters |        |
|----------------|--------|-------|-------------|--------|
|                | Min    | Max   | Min         | Max    |
| A              | —      | 0.200 | —           | 5.080  |
| Q              | 0.015  | 0.045 | 0.381       | 1.143  |
| b              | 0.015  | 0.023 | 0.381       | 0.584  |
| b <sub>1</sub> | 0.050  | 0.070 | 1.270       | 1.778  |
| C              | 0.008  | 0.015 | 0.203       | 0.381  |
| D              | 0.745  | 0.795 | 18.923      | 20.193 |
| E              | 0.242  | 0.302 | 6.147       | 7.671  |
| e              | 0.090  | 0.110 | 2.286       | 2.794  |
| E <sub>1</sub> | 0.290  | 0.320 | 7.366       | 8.128  |
| L              | 0.125  | 0.160 | 3.175       | 4.064  |
| L <sub>1</sub> | 0.150  | —     | 3.810       | —      |
| α              | 0-15°  |       | 0-15°       |        |
| S              | —      | 0.098 | —           | 2.489  |
| S <sub>1</sub> | 0.025  | —     | 0.635       | —      |

16 LEAD



|                | Inches |       | Millimeters |        |
|----------------|--------|-------|-------------|--------|
|                | Min    | Max   | Min         | Max    |
| A              | —      | 0.200 | —           | 5.080  |
| Q              | 0.015  | 0.045 | 0.381       | 1.143  |
| b              | 0.015  | 0.023 | 0.381       | 0.584  |
| b <sub>1</sub> | 0.050  | 0.070 | 1.270       | 1.778  |
| C              | 0.008  | 0.015 | 0.203       | 0.381  |
| D              | 0.745  | 0.795 | 18.923      | 20.193 |
| E              | 0.242  | 0.302 | 6.147       | 7.671  |
| e              | 0.090  | 0.110 | 2.286       | 2.794  |
| E <sub>1</sub> | 0.290  | 0.320 | 7.366       | 8.128  |
| L              | 0.125  | 0.160 | 3.175       | 4.064  |
| L <sub>1</sub> | 0.150  | —     | 3.810       | —      |
| α              | 0-15°  |       | 0-15°       |        |
| S              | —      | 0.060 | —           | 1.524  |
| S <sub>1</sub> | 0.005  | —     | 0.127       | —      |

24 LEAD



|                | Inches |       | Millimeters |        |
|----------------|--------|-------|-------------|--------|
|                | Min    | Max   | Min         | Max    |
| A              | —      | 0.200 | —           | 5.080  |
| Q              | 0.015  | 0.045 | 0.381       | 1.143  |
| b              | 0.015  | 0.023 | 0.381       | 0.584  |
| b <sub>1</sub> | 0.050  | 0.070 | 1.270       | 1.778  |
| C              | 0.008  | 0.015 | 0.203       | 0.381  |
| D              | 1.235  | 1.290 | 31.369      | 32.766 |
| E              | 0.510  | 0.545 | 12.954      | 13.843 |
| e              | 0.090  | 0.110 | 2.286       | 2.794  |
| E <sub>1</sub> | 0.590  | 0.620 | 14.986      | 15.748 |
| L              | 0.125  | 0.160 | 3.175       | 4.064  |
| L <sub>1</sub> | 0.150  | —     | 3.810       | —      |
| α              | 0-15°  |       | 0-15°       |        |
| S              | —      | 0.098 | —           | 2.489  |
| S <sub>1</sub> | 0.025  | —     | 0.635       | —      |