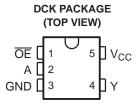
SCES455B-DECEMBER 2003-REVISED JUNE 2006



FEATURES

- **Controlled Baseline**
 - One Assembly/Test Site, One Fabrication
- **Enhanced Diminishing Manufacturing** Sources (DMS) Support
- **Enhanced Product-Change Notification**
- Qualification Pedigree (1)
- **Supports 5-V V_{CC} Operation**
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 3.7 ns at 3.3 V
- (1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

- Low Power Consumption, 10-μA Max I_{CC}
- ±24-mA Output Drive at 3.3 V
- I_{off} Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78. Class II
- **ESD Protection Exceeds JESD 22**
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)



DESCRIPTION/ORDERING INFORMATION

This bus buffer gate is designed for 1.65-V to 5.5-V $V_{\rm CC}$ operation.

The SN74LVC1G125 is a single line driver with a 3-state output. The output is disabled when the output-enable (OE) input is high.

This device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

ORDERING INFORMATION

| T _A | PACKAGE ⁽¹⁾ | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|--------------------------------|--------------|-----------------------|------------------|
| -40°C to 85°C | SOT (SC-70) – DCK Reel of 3000 | | CLVC1G125IDCKREP | СМО |
| -55°C to 125°C | SOT (SC-70) - DCK | Reel of 3000 | CLVC1G125MDCKREP | СМО |

Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE

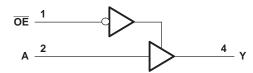
| INPU | JTS | OUTPUT |
|------|-----|--------|
| ŌĒ | Α | Y |
| L | Н | Н |
| L | L | L |
| Н | Χ | Z |



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



LOGIC DIAGRAM (POSITIVE LOGIC)



Absolute Maximum Ratings⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

| | | | MIN | MAX | UNIT |
|------------------|--|--------------------|-----------------------|------|------|
| V_{CC} | Supply voltage range | | -0.5 | 6.5 | V |
| VI | Input voltage range (2) | -0.5 | 6.5 | V | |
| Vo | Voltage range applied to any output in the high-impeda | -0.5 | 6.5 | V | |
| Vo | Voltage range applied to any output in the high or low | -0.5 | V _{CC} + 0.5 | V | |
| I _{IK} | Input clamp current | V _I < 0 | | -50 | mA |
| I_{OK} | Output clamp current | V _O < 0 | | -50 | mA |
| Io | Continuous output current | | | ±50 | mA |
| | Continuous current through V _{CC} or GND | | ±100 | mA | |
| θ_{JA} | Package thermal impedance ⁽⁴⁾ | | 252 | °C/W | |
| T _{stg} | Storage temperature range | -65 | 150 | °C | |

⁽¹⁾ Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

⁽²⁾ The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

⁽³⁾ The value of V_{CC} is provided in the recommended operating conditions table.

⁽⁴⁾ The package thermal impedance is calculated in accordance with JESD 51-7.

SN74LVC1G125-EP



Recommended Operating Conditions⁽¹⁾

| | | | MIN | MAX | UNIT |
|----------------|--|--|----------------------|----------------------|------|
| 1/ | Cumply valtage | Operating | 1.65 | 5.5 | V |
| V_{CC} | Supply voltage | Data retention only | 1.5 | | V |
| | | V _{CC} = 1.65 V to 1.95 V | $0.65 \times V_{CC}$ | | |
| \/ | High lavel input valtage | V _{CC} = 2.3 V to 2.7 V | 1.7 | | V |
| V_{IH} | High-level input voltage | V _{CC} = 3 V to 3.6 V | 2 | | V |
| | | V _{CC} = 4.5 V to 5.5 V | $0.7 \times V_{CC}$ | | |
| | | V _{CC} = 1.65 V to 1.95 V | | $0.35 \times V_{CC}$ | |
| \/ | Lavidaval innut valtana | V _{CC} = 2.3 V to 2.7 V | | 0.7 | |
| V_{IL} | Low-level input voltage | V _{CC} = 3 V to 3.6 V | | 0.8 | V |
| | | V _{CC} = 4.5 V to 5.5 V | | $0.3 \times V_{CC}$ | |
| V _I | Input voltage | , | 0 | 5.5 | V |
| Vo | Output voltage | | 0 | V _{CC} | V |
| | | V _{CC} = 1.65 V | | -4 | |
| | | V _{CC} = 2.3 V | | -8 | |
| I_{OH} | High-level output current | V 2V | | -16 | mA |
| | | V _{CC} = 3 V | | -24 | |
| | | V _{CC} = 4.5 V | | -32 | |
| | | V _{CC} = 1.65 V | | 4 | |
| | | V _{CC} = 2.3 V | | 8 | |
| I_{OL} | Low-level output current | V 0V | | 16 | mA |
| | | V _{CC} = 3 V | | 24 | |
| | | V _{CC} = 4.5 V | | 32 | |
| | | V_{CC} = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V | | 20 | |
| Δt/Δν | t/∆v Input transition rise or fall rate | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ | | 10 | ns/V |
| | | $V_{CC} = 5 V \pm 0.5 V$ | | | |
| _ | On a matter of the second of the second operations | , | -40 | 85 | 00 |
| T_A | Operating free-air temperature | | -55 | 125 | °C |

⁽¹⁾ All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

SN74LVC1G125-EP SINGLE BUS BUFFER GATE WITH 3-STATE OUTPUT

SCES455B-DECEMBER 2003-REVISED JUNE 2006



Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

| DADAMETED | TEST COMPITIONS | V | -40° | C to 85°C | | -55° | C to 125°C | | UNIT | |
|-------------------------------|---|-----------------|-----------------------|--------------------|------|-----------------------|--------------------|------|------|--|
| PARAMETER | TEST CONDITIONS | V _{cc} | MIN | TYP ⁽¹⁾ | MAX | MIN | TYP ⁽¹⁾ | MAX | MAX | |
| | $I_{OH} = -100 \mu A$ | 1.65 V to 5.5 V | V _{CC} - 0.1 | | | V _{CC} - 0.1 | | | | |
| | $I_{OH} = -4 \text{ mA}$ | 1.65 V | 1.2 | | | 1.2 | | | | |
| V | I _{OH} = -8 mA | 2.3 V | 1.9 | | | 1.9 | | | V | |
| V _{OH} | I _{OH} = -16 mA | 3 V | 2.4 | | | 2.4 | | | V | |
| | $I_{OH} = -24 \text{ mA}$ | 3 V | 2.3 | | | 2.3 | | | | |
| | I _{OH} = -32 mA | 4.5 V | 3.8 | | | 3.8 | | | | |
| | $I_{OL} = 100 \mu A$ | 1.65 V to 5.5 V | | | 0.1 | | | 0.1 | | |
| | $I_{OL} = 4 \text{ mA}$ | 1.65 V | | | 0.45 | | | 0.45 | | |
| V | $I_{OL} = 8 \text{ mA}$ | 2.3 V | | | 0.3 | | | 0.3 | V | |
| V _{OL} | I _{OL} = 16 mA | 3 V | | | 0.4 | | | 0.4 | | |
| | I _{OL} = 24 mA | 3 V | | | 0.55 | | | 0.60 | | |
| | I _{OL} = 32 mA | 4.5 V | | | 0.55 | | | 0.60 | | |
| I _I A or OE inputs | V _I = 5.5 V or GND | 0 V to 5.5 V | | | ±5 | | | ±5 | μΑ | |
| I _{off} | V_I or $V_O = 5.5 \text{ V}$ | 0 | | | ±10 | | | ±10 | μΑ | |
| I _{OZ} | V _O = 0 to 5.5 V | 3.6 V | | | 10 | | | 10 | μΑ | |
| I _{CC} | $V_I = 5.5 \text{ V or GND},$ $I_O = 0$ | 1.65 V to 5.5 V | | | 10 | | | 10 | μΑ | |
| Δl _{CC} | One input at V _{CC} – 0.6 V, Other inputs at V _{CC} or GND | 3 V to 5.5 V | | | 500 | | | 500 | μΑ | |
| C _i | $V_I = V_{CC}$ or GND | 3.3 V | | 4 | | | 4 | | pF | |

⁽¹⁾ All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

Switching Characteristics

over recommended operating free-air temperature range of -40° C to 85° C , $C_L = 15$ pF (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTBUT) | V _{CC} = ± 0.1 | | V _{CC} = ± 0. | 2.5 V 2 V | V _{CC} = ± 0.3 | | V _{CC} = ± 0.5 | | UNIT |
|-----------------|------------------|-------------|-------------------------|-----|------------------------|--------------|----------------------------|-----|----------------------------|-----|------|
| | (INPUT) (OUTPUT) | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | | |
| t _{pd} | A | Υ | 1.9 | 6.9 | 0.7 | 4.6 | 0.6 | 3.7 | 0.5 | 3.4 | ns |

Switching Characteristics

over recommended operating free-air temperature range of -40° C to 85° C, $C_L = 30$ pF or 50 pF (unless otherwise noted) (see Figure 2)

| PARAMETER | FROM | TO (OUTPUT) | V _{CC} = ± 0.1 | | V _{CC} = 1 ± 0.2 | | V _{CC} = ± 0. | | V _{CC} = ± 0. | | UNIT |
|------------------|---------|-------------|----------------------------|------|------------------------------|-----|------------------------|-----|------------------------|-----|------|
| | (INPUT) | (OUTPUT) | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | |
| t _{pd} | A | Y | 2.8 | 9 | 1.2 | 5.5 | 1 | 4.5 | 1 | 4 | ns |
| t _{en} | ŌĒ | Υ | 3.3 | 10.1 | 1.5 | 6.6 | 1 | 5.3 | 1 | 5 | ns |
| t _{dis} | ŌĒ | Υ | 1.3 | 9.2 | 1 | 5 | 1 | 5 | 1 | 4.2 | ns |



SN74LVC1G125-EP SINGLE BUS BUFFER GATE WITH 3-STATE OUTPUT

Switching Characteristics

over recommended operating free-air temperature range of -55° C to 125° C, $C_{L} = 50$ pF (unless otherwise noted) (see Figure 2)

| PARAMETER | PARAMETER FROM (INPUT) | | V _{CC} = 3.3 V ± 0.3 V | | V _{CC} = 5 V ± 0.5 V | | UNIT | |
|------------------|------------------------|----------|------------------------------------|-----|----------------------------------|-----|------|--|
| | (INFOT) | (OUTPUT) | MIN | MAX | MIN | MAX | | |
| t_{pd} | Α | Υ | 1 | 4.9 | 1 | 4 | ns | |
| t _{en} | ŌĒ | Υ | 1 | 5.8 | 1 | 5 | ns | |
| t _{dis} | ŌĒ | Υ | 1 | 5 | 1 | 4.2 | ns | |

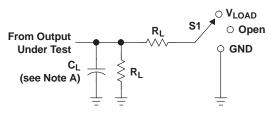
Operating Characteristics

 $T_A = 25^{\circ}C$

| | PARAMET | ER | TEST CONDITIONS | V _{CC} = 1.8 V TYP | V _{CC} = 2.5 V TYP | V _{CC} = 3.3 V TYP | V _{CC} = 5 V TYP | UNIT | |
|-----|-------------------|------------------|--------------------|--------------------------------|--------------------------------|--------------------------------|------------------------------|------|--|
| _ | Power dissipation | Outputs enabled | f = 10 MHz | 18 | 18 | 19 | 21 | pF | |
| Cpc | capacitance | Outputs disabled | I = IU IVIMZ | 2 | 2 | 2 | 4 | | |



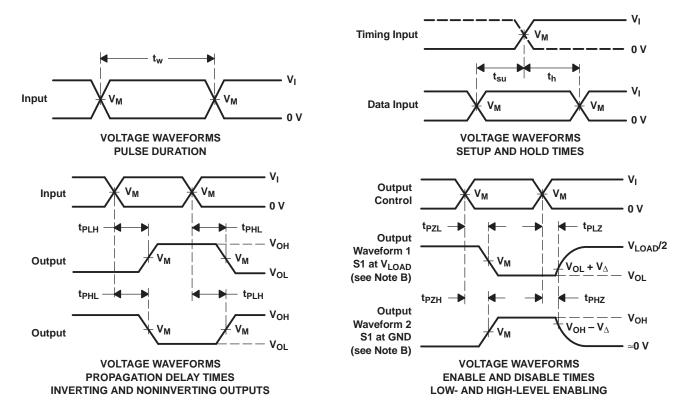
PARAMETER MEASUREMENT INFORMATION



| TEST | S1 | | |
|------------------------------------|-------------------|--|--|
| t _{PLH} /t _{PHL} | Open | | |
| t _{PLZ} /t _{PZL} | V _{LOAD} | | |
| t _{PHZ} /t _{PZH} | GND | | |

LOAD CIRCUIT

| ., | INI | PUTS | ., | v | | _ | ., |
|-------------------|-----------------|--------------------------------|--------------------|-------------------|-------|----------------|-----------------------------------|
| V _{CC} | VI | t _r /t _f | V _M | V _{LOAD} | CL | R _L | $V_{\!\scriptscriptstyle \Delta}$ |
| 1.8 V ± 0.15 V | V _{CC} | ≤2 ns | V _{CC} /2 | 2×V _{CC} | 15 pF | 1 ΜΩ | 0.15 V |
| 2.5 V \pm 0.2 V | V _{CC} | ≤2 ns | V _{CC} /2 | 2×V _{CC} | 15 pF | 1 M Ω | 0.15 V |
| 3.3 V \pm 0.3 V | 3 V | ≤2.5 ns | 1.5 V | 6 V | 15 pF | 1 M Ω | 0.3 V |
| 5 V \pm 0.5 V | V _{CC} | ≤2.5 ns | V _{CC} /2 | 2×V _{CC} | 15 pF | 1 M Ω | 0.3 V |

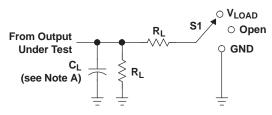


- NOTES: A. C_L includes probe and jig capacitance.
 - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
 - C. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_O = 50 \Omega$.
 - D. The outputs are measured one at a time, with one transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en}.
 - G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 - H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms



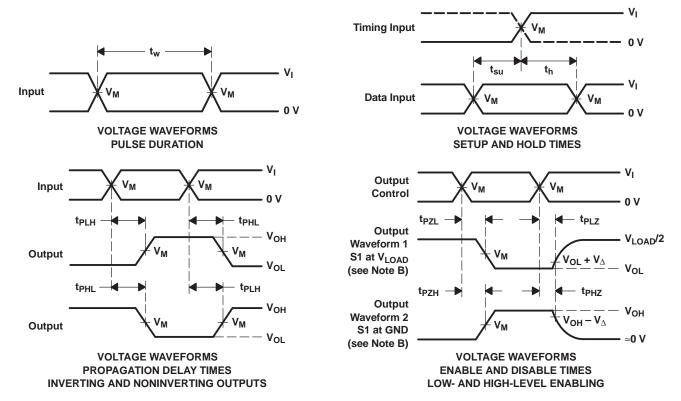
PARAMETER MEASUREMENT INFORMATION



| TEST | S1 |
|------------------------------------|-------------------|
| t _{PLH} /t _{PHL} | Open |
| t _{PLZ} /t _{PZL} | V _{LOAD} |
| t _{PHZ} /t _{PZH} | GND |

LOAD CIRCUIT

| V | INF | PUTS | ., | V | | | | |
|--------------------|-----------------|--------------------------------|--------------------|-------------------|-------|----------------|-----------------------------------|--|
| V _{CC} | VI | t _r /t _f | V _M | V _{LOAD} | CL | R _L | $V_{\!\scriptscriptstyle \Delta}$ | |
| 1.8 V \pm 0.15 V | V _{CC} | ≤ 2 ns | V _{CC} /2 | 2×V _{CC} | 30 pF | 1 k Ω | 0.15 V | |
| 2.5 V \pm 0.2 V | V _{CC} | ≤2 ns | V _{CC} /2 | 2×V _{CC} | 30 pF | 500 Ω | 0.15 V | |
| 3.3 V \pm 0.3 V | 3 V | ≤2.5 ns | 1.5 V | 6 V | 50 pF | 500 Ω | 0.3 V | |
| 5 V \pm 0.5 V | V _{CC} | ≤2.5 ns | V _{CC} /2 | 2×V _{CC} | 50 pF | 500 Ω | 0.3 V | |



- NOTES: A. C_L includes probe and jig capacitance.
 - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
 - C. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_O = 50 \Omega$.
 - D. The outputs are measured one at a time, with one transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en}.
 - G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 - H. All parameters and waveforms are not applicable to all devices.

Figure 2. Load Circuit and Voltage Waveforms





i.com 18-Sep-2008

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | e Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|-----------------|--------------------|------|----------------|---------------------------|------------------|------------------------------|
| CLVC1G125IDCKREP | ACTIVE | SC70 | DCK | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| CLVC1G125MDCKREP | ACTIVE | SC70 | DCK | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| V62/04735-01XE | ACTIVE | SC70 | DCK | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| V62/04735-02XE | ACTIVE | SC70 | DCK | 5 | 3000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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OTHER QUALIFIED VERSIONS OF SN74LVC1G125-EP:

• Catalog: SN74LVC1G125

Automotive: SN74LVC1G125-Q1

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Automotive Q100 devices qualified for high-reliability automotive applications targeting zero defects



TAPE AND REEL INFORMATION





| A0 | Dimension designed to accommodate the component width |
|----|---|
| В0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

| Device | Package Type | Package Drawing | | | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------------|-----------------|--------------------|---|------|--------------------------|--------------------------|---------|---------|---------|------------|-----------|------------------|
| CLVC1G125IDCKREP | SC70 | DCK | 5 | 3000 | 179.0 | 8.4 | 2.2 | 2.5 | 1.2 | 4.0 | 8.0 | Q3 |
| CLVC1G125MDCKREP | SC70 | DCK | 5 | 3000 | 179.0 | 8.4 | 2.2 | 2.5 | 1.2 | 4.0 | 8.0 | Q3 |





*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CLVC1G125IDCKREP | SC70 | DCK | 5 | 3000 | 195.0 | 200.0 | 45.0 |
| CLVC1G125MDCKREP | SC70 | DCK | 5 | 3000 | 195.0 | 200.0 | 45.0 |

DCK (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-203 variation AA.



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