To our customers,

# Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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# HD74LS373

## Octal D-type Transparent Latches (with three-state outputs)

REJ03D0482–0200
Rev.2.00
Feb.18.2005

The HD74LS373, 8-bit register features totem-pole three-state outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. The high-impedance third state and increased high-logic-level drive provide this register with the capacity of being connected directly to and driving the bus lines in a bus-organized system without need for interface or pull-up components. They are particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight latches are transparent D-type latches meaning that while the enable (G) is high the Q outputs will follow the data (D) inputs. When the enable is taken low the output will be latched at the level of the data that was setup.

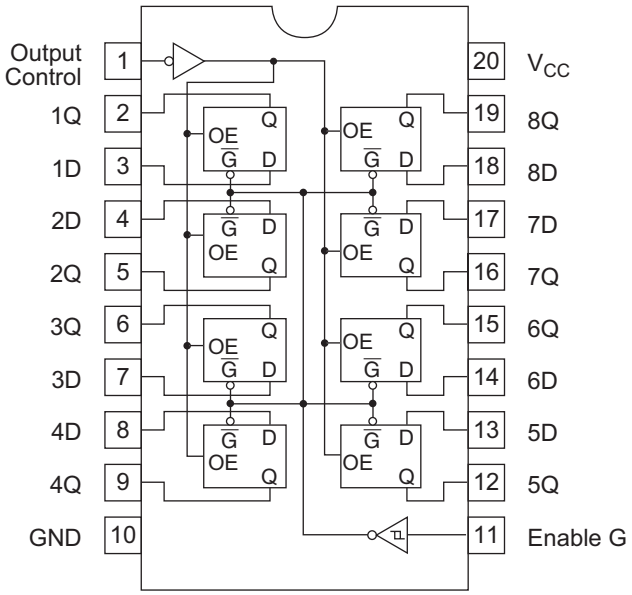
### Features

- Ordering Information

| Part Name | Package Type | Package Code (Previous Code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|---|---|---|---|---|
| HD74LS373P | DILP-20 pin | PRDP0020AC-B (DP-20NEV) | P | — |
| HD74LS373FPEL | SOP-20 pin (JEITA) | PRSP0020DD-B (FP-20DAV) | FP | EL (2,000 pcs/reel) |
| HD74LS373RPEL | SOP-20 pin (JEDEC) | PRSP0020DC-A (FP-20DBV) | RP | EL (1,000 pcs/reel) |

Note: Please consult the sales office for the above package availability.

### Pin Arrangement




(Top view)

## Function Table

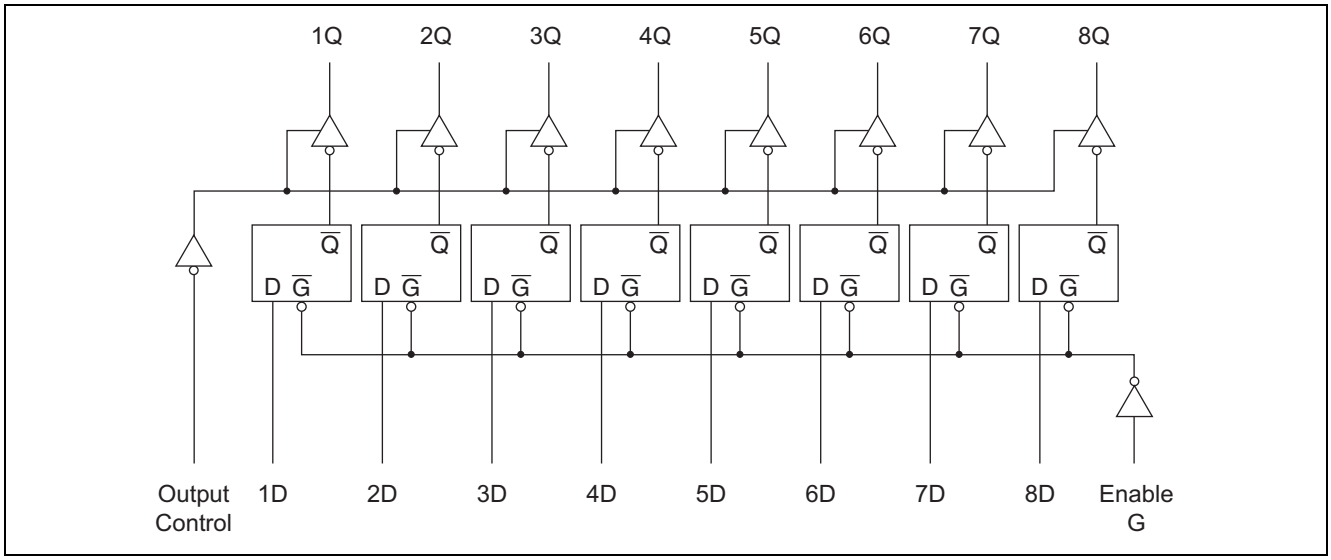
| Inputs | | | Output |
|---|---|---|---|
| **Output control** | **Enable G** | **D** | **Q** |
| L | H | H | H |
| L | H | L | L |
| L | L | X | $Q_0$ |
| H | X | X | Z |

Notes: H; high level, L; low level, X; irrelevant

$Q_0$; level of Q before the indicated steady-state input conditions were established

Z; off (high-impedance) state of a three-state output

## Block Diagram




## Absolute Maximum Ratings

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 7 | V |
| Input voltage | $V_{IN}$ | 7 | V |
| Power dissipation | $P_T$ | 400 | mW |
| Storage temperature | Tstg | –65 to +150 | °C |

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

## Recommended Operating Conditions

| Item | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply voltage | | $V_{CC}$ | 4.75 | 5.00 | 5.25 | V |
| Output voltage | | $V_{OH}$ | — | — | 5.5 | V |
| Output current | | $I_{OH}$ | — | — | –2.6 | mA |
| | | $I_{OL}$ | — | — | 24 | mA |
| Operating temperature | | Topr | –20 | 25 | 75 | °C |
| Enable pulse width | “H” Level | $t_w$ | 15 | — | — | ns |
| | “L” Level | | 15 | — | — | ns |
| Data setup time | | $t_{su}$ | 5↓ | — | — | ns |
| Data hold time | | $t_h$ | 20↓ | — | — | ns |

## Electrical Characteristics

(Ta = –20 to +75 °C)

| Item | Symbol | min. | typ.* | max. | Unit | Condition | |
|---|---|---|---|---|---|---|---|
| Input voltage | $V_{IH}$ | 2.0 | — | — | V | | |
| | $V_{IL}$ | — | — | 0.7 | V | Data inputs | |
| | | — | — | 0.8 | | G, Output control inputs | |
| Output voltage | $V_{OH}$ | 2.4 | — | — | V | $V_{CC}$ = 4.75 V, $V_{IH}$ = 2 V, $V_{IL}$ = $V_{IL\ max}$<br>$I_{OH}$ = –2.6 mA | |
| | $V_{OL}$ | — | — | 0.4 | V | $I_{OL}$ = 12 mA | $V_{CC}$ = 4.75 V, $V_{IH}$ = 2 V, $V_{IL}$ = $V_{IL\ max}$ |
| | | — | — | 0.5 | | $I_{OL}$ = 24 mA | |
| Output current | $I_{OZH}$ | — | — | 20 | µA | $V_O$ = 2.7 V | $V_{CC}$ = 5.25 V, $V_{IH}$ = 2 V |
| | $I_{OZL}$ | — | — | –20 | | $V_O$ = 0.4 V | |
| Input current | $I_{IH}$ | — | — | 20 | µA | $V_{CC}$ = 5.25 V, $V_I$ = 2.7 V | |
| | $I_{IL}$ | — | — | –0.4 | mA | $V_{CC}$ = 5.25 V, $V_I$ = 0.4 V | |
| | $I_I$ | — | — | 0.1 | mA | $V_{CC}$ = 5.25 V, $V_I$ = 7 V | |
| Short-circuit output current | $I_{OS}$ | –30 | — | –130 | mA | $V_{CC}$ = 5.25 V | |
| Supply current | $I_{CC}$ | — | 24 | 40 | mA | $V_{CC}$ = 5.25 V,<br>$V_I$ = 4.5 V (Output control) | |
| Input clamp voltage | $V_{IK}$ | — | — | –1.5 | V | $V_{CC}$ = 4.75 V, $I_{IN}$ = –18 mA | |

Note: * $V_{CC}$ = 5 V, Ta = 25°C

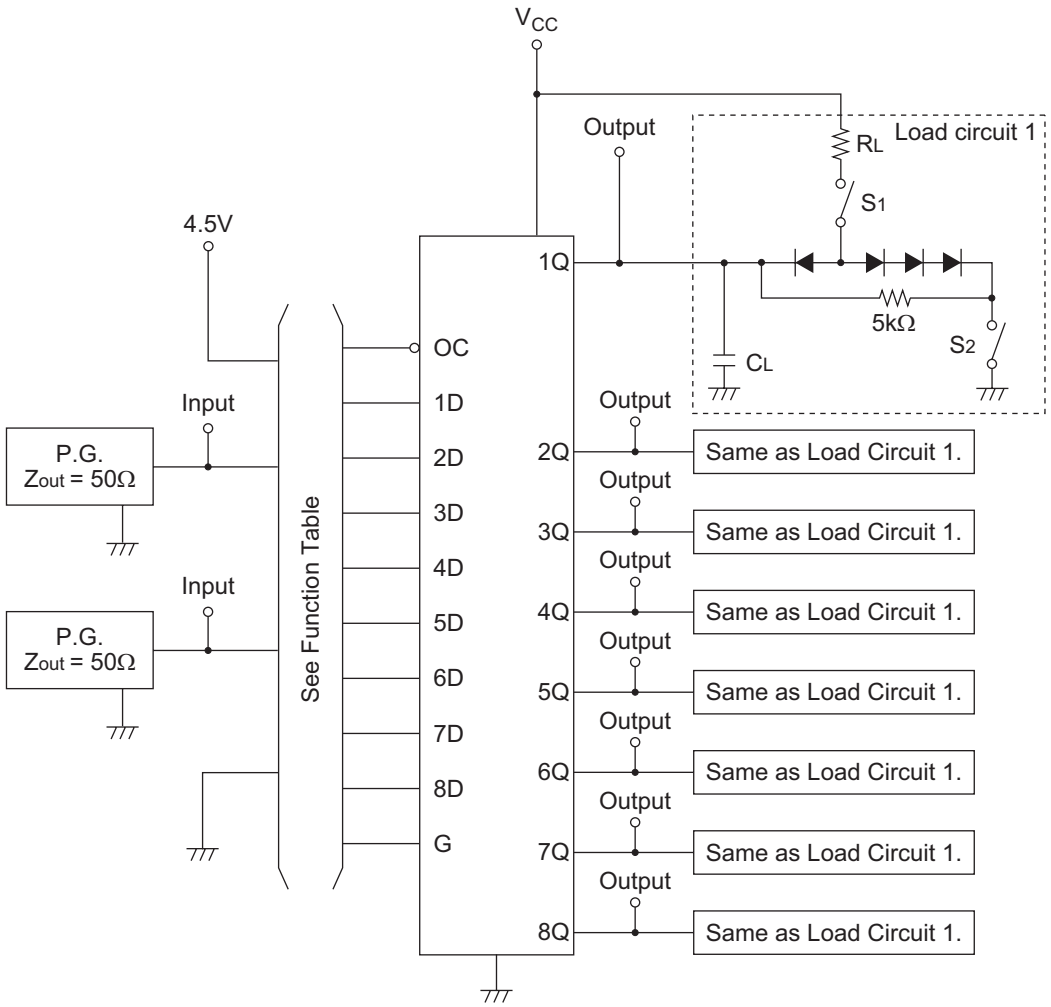
## Switching Characteristics

($V_{CC}$ = 5 V, Ta = 25°C)

| Item | Symbol | Input | Output | min. | typ. | max. | Unit | Condition |
|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$ | D | Q | — | 12 | 18 | ns | $C_L$ = 45 pF, $R_L$ = 667 Ω |
| | $t_{PHL}$ | | | — | 12 | 18 | | |
| | $t_{PLH}$ | G | Q | — | 20 | 30 | | |
| | $t_{PHL}$ | | | — | 18 | 30 | | |
| Output enable time | $t_{ZH}$ | OC | Q | — | 15 | 28 | | |
| | $t_{ZL}$ | | | — | 25 | 36 | | |
| Output disable time | $t_{HZ}$ | OC | Q | — | 12 | 20 | | $C_L$ = 5 pF, $R_L$ = 667 Ω |
| | $t_{LZ}$ | | | — | 15 | 25 | | |

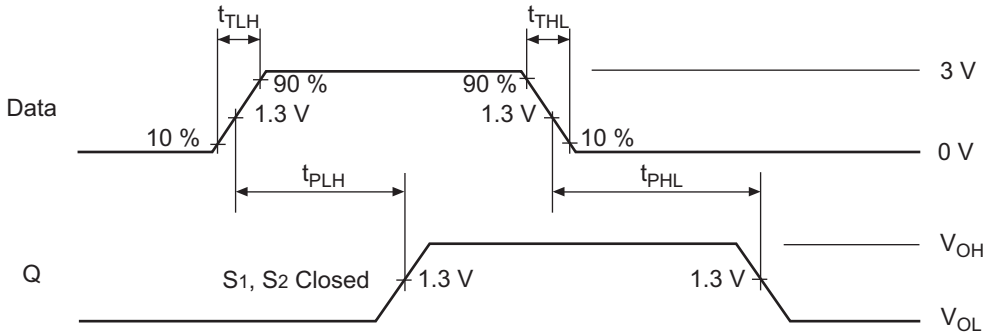
## Testing Method

### Test Circuit



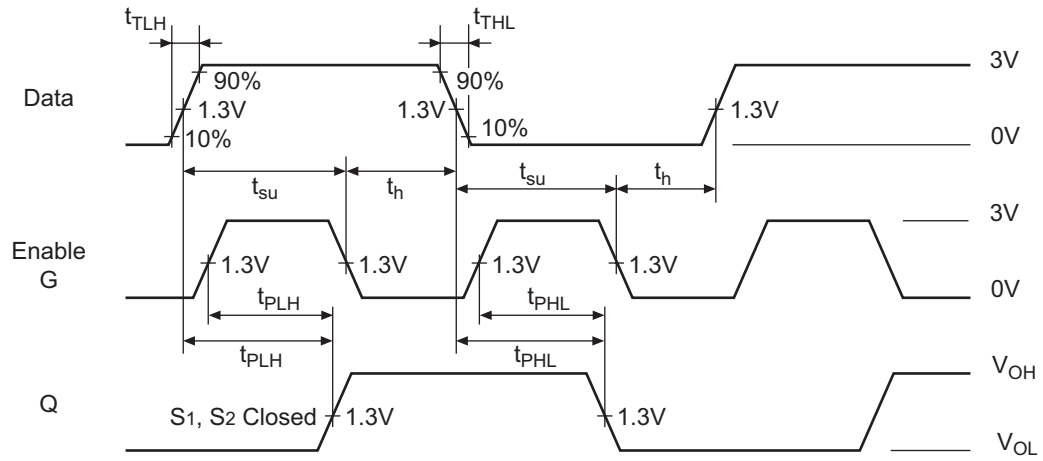

Notes: 1. $C_L$ includes probe and jig capacitance.
2. All diodes are 1S2074(H).

### Waveforms 1



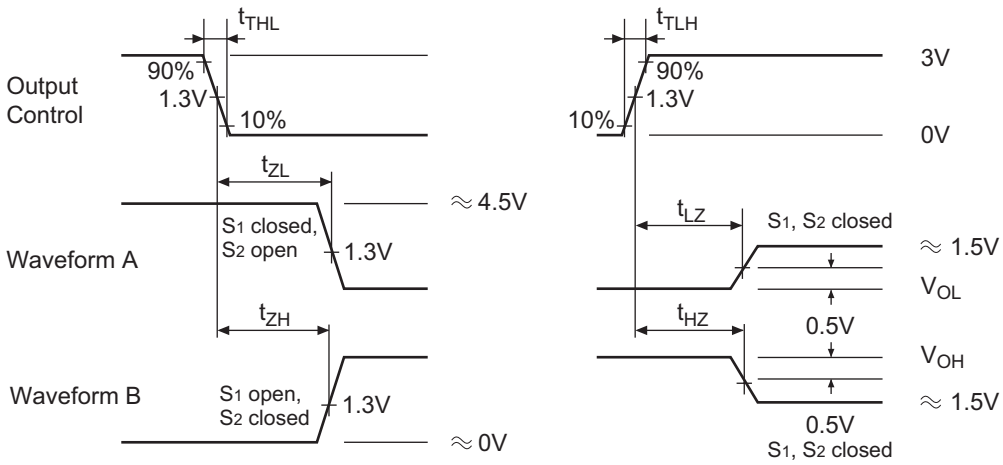

Note: Input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz, duty cycle 50%

## Waveforms 2




Note: Enable input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz
Data input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz, G input is high

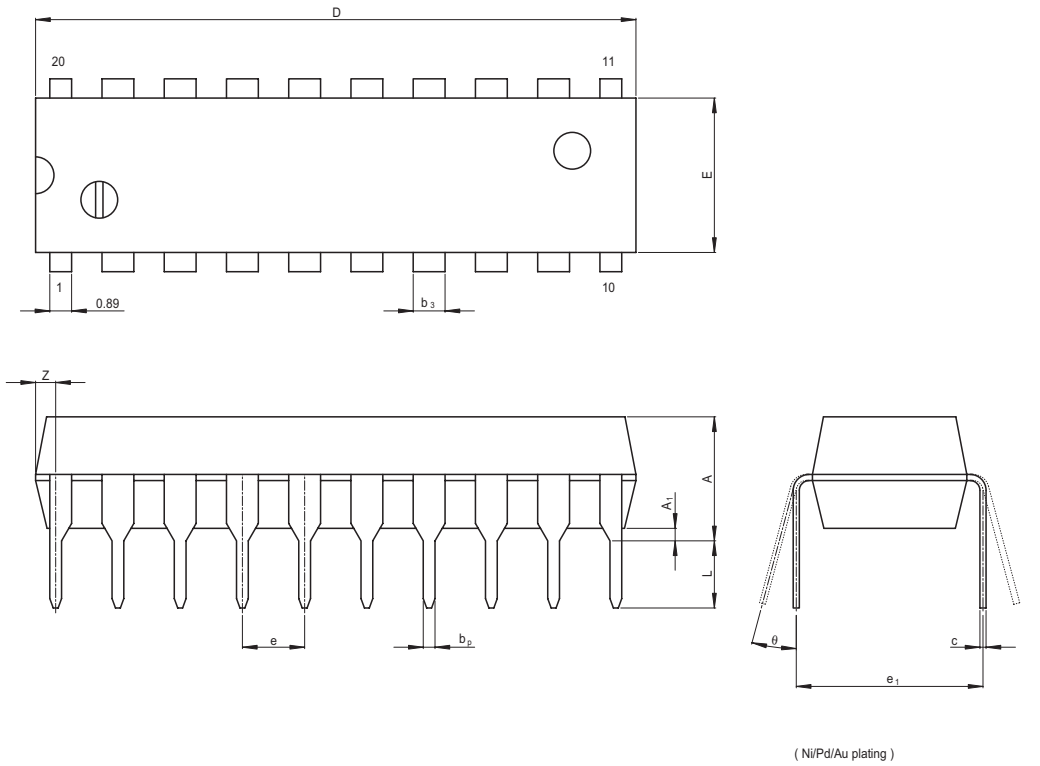
## Waveforms 3




Notes:
1. Input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz, duty cycle 50%
2. Waveform A if for an output with internal conditions such that the output is low except when disabled by the output control. Waveform B is for an output with internal conditions such that the output is high except when disabled by the output control.

# Package Dimensions

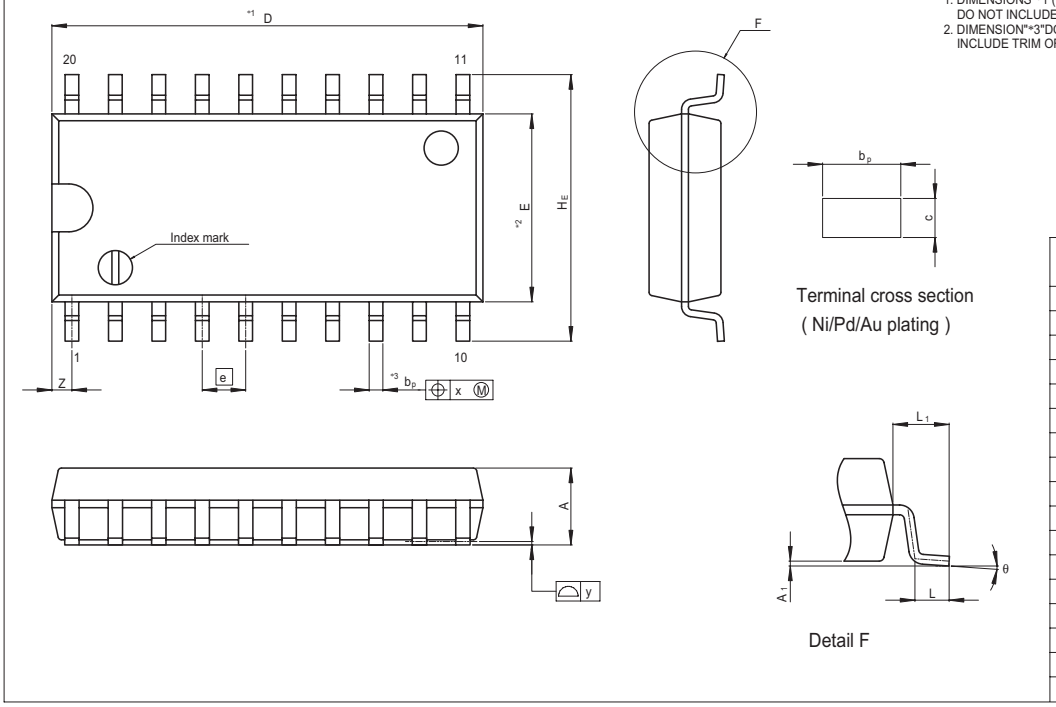
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|
| P-DIP20-6.3x24.5-2.54 | PRDP0020AC-B | DP-20NEV | 1.26g |




| Reference Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| e 1 | —— | 7.62 | —— |
| D | —— | 24.50 | 25.40 |
| E | —— | 6.30 | 7.00 |
| A | —— | —— | 5.08 |
| A 1 | 0.51 | —— | —— |
| b p | 0.40 | 0.48 | 0.56 |
| b 3 | —— | 1.30 | —— |
| c | 0.19 | 0.25 | 0.31 |
| θ | 0° | —— | 15° |
| e | 2.29 | 2.54 | 2.79 |
| Z | —— | —— | 1.27 |
| L | 2.54 | —— | —— |

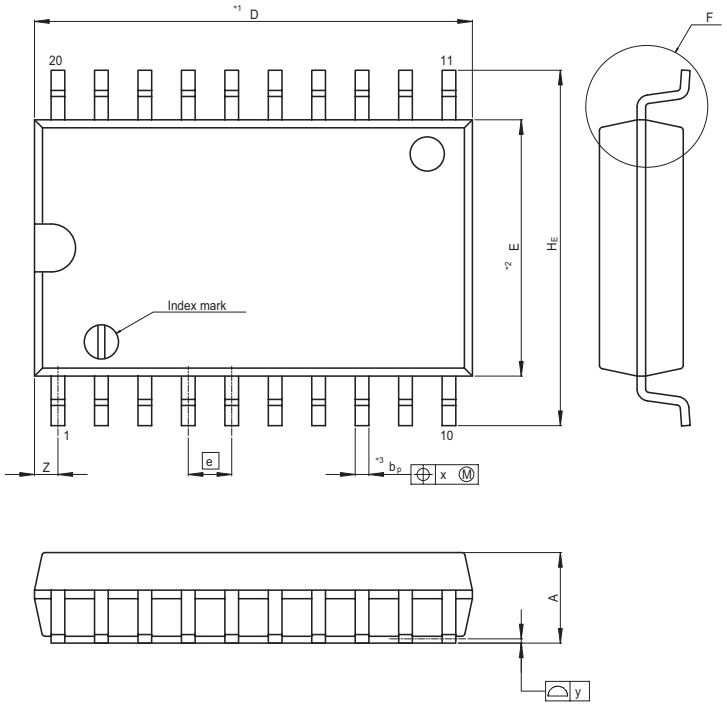
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|
| P-SOP20-5.5x12.6-1.27 | PRSP0020DD-B | FP-20DAV | 0.31g |

NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2"
   DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT
   INCLUDE TRIM OFFSET.

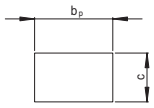



| Reference Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| D | —— | 12.60 | 13.0 |
| E | —— | 5.50 | —— |
| A 2 | —— | —— | —— |
| A 1 | 0.00 | 0.10 | 0.20 |
| A | —— | —— | 2.20 |
| b p | 0.34 | 0.40 | 0.46 |
| b 1 | —— | —— | —— |
| c | 0.15 | 0.20 | 0.25 |
| c 1 | —— | —— | —— |
| θ | 0° | —— | 8° |
| H E | 7.50 | 7.80 | 8.00 |
| e | —— | 1.27 | —— |
| x | —— | —— | 0.12 |
| y | —— | —— | 0.15 |
| Z | —— | —— | 0.80 |
| L | 0.50 | 0.70 | 0.90 |
| L 1 | —— | 1.15 | —— |

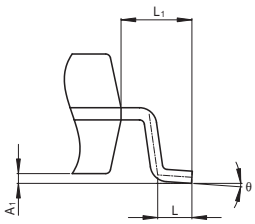
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|
| P-SOP20-7.5x12.8-1.27 | PRSP0020DC-A | FP-20DBV | 0.52g |




NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2"
   @ DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT
   @ INCLUDE TRIM OFFSET.




Terminal cross section
( Ni/Pd/Au plating )




Detail F

| Reference Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| D | —— | 12.80 | 13.2 |
| E | —— | 7.50 | —— |
| $A_2$ | —— | —— | —— |
| $A_1$ | 0.10 | 0.20 | 0.30 |
| A | —— | —— | 2.65 |
| $b_p$ | 0.34 | 0.40 | 0.46 |
| $b_1$ | —— | —— | —— |
| c | 0.20 | 0.25 | 0.30 |
| $c_1$ | —— | —— | —— |
| θ | 0° | —— | 8° |
| $H_E$ | 10.00 | 10.40 | 10.65 |
| e | —— | 1.27 | —— |
| x | —— | —— | 0.12 |
| y | —— | —— | 0.15 |
| Z | —— | —— | 0.935 |
| L | 0.40 | 0.70 | 1.27 |
| $L_1$ | —— | 1.45 | —— |

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