

## Single 2-Input Positive-OR Gate

### Description

The FLG1G32 Single 2-input positive-OR gate is designed for 1.65V to 5.5V  $V_{CC}$  operation.

The FLG1G32 device performs the Boolean function  $Y = A + B$  or  $Y = \overline{\overline{A} \cdot \overline{B}}$  in positive logic. The 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.

The FLG1G32 is available in Green SOT23-5, SC70-5 and XDFN1X1-6 packages. It operates over an ambient temperature range of  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ .

### Features

- Operating Voltage Range: 1.65V to 5.5V
- Low Power Consumption:  $1\mu\text{A}$  (Max)
- Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Input accept Voltage to 5.5V
- High Output Drive:  $\pm 24\text{mA}$  at  $V_{CC}=3.0\text{V}$
- Micro SIZE PACKAGES: SOT23-5, SC70-5, XDFN1X1-6

### Applications

- AV Receiver
- Blu-ray Player and Home Theater
- Digital Picture Frame (DPF)
- High-Speed Data Acquisition and Generation
- Personal Navigation Device (GPS)
- Portable Media Player

## Order information <sup>(1)</sup>

| Mode    | Package               | Specified Temperature range | Ordering Number     | Packing Option     |
|---------|-----------------------|-----------------------------|---------------------|--------------------|
| FLG1G32 | SOT23-5               | -40°C to +125°C             | FLG1G32YSOT235G/TR  | Tape and Reel,3000 |
|         | SC70-5 <sup>(2)</sup> | -40°C to +125°C             | FLG1G32YSC705G/TR   | Tape and Reel,3000 |
|         | XDFN1X1-6             | -40°C to +125°C             | FLG1G32YXDFN1X1G/TR | Tape and Reel,5000 |

Note:

(1) This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document.

(2) Equivalent to SOT353.

## Logic Symbol



## Function Table

| INPUTS |   | OUTPUT |
|--------|---|--------|
| A      | B | Y      |
| H      | H | H      |
| L      | H | H      |
| H      | L | H      |
| L      | L | L      |

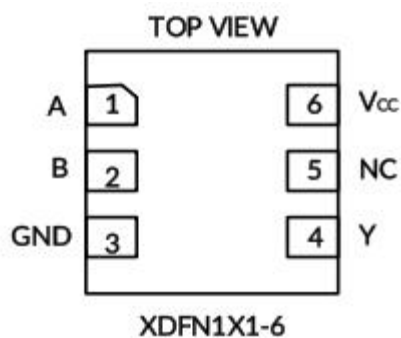
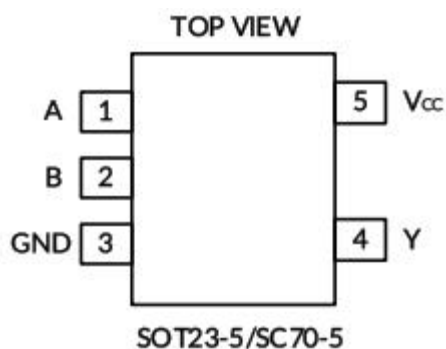
Note:

H=High Voltage Level

L=Low Voltage Level

$Y = A + B$

## Pin Configuration



## Pin Description

| Pin            |           | Name            | I/O Type <sup>(1)</sup> | Function      |
|----------------|-----------|-----------------|-------------------------|---------------|
| SOT23-5/SC70-5 | XDFN1X1-6 |                 |                         |               |
| 1              | 1         | A               | I                       | Input         |
| 2              | 2         | B               | I                       | Input         |
| 3              | 3         | GND             | -                       | Ground Pin    |
| 4              | 4         | Y               | O                       | Y Output      |
| -              | 5         | NC              | -                       | Not connected |
| 5              | 6         | V <sub>CC</sub> | -                       | Power Pin     |

Note:

I=input, O=output.

## Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) <sup>(1) (2)</sup>

|                  |                                                                                             |                   | MIN  | MAX                  | UNIT |
|------------------|---------------------------------------------------------------------------------------------|-------------------|------|----------------------|------|
| V <sub>CC</sub>  | Supply voltage range                                                                        |                   | -0.5 | 6.5                  | V    |
| V <sub>I</sub>   | Input voltage range <sup>(2)</sup>                                                          |                   | -0.5 | 6.5                  | V    |
| V <sub>O</sub>   | Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup> |                   | -0.5 | 6.5                  | V    |
| V <sub>O</sub>   | Voltage range applied to any output in the high or low state <sup>(2)(3)</sup>              |                   | -0.5 | V <sub>CC</sub> +0.5 | V    |
| I <sub>IK</sub>  | Input clamp current                                                                         | V <sub>I</sub> <0 |      | -50                  | mA   |
| I <sub>OK</sub>  | Output clamp current                                                                        | V <sub>O</sub> <0 |      | -50                  | mA   |
| I <sub>O</sub>   | Continuous output current                                                                   |                   |      | ± 50                 | mA   |
|                  | Continuous current through V <sub>CC</sub> or GND                                           |                   |      | ± 100                | mA   |
| θ <sub>JA</sub>  | Package thermal impedance <sup>(4)</sup>                                                    | SOT23-5           |      | 230                  | °C/W |
|                  |                                                                                             | SC70-5            |      | 380                  |      |
|                  |                                                                                             | XDFN1X1-6         |      | 438                  |      |
| T <sub>J</sub>   | Junction temperature <sup>(5)</sup>                                                         |                   | -65  | 150                  | °C   |
| T <sub>stg</sub> | Storage temperature                                                                         |                   | -65  | 150                  | °C   |

Note:

(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<sub>CC</sub> is provided in the Recommended Operating Conditions table.

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

(5) The maximum power dissipation is a function of T<sub>J(MAX)</sub>, R<sub>θJA</sub>, and T<sub>A</sub>. The maximum allowable power dissipation at

any ambient temperature is  $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$ . All numbers apply for packages soldered directly onto a PCB.

## ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

|                                     |                                                        | Value      | Unit |
|-------------------------------------|--------------------------------------------------------|------------|------|
| $V_{(ESD)}$ Electrostatic discharge | Human-body model (HBM)), per EIA/JESD22-a114, all pins | $\pm 8000$ | V    |
|                                     | Charged device model (CDM), per JS-002, all pins       | $\pm 1500$ | V    |
|                                     | Machine model (MM)), per EIA/JESD22-a115, all pins     | $\pm 350$  | V    |



### ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## Recommended Operating Range

over recommended operating free-air temperature range (TYP values are at  $T_A = +25^\circ\text{C}$ , unless otherwise noted.) <sup>(1)</sup>

| Parameter                     | Symbol     | Test Conditions                                                    | Min                  | Max                  | Unit             |
|-------------------------------|------------|--------------------------------------------------------------------|----------------------|----------------------|------------------|
| Supply voltage                | $V_{CC}$   | Operating                                                          | 1.65                 | 5.5                  | V                |
|                               |            | Data retention only                                                | 1.5                  | 5.5                  |                  |
| High-level input voltage      | $V_{IH}$   | $V_{CC}=1.65\text{V to }1.95\text{V}$                              | $0.65 \times V_{CC}$ |                      | V                |
|                               |            | $V_{CC}=2.3\text{V to }2.7\text{V}$                                | 1.7                  |                      |                  |
|                               |            | $V_{CC}=3\text{V to }3.6\text{V}$                                  | 2.2                  |                      |                  |
|                               |            | $V_{CC}=4.5\text{V to }5.5\text{V}$                                | $0.7 \times V_{CC}$  |                      |                  |
| Low-level input voltage       | $V_{IL}$   | $V_{CC}=1.65\text{V to }1.95\text{V}$                              |                      | $0.15 \times V_{CC}$ | V                |
|                               |            | $V_{CC}=2.3\text{V to }2.7\text{V}$                                |                      | 0.7                  |                  |
|                               |            | $V_{CC}=3\text{V to }3.6\text{V}$                                  |                      | 0.8                  |                  |
|                               |            | $V_{CC}=4.5\text{V to }5.5\text{V}$                                |                      | $0.15 \times V_{CC}$ |                  |
| Input voltage                 | $V_I$      |                                                                    | 0                    | 5.5                  | V                |
| Output voltage                | $V_O$      |                                                                    | 0                    | $V_{CC}$             | V                |
| Input transition rise or fall | $t_r, t_f$ | $V_{CC}=1.8\text{V} \pm 0.15\text{V}, 2.5\text{V} \pm 0.2\text{V}$ |                      | 20                   | ns/V             |
|                               |            | $V_{CC}=3.3\text{V} \pm 0.3\text{V}$                               |                      | 10                   |                  |
|                               |            | $V_{CC}=5\text{V} \pm 0.5\text{V}$                                 |                      | 5                    |                  |
| Operating temperature         | $T_A$      |                                                                    | -40                  | +125                 | $^\circ\text{C}$ |

Note: (1) All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.

## Electrical Characteristics

### ● DC Characteristics

over recommended operating free-air temperature range (TYP values are at  $T_A = +25^{\circ}\text{C}$ , unless otherwise noted.) <sup>(1)</sup>

| Parameter        |               | Test Conditions                                                                  | V <sub>CC</sub> | Temp  | Min <sup>(2)</sup>   | Typ <sup>(3)</sup> | Max <sup>(2)</sup> | Unit |
|------------------|---------------|----------------------------------------------------------------------------------|-----------------|-------|----------------------|--------------------|--------------------|------|
| V <sub>OH</sub>  |               | I <sub>OH</sub> = -100μA                                                         | 1.65V to 5.5V   | Full  | V <sub>CC</sub> -0.1 |                    |                    | V    |
|                  |               | I <sub>OH</sub> = -4mA                                                           | 1.65V           |       | 1.2                  |                    |                    |      |
|                  |               | I <sub>OH</sub> = -8mA                                                           | 2.3V            |       | 1.9                  |                    |                    |      |
|                  |               | I <sub>OH</sub> = -16mA                                                          | 3V              |       | 2.4                  |                    |                    |      |
|                  |               | I <sub>OH</sub> = -24mA                                                          |                 |       | 2.3                  |                    |                    |      |
|                  |               | I <sub>OH</sub> = -32mA                                                          | 4.5V            |       | 3.8                  |                    |                    |      |
| V <sub>OL</sub>  |               | I <sub>OL</sub> = 100μA                                                          | 1.65V to 5.5V   | Full  |                      |                    | 0.1                | V    |
|                  |               | I <sub>OL</sub> = 4mA                                                            | 1.65V           |       |                      |                    | 0.45               |      |
|                  |               | I <sub>OL</sub> = 8mA                                                            | 2.3V            |       |                      |                    | 0.3                |      |
|                  |               | I <sub>OL</sub> = 16mA                                                           | 3V              |       |                      |                    | 0.4                |      |
|                  |               | I <sub>OL</sub> = 24mA                                                           |                 |       |                      |                    | 0.55               |      |
|                  |               | I <sub>OL</sub> = 32mA                                                           | 4.5V            |       |                      |                    | 0.55               |      |
| I <sub>I</sub>   | A or B inputs | V <sub>I</sub> =5.5V or GND                                                      | 0V to 5.5V      | +25°C |                      | ±0.1               | ±1                 | μA   |
|                  |               |                                                                                  |                 | Full  |                      |                    | ±5                 |      |
| I <sub>off</sub> |               | V <sub>I</sub> or V <sub>O</sub> =5.5V                                           | 0               | +25°C |                      | ±0.1               | ±1                 | μA   |
|                  |               |                                                                                  |                 | Full  |                      |                    | ±10                |      |
| I <sub>CC</sub>  |               | V <sub>I</sub> =5.5V or GND, I <sub>O</sub> =0                                   | 1.65V to 5.5V   | +25°C |                      | 0.1                | 1                  | μA   |
|                  |               |                                                                                  |                 | Full  |                      |                    | 10                 |      |
| ΔI <sub>CC</sub> |               | One input at V <sub>CC</sub> -0.6V,<br>Other inputs at V <sub>CC</sub> or<br>GND | 3V to 5.5V      | Full  |                      |                    | 500                | μA   |

Note:

(1) All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.

(2) Limits are 100% production tested at  $25^{\circ}\text{C}$ . Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.

(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

## ● AC Characteristics

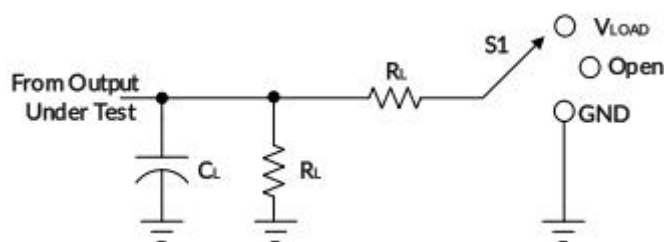
over recommended operating free-air temperature range (TYP values are at  $T_A = +25^{\circ}\text{C}$ , unless otherwise noted.) <sup>(1)</sup>

| Parameter                     | Symbol   | Test Conditions                      |                                           | Min <sup>(2)</sup> | Typ <sup>(3)</sup> | Max <sup>(2)</sup> | Unit |
|-------------------------------|----------|--------------------------------------|-------------------------------------------|--------------------|--------------------|--------------------|------|
| Propagation Delay             | $t_{pd}$ | $V_{CC}=1.8\text{V}\pm 0.15\text{V}$ | $C_L=30\text{pF}$ , $R_L=1\text{k}\Omega$ |                    | 8.0                |                    | ns   |
|                               |          | $V_{CC}=2.5\text{V}\pm 0.2\text{V}$  | $C_L=30\text{pF}$ , $R_L=500\Omega$       |                    | 3.7                |                    |      |
|                               |          | $V_{CC}=3.3\text{V}\pm 0.3\text{V}$  | $C_L=50\text{pF}$ , $R_L=500\Omega$       |                    | 2.5                |                    |      |
|                               |          | $V_{CC}=5\text{V}\pm 0.5\text{V}$    | $C_L=50\text{pF}$ , $R_L=500\Omega$       |                    | 2.7                |                    |      |
| Input Capacitance             | $C_i$    | $V_{CC}=3.3\text{V}$                 | $V_i=V_{CC}$ or GND                       |                    | 4                  |                    | pF   |
| Power dissipation capacitance | $C_{pd}$ | $V_{CC}=1.8\text{V}$                 | $f=10\text{MHz}$                          |                    | 20                 |                    | pF   |
|                               |          | $V_{CC}=2.5\text{V}$                 |                                           |                    | 21                 |                    |      |
|                               |          | $V_{CC}=3.3\text{V}$                 |                                           |                    | 22                 |                    |      |
|                               |          | $V_{CC}=5\text{V}$                   |                                           |                    | 25                 |                    |      |

Note:

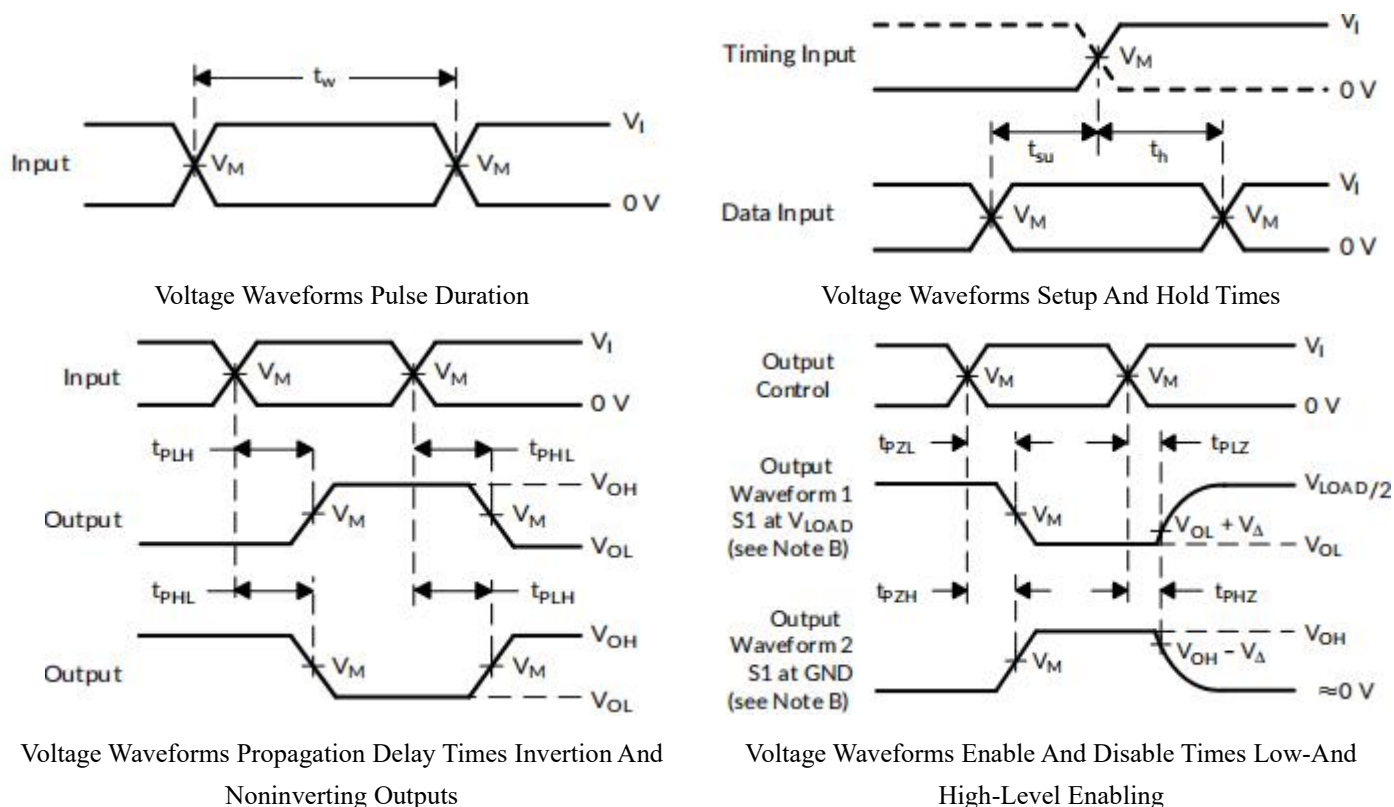
- (1) All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.
- (2) This parameter is ensured by design and/or characterization and is not tested in production.
- (3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

## Parameter Measurement Information



| Test              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

| $V_{CC}$                      | INPUTS   |                     | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|-------------------------------|----------|---------------------|------------|-------------------|-------|--------------|--------------|
|                               | $V_I$    | $t_r/t_f$           |            |                   |       |              |              |
| $1.8\text{V}\pm 0.15\text{V}$ | $V_{CC}$ | $\leq 2\text{ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 1k $\Omega$  | 0.15V        |
| $2.5\text{V}\pm 0.2\text{V}$  | $V_{CC}$ | $\leq 2\text{ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 500 $\Omega$ | 0.15V        |
| $3.3\text{V}\pm 0.3\text{V}$  | 3V       | $\leq 2.5\text{ns}$ | 1.5V       | 6V                | 50pF  | 500 $\Omega$ | 0.3V         |
| $5\text{V}\pm 0.5\text{V}$    | $V_{CC}$ | $\leq 2.5\text{ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50pF  | 500 $\Omega$ | 0.3V         |



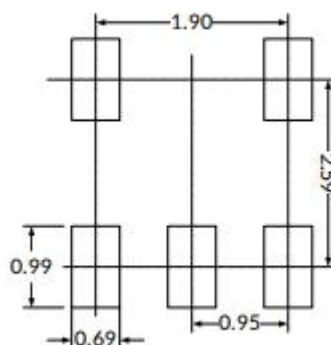
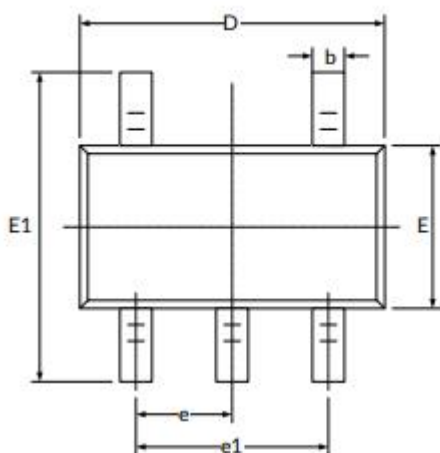
Notes:

- 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:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50\Omega$ .
- 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.

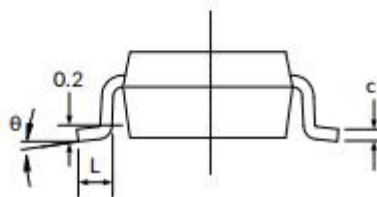
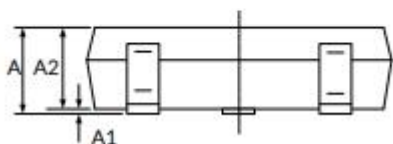
**Figure 1. Load Circuit and Voltage Waveforms**

## Package Outline Dimensions(All dimensions in mm.)

Package Type: SOT23-5 <sup>(3)</sup>



RECOMMENDED LAND PATTERN (Unit: mm)

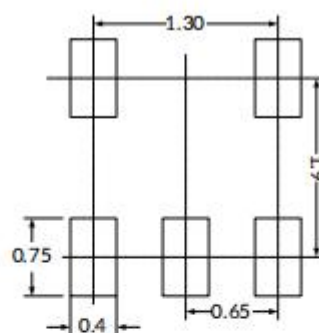
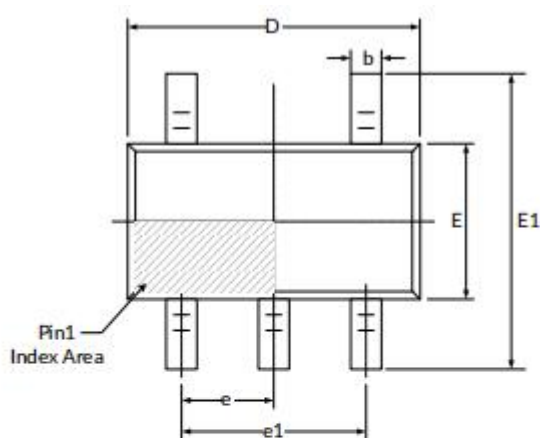


| Symbol           | Dimensions In Millimeters |       | Dimensions In Inches      |       |
|------------------|---------------------------|-------|---------------------------|-------|
|                  | Min                       | Max   | Min                       | Max   |
| A <sup>(1)</sup> | 1.050                     | 1.250 | 0.041                     | 0.049 |
| A1               | 0.000                     | 0.100 | 0.000                     | 0.004 |
| A2               | 1.050                     | 1.150 | 0.041                     | 0.045 |
| b                | 0.300                     | 0.500 | 0.012                     | 0.020 |
| c                | 0.100                     | 0.200 | 0.004                     | 0.008 |
| D <sup>(1)</sup> | 2.820                     | 3.020 | 0.111                     | 0.119 |
| E <sup>(1)</sup> | 1.500                     | 1.700 | 0.059                     | 0.067 |
| E1               | 2.650                     | 2.950 | 0.104                     | 0.116 |
| e                | 0.950(BSC) <sup>(2)</sup> |       | 0.037(BSC) <sup>(2)</sup> |       |
| e1               | 1.800                     | 2.000 | 0.071                     | 0.079 |
| L                | 0.300                     | 0.600 | 0.012                     | 0.024 |
| theta            | 0°                        | 8°    | 0°                        | 8°    |

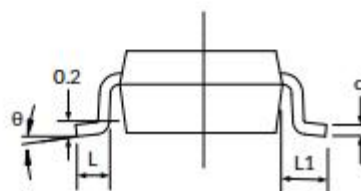
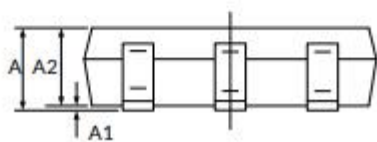
Note:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

Package Type: SC70-5 <sup>(3)</sup>



RECOMMENDED LAND PATTERN (Unit: mm)

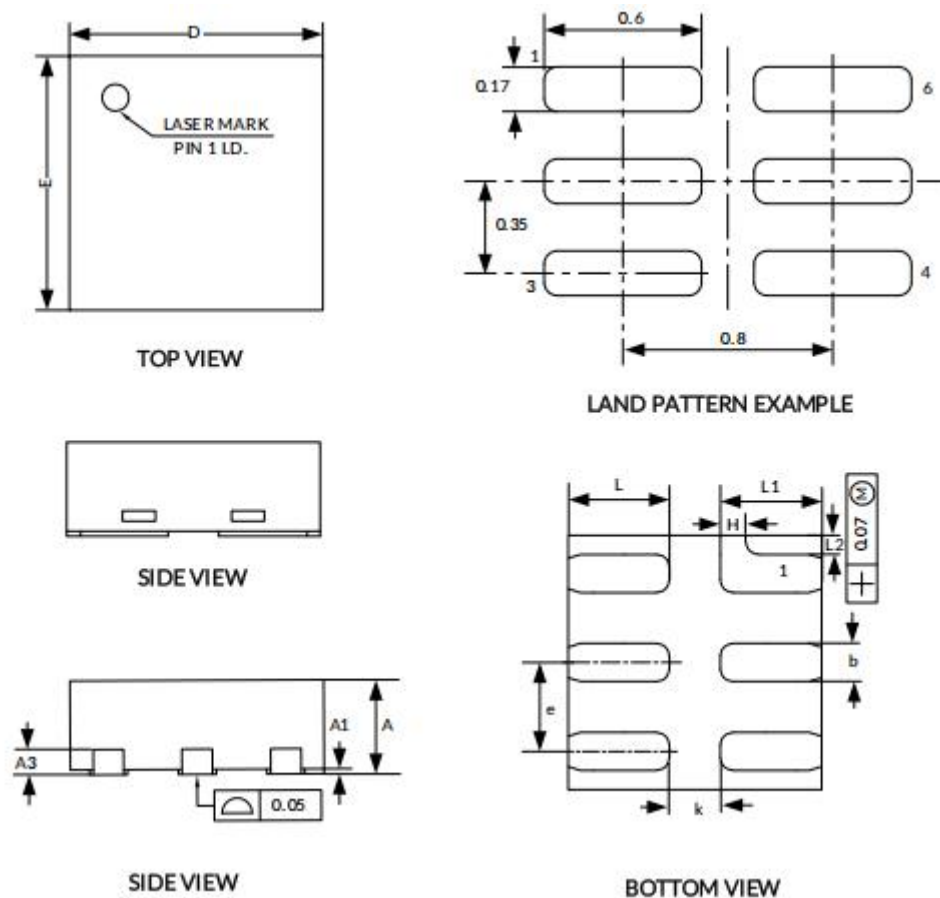


| Symbol           | Dimensions In Millimeters |       | Dimensions In Inches      |       |
|------------------|---------------------------|-------|---------------------------|-------|
|                  | Min                       | Max   | Min                       | Max   |
| A <sup>(1)</sup> | 0.900                     | 1.100 | 0.035                     | 0.043 |
| A1               | 0.000                     | 0.100 | 0.000                     | 0.004 |
| A2               | 0.900                     | 1.000 | 0.035                     | 0.039 |
| b                | 0.150                     | 0.350 | 0.006                     | 0.014 |
| c                | 0.080                     | 0.150 | 0.003                     | 0.006 |
| D <sup>(1)</sup> | 2.000                     | 2.200 | 0.079                     | 0.087 |
| E <sup>(1)</sup> | 1.150                     | 1.350 | 0.045                     | 0.053 |
| E1               | 2.150                     | 2.450 | 0.085                     | 0.096 |
| e                | 0.650(BSC) <sup>(2)</sup> |       | 0.026(BSC) <sup>(2)</sup> |       |
| e1               | 1.300(BSC) <sup>(2)</sup> |       | 0.051(BSC) <sup>(2)</sup> |       |
| L                | 0.260                     | 0.460 | 0.010                     | 0.018 |
| L1               | 0.525                     |       | 0.021                     |       |
| θ                | 0°                        | 8°    | 0°                        | 8°    |

Note:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

Package Type: XDFN1X1-6 <sup>(3)</sup>



| Symbol           | Dimensions In Millimeters  |       | Dimensions In Inches       |       |
|------------------|----------------------------|-------|----------------------------|-------|
|                  | Min                        | Max   | Min                        | Max   |
| A <sup>(1)</sup> | 0.340                      | 0.400 | 0.013                      | 0.016 |
| A1               | 0.000                      | 0.050 | 0.000                      | 0.002 |
| A3               | 0.100 (REF) <sup>(2)</sup> |       | 0.004 (REF) <sup>(2)</sup> |       |
| b                | 0.100                      | 0.200 | 0.004                      | 0.008 |
| D <sup>(1)</sup> | 0.950                      | 1.050 | 0.037                      | 0.041 |
| E <sup>(1)</sup> | 0.950                      | 1.050 | 0.037                      | 0.041 |
| e                | 0.300                      | 0.400 | 0.012                      | 0.016 |
| H                | 0.100 (REF) <sup>(2)</sup> |       | 0.004 (REF) <sup>(2)</sup> |       |
| K                | 0.150                      |       | 0.006                      |       |
| L                | 0.350                      | 0.450 | 0.014                      | 0.018 |
| L1               | 0.350                      | 0.450 | 0.014                      | 0.018 |
| L2               | 0.075 (REF) <sup>(2)</sup> |       | 0.003 (REF)                |       |

Note:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

## Important Notice And Disclaimer

- We reserves the right to change the instruction manual without prior notice.
- Any semiconductor product has a certain possibility of failure or malfunction under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design and overall manufacturing to avoid potential failure risks that may cause personal injury or property damage.
- The improvement of product quality is endless, our company will be dedicated to provide customers with better products.