



# SILEGO

# SLG59M1515V

## 20 mΩ, 2.0 A Fast Turn On Integrated Power Switch with Discharge

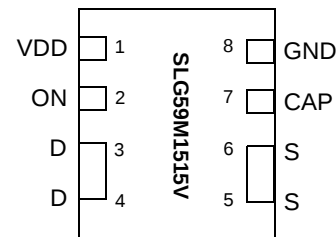
### General Description

The SLG59M1515V is a 20 mΩ 2.0 A single-channel power switch with configurable slew rate control. The device can enable fast power rail turn on with big cap loading. Internal circuit limits max inrush current to prevent device damage. The product is packaged in an ultra-small 1.0x1.6mm package.

### Features

- 1.0 x 1.6 x 0.55 mm STDFN 8L package (2 fused pins for drain and 2 fused pins for source)
- Logic level ON pin capable of supporting 0.85 V CMOS Logic
- Discharged Load when off
- Fast Turn On time
  - 25 μs, Tune Cap = 0.1 nF, C<sub>LOAD</sub> = 1 μF @ 100 mA
  - 95 μs, Tune Cap = 0.5 nF, C<sub>LOAD</sub> = 10 μF @ 2.5 A
- Low RDS<sub>ON</sub> while supporting 2.0 A
  - 20 mΩ, V<sub>DD</sub> = 5 V, V<sub>D</sub> = 1 V
  - 27.5 mΩ, V<sub>DD</sub> = 3.3 V, V<sub>D</sub> = 1 V
- Pb-Free / Halogen-Free / RoHS compliant
- Operating Temperature: -40 °C to 85°C
- Operating Voltage: 2.5 V to 5.5 V
- Power Rail Switching V<sub>D</sub> = 0.85 V to V<sub>D</sub> = V<sub>DD</sub> - 1.5 V

### Pin Configuration

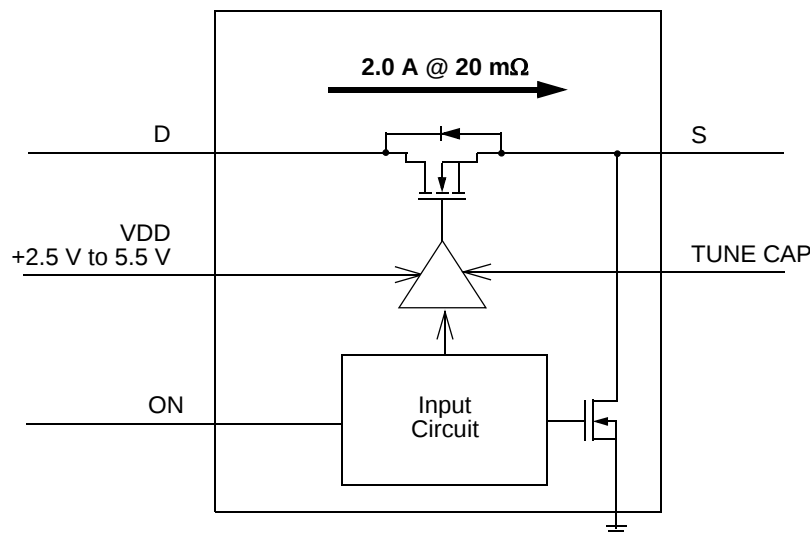


**8-pin STDFN**  
(Top View)

### Applications

- Fast Turn On/Off power rail switching with big Cap loading
- Frequent wake & sleep power cycle
- Mobile devices and portable devices

### Block Diagram





### Pin Description

| Pin # | Pin Name | Type   | Pin Description                                                                                |
|-------|----------|--------|------------------------------------------------------------------------------------------------|
| 1     | VDD      | PWR    | VDD power for power switch control (2.5 V to 5.5 V)                                            |
| 2     | ON       | Input  | Turns MOSFET ON (4 M $\Omega$ pull down resistor)<br>CMOS input with VIL < 0.3 V, VIH > 0.85 V |
| 3     | D        | MOSFET | Drain of Power MOSFET (fused with pin 4)                                                       |
| 4     | D        | MOSFET | Drain of Power MOSFET (fused with pin 3)                                                       |
| 5     | S        | MOSFET | Source of Power MOSFET (fused with pin 6)                                                      |
| 6     | S        | MOSFET | Source of Power MOSFET (fused with pin 5)                                                      |
| 7     | CAP      | CAP    | Tuning Cap                                                                                     |
| 8     | GND      | GND    | Ground                                                                                         |

### Ordering Information

| Part Number   | Type                     | Production Flow             |
|---------------|--------------------------|-----------------------------|
| SLG59M1515V   | STDFN 8L                 | Industrial, -40 °C to 85 °C |
| SLG59M1515VTR | STDFN 8L (Tape and Reel) | Industrial, -40 °C to 85 °C |



### Absolute Maximum Ratings

| Parameter         | Description                       | Conditions                                     | Min. | Typ. | Max. | Unit |
|-------------------|-----------------------------------|------------------------------------------------|------|------|------|------|
| $V_{DD}$          | Power Supply                      |                                                | --   | --   | 7    | V    |
| $T_S$             | Storage Temperature               |                                                | -65  | --   | 150  | °C   |
| $ESD_{HBM}$       | ESD Protection                    | Human Body Model                               | 2000 | --   | --   | V    |
| $W_{DIS}$         | Package Power Dissipation         |                                                | --   | --   | 0.4  | W    |
| MOSFET $IDS_{PK}$ | Peak Current from Drain to Source | For no more than 20 $\mu s$ with 1% duty cycle | --   | --   | 25.0 | A    |
|                   |                                   | For no more than 50 $\mu s$ with 1% duty cycle | --   | --   | 12.5 | A    |
|                   |                                   | For no more than 1 ms with 1% duty cycle       | --   | --   | 3.5  | A    |

Note: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

### Electrical Characteristics

$T_A = -40^\circ C$  to  $85^\circ C$  (unless otherwise stated)

| Parameter       | Description                                              | Conditions                                                                                   | Min. | Typ. | Max.           | Unit      |
|-----------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------|------|------|----------------|-----------|
| $V_{DD}$        | Power Supply Voltage                                     | $-40^\circ C$ to $85^\circ C$                                                                | 2.5  | --   | 5.5            | V         |
| $I_{DD}$        | Power Supply Current (PIN 1)                             | when OFF                                                                                     | --   | --   | 1              | $\mu A$   |
|                 |                                                          | when ON, No load                                                                             | --   | --   | 10             | $\mu A$   |
| $R_{DS_{ON}}$   | Static Drain to Source ON Resistance, $T_A = 25^\circ C$ | $V_{DD} = 5 V, V_D = 1.05 V, V_{DD} - V_D = 4.0 V, R_L = 0.5 \Omega$                         | --   | 20   | 22             | $m\Omega$ |
|                 |                                                          | $V_{DD} = 3.3 V, V_D = 1.05 V, V_{DD} - V_D = 2.3 V, R_L = 0.5 \Omega$                       | --   | 27.5 | 29             | $m\Omega$ |
|                 | Static Drain to Source ON Resistance, $T_A = 70^\circ C$ | $V_{DD} = 5 V, V_D = 1.05 V, V_{DD} - V_D = 4.0 V, R_L = 0.5 \Omega$                         | --   | 23.5 | 25             | $m\Omega$ |
|                 |                                                          | $V_{DD} = 3.3 V, V_D = 1.05 V, V_{DD} - V_D = 2.3 V, R_L = 0.5 \Omega$                       | --   | 31   | 33             | $m\Omega$ |
|                 | Static Drain to Source ON Resistance, $T_A = 85^\circ C$ | $V_{DD} = 5 V, V_D = 1.05 V, V_{DD} - V_D = 4.0 V, R_L = 0.5 \Omega$                         | --   | 24.5 | 26             | $m\Omega$ |
|                 |                                                          | $V_{DD} = 3.3 V, V_D = 1.05 V, V_{DD} - V_D = 2.3 V, R_L = 0.5 \Omega$                       | --   | 33   | 35             | $m\Omega$ |
| $IDS$           | Operating Current                                        | $V_D = 0.85 V$ to $3.3 V$                                                                    | --   | --   | 2.0            | A         |
| $V_D$           | Drain Voltage                                            |                                                                                              | 0.85 | --   | $V_{DD} - 1.5$ | V         |
| $T_{ON\_Delay}$ | ON Delay Time                                            | 50% ON to 10% $V_S$ , Internal Logic Delay, $V_{DD} = 5 V, V_D = 1.05 V$ , Tune Cap = 0.1 nF | --   | 12   | 15             | $\mu s$   |
|                 |                                                          | 50% ON to 10% $V_S$ , Internal Logic Delay, $V_{DD} = 5 V, V_D = 1.05 V$ , Tune Cap = 0.5 nF | --   | 32   | 35             | $\mu s$   |

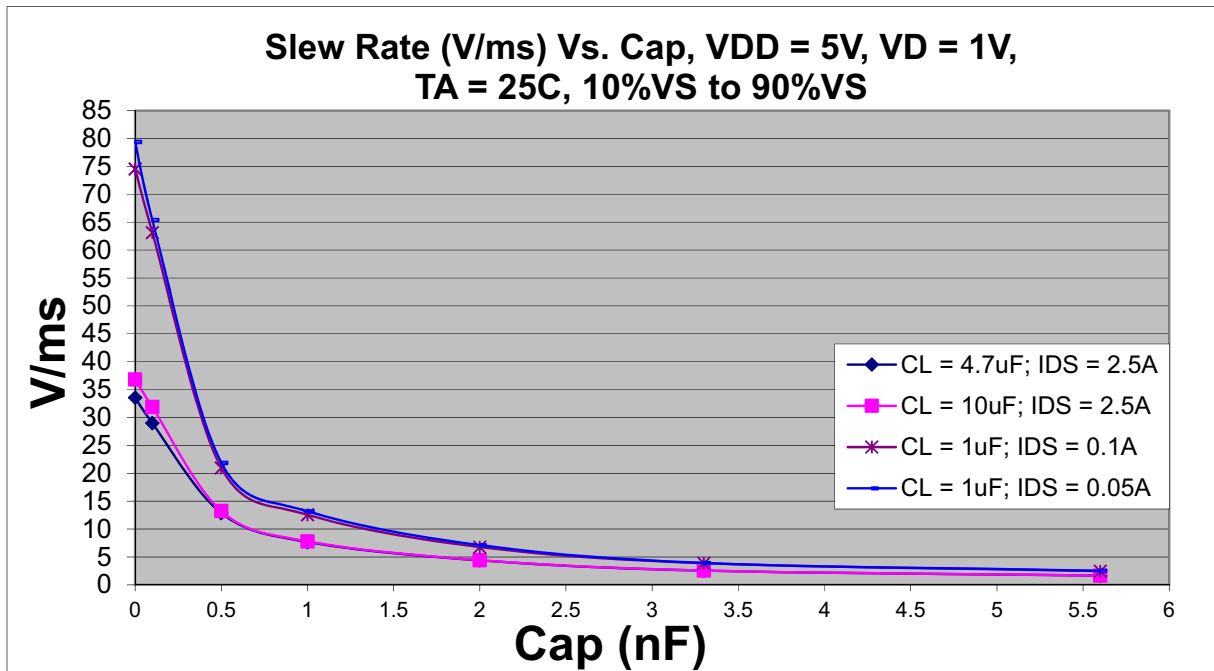


T<sub>A</sub> = -40 °C to 85 °C (unless otherwise stated)

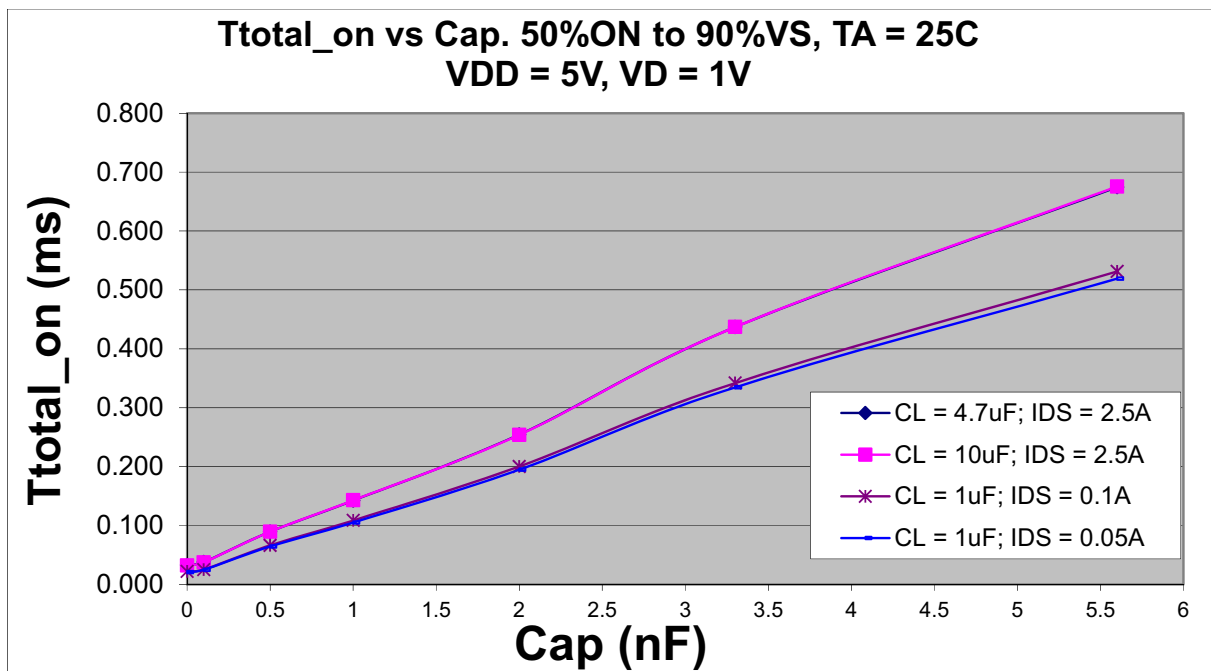
| Parameter              | Description                  | Conditions                                                                                                                                                 | Min.         | Typ. | Max.            | Unit |
|------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------|-----------------|------|
| T <sub>Total_ON</sub>  | Total Turn On Time           | 50% ON to 90% V <sub>S</sub>                                                                                                                               | Configurable |      |                 |      |
|                        |                              | 50% ON to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 1 μF, Current Load = 50 mA, Tune Cap = 0.1 nF               | --           | 32   | 39              | μs   |
|                        |                              | 50% ON to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 1 μF, Current Load = 100 mA, Tune Cap = 0.1 nF              | --           | 32   | 39              | μs   |
|                        |                              | 50% ON to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 4.7 μF, Current Load = 2.5 A, Tune Cap = 0.5 nF             | --           | 102  | 123             | μs   |
|                        |                              | 50% ON to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 10 μF, Current Load = 2.5 A, Tune Cap = 0.5 nF              | --           | 102  | 123             | μs   |
| T <sub>SLEWRATE</sub>  | Slew Rate                    | 10% V <sub>S</sub> to 90% V <sub>S</sub>                                                                                                                   | Configurable |      |                 |      |
|                        |                              | 10% V <sub>S</sub> to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 1 μF, Current Load = 50 mA, Tune Cap = 0.1 nF   | --           | 65   | 78              | V/ms |
|                        |                              | 10% V <sub>S</sub> to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 1 μF, Current Load = 100 mA, Tune Cap = 0.1 nF  | --           | 65   | 78              | V/ms |
|                        |                              | 10% V <sub>S</sub> to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 4.7 μF, Current Load = 2.5 A, Tune Cap = 0.5 nF | --           | 13   | 16              | V/ms |
|                        |                              | 10% V <sub>S</sub> to 90% V <sub>S</sub> , V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, C <sub>L</sub> = 10 μF, Current Load = 2.5 A, Tune Cap = 0.5 nF  | --           | 13.5 | 16.5            | V/ms |
| CAP <sub>SOURCE</sub>  | Source Cap                   | Source to GND                                                                                                                                              | --           | --   | 10              | μF   |
| R <sub>DIS</sub>       | Discharge Resistance         |                                                                                                                                                            | 100          | 150  | 300             | Ω    |
| ON_V <sub>IH</sub>     | High Input Voltage on ON pin |                                                                                                                                                            | 0.85         | --   | V <sub>DD</sub> | V    |
| ON_V <sub>IL</sub>     | Low Input Voltage on ON pin  |                                                                                                                                                            | -0.3         | 0    | 0.3             | V    |
| T <sub>OFF_Delay</sub> | OFF Delay Time               | 50% ON to V <sub>S</sub> Fall, C <sub>L</sub> = 10 μF, R <sub>L</sub> = 20 Ω, V <sub>DD</sub> = 5 V, V <sub>D</sub> = 1.0 V, No Tune CAP                   | --           | 120  | 150             | μs   |
| THERM_OFF              | Thermal Protection Shutoff   | Programmable, automatic shutoff temperature                                                                                                                | --           | 125  | --              | °C   |
| THERM_OFF_ACC          | Thermal Sensor Accuracy      |                                                                                                                                                            | --           | --   | ±20             | %    |
| THERM_DT               | Thermal Disable Time         | Thermal sensor disable for the ON rising edge to 100 μs. Prevent therm shutdown from inrush current                                                        | --           | --   | 100             | μs   |



### Tune Cap vs Slew Rate

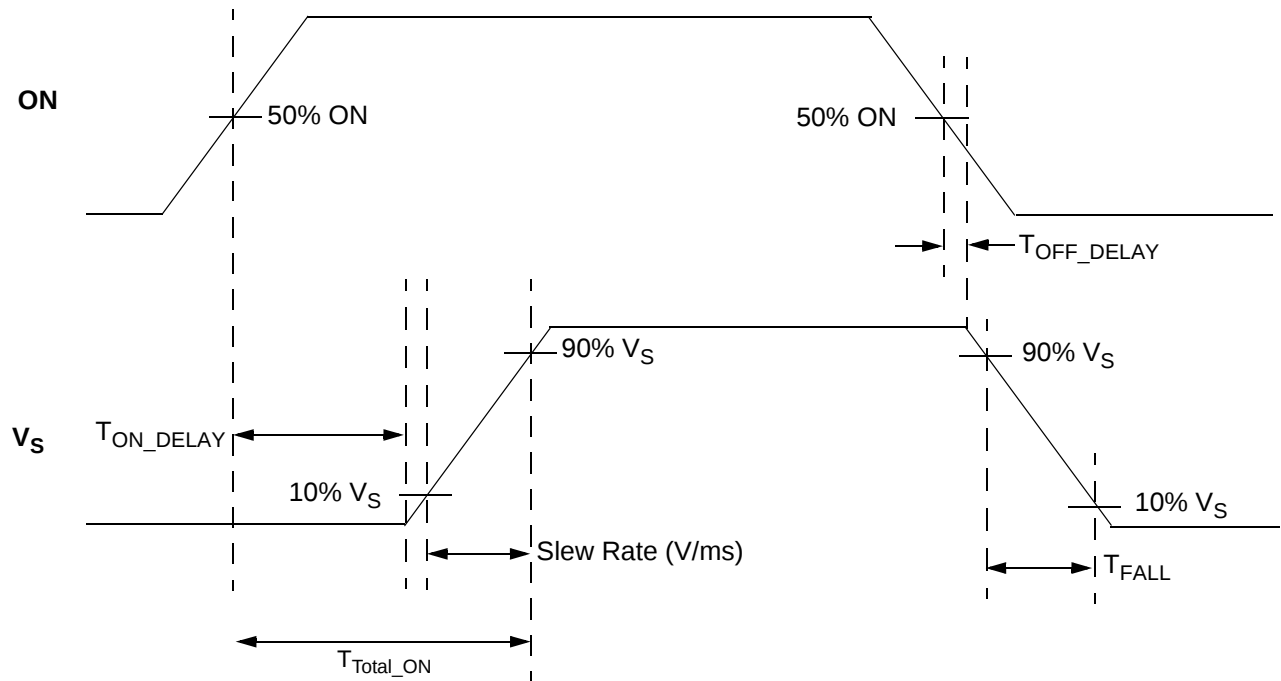


### Tune Cap vs Ttotal\_on





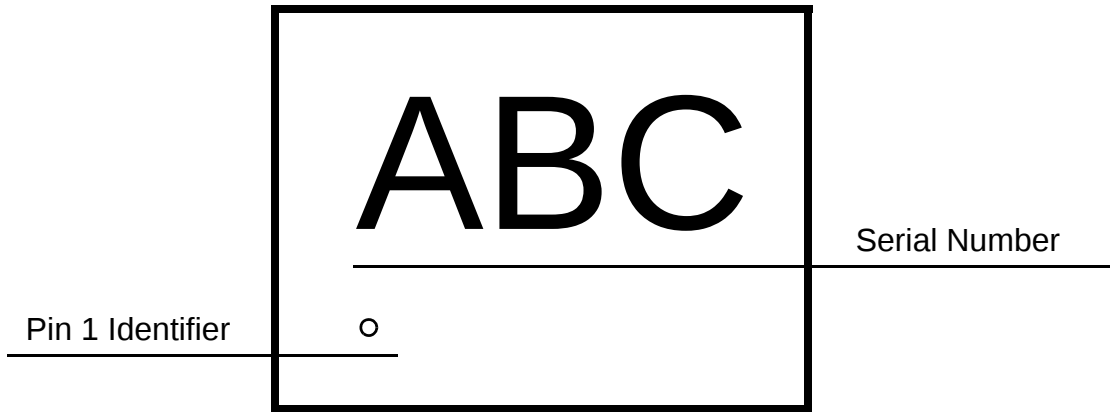
### $T_{Total\_ON}$ , $T_{ON\_Delay}$ and Slew Rate Measurement (TBD)





---

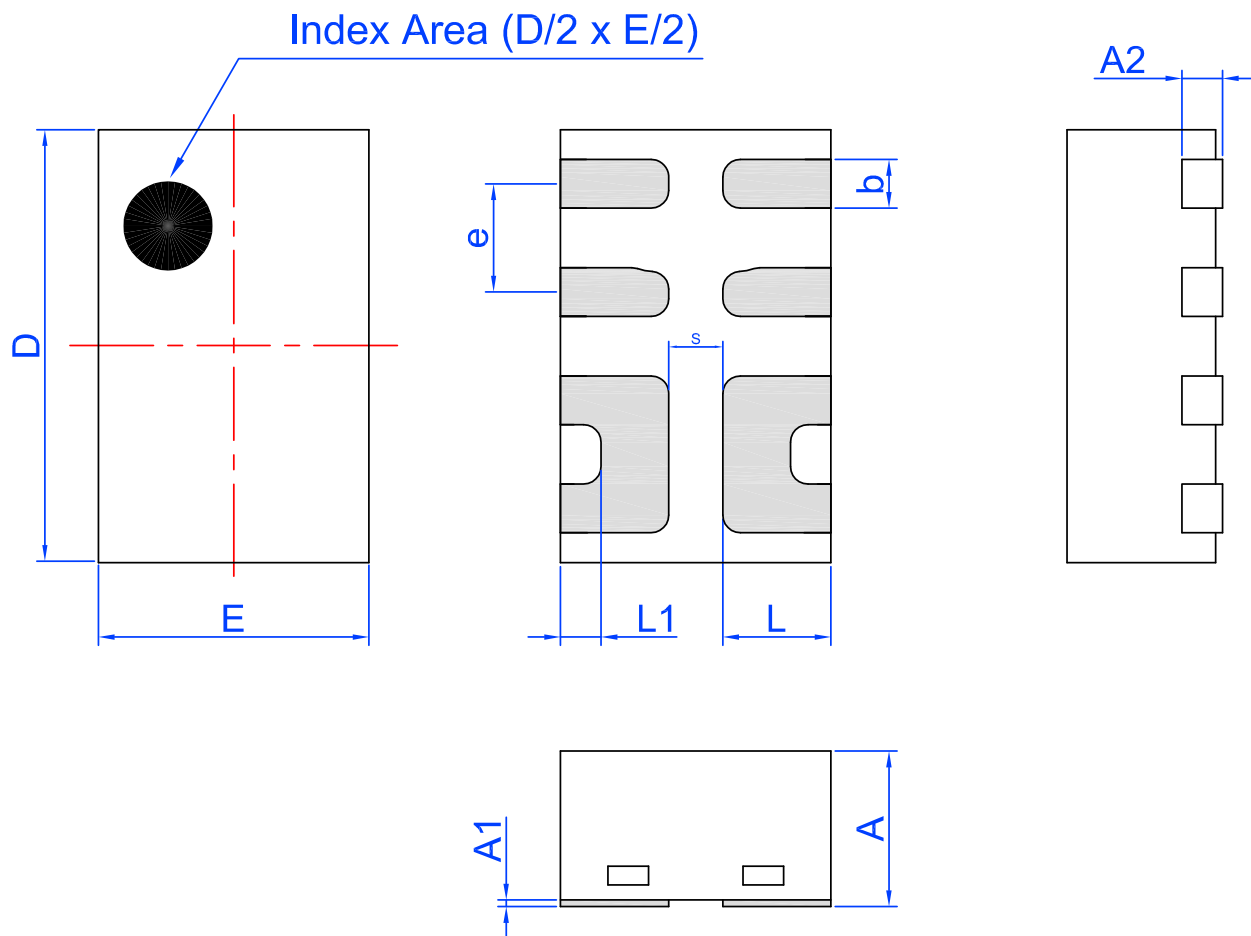
Package Top Marking System Definition





### Package Drawing and Dimensions

8 Lead STDFN Package 1.0 x 1.6 mm (Fused Lead)



Unit: mm

| Symbol | Min      | Nom. | Max   | Symbol | Min     | Nom. | Max  |
|--------|----------|------|-------|--------|---------|------|------|
| A      | 0.50     | 0.55 | 0.60  | D      | 1.55    | 1.60 | 1.65 |
| A1     | 0.005    | -    | 0.060 | E      | 0.95    | 1.00 | 1.05 |
| A2     | 0.10     | 0.15 | 0.20  | L      | 0.35    | 0.40 | 0.45 |
| b      | 0.13     | 0.18 | 0.23  | L1     | 0.10    | 0.15 | 0.20 |
| e      | 0.40 BSC |      |       | S      | 0.2 REF |      |      |

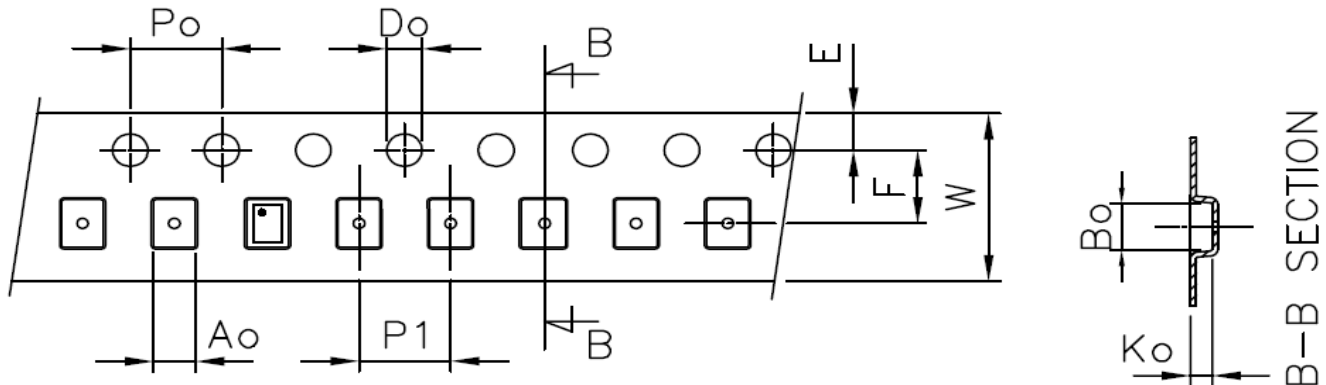


### Tape and Reel Specifications

| Package Type                            | # of Pins | Nominal Package Size [mm] | Max Units |         | Reel & Hub Size [mm] | Leader (min) |             | Trailer (min) |             | Tape Width [mm] | Part Pitch [mm] |
|-----------------------------------------|-----------|---------------------------|-----------|---------|----------------------|--------------|-------------|---------------|-------------|-----------------|-----------------|
|                                         |           |                           | per Reel  | per Box |                      | Pockets      | Length [mm] | Pockets       | Length [mm] |                 |                 |
| STDFN 8L<br>1x1.6mm<br>0.4P FC<br>Green | 8         | 1.0 x 1.6 x 0.55          | 3,000     | 3,000   | 178 / 60             | 100          | 400         | 100           | 400         | 8               | 4               |

### Carrier Tape Drawing and Dimensions

| Package Type                            | Pocket BTM Length | Pocket BTM Width | Pocket Depth | Index Hole Pitch | Pocket Pitch | Index Hole Diameter | Index Hole to Tape Edge | Index Hole to Pocket Center | Tape Width |
|-----------------------------------------|-------------------|------------------|--------------|------------------|--------------|---------------------|-------------------------|-----------------------------|------------|
|                                         | A0                | B0               | K0           | P0               | P1           | D0                  | E                       | F                           | W          |
| STDFN 8L<br>1x1.6mm<br>0.4P FC<br>Green | 1.12              | 1.72             | 0.7          | 4                | 4            | 1.55                | 1.75                    | 3.5                         | 8          |



### Recommended Reflow Soldering Profile

Please see IPC/JEDEC J-STD-020: latest revision for reflow profile based on package volume of 0.88 mm<sup>3</sup> (nominal). More information can be found at [www.jedec.org](http://www.jedec.org).