



Dual 4.5 A Integrated Power Switch with Reverse Current Blocking

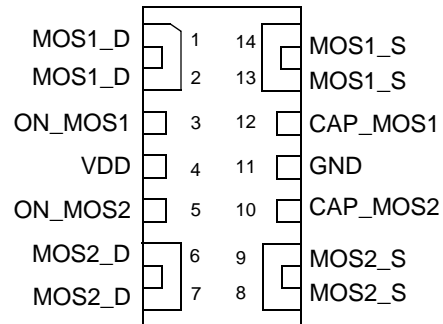
General Description

The SLG59M1606V is designed for load switching application. The part comes with two 4.5 A rated MOSFETs switched on by two ON control pins. Each MOSFETs turn on time is independently adjusted by an external capacitor.

Features

- Two 4.5 A independent MOSFETs with Reverse Current Blocking
- Two Integrated VGS Charge Pumps
- Independent Ramp Control
- Protected by thermal shutdown
- Pb-Free / RoHS Compliant
- Halogen-Free
- STDFN 14L, 1 x 3 x 0.55 mm

Pin Configuration

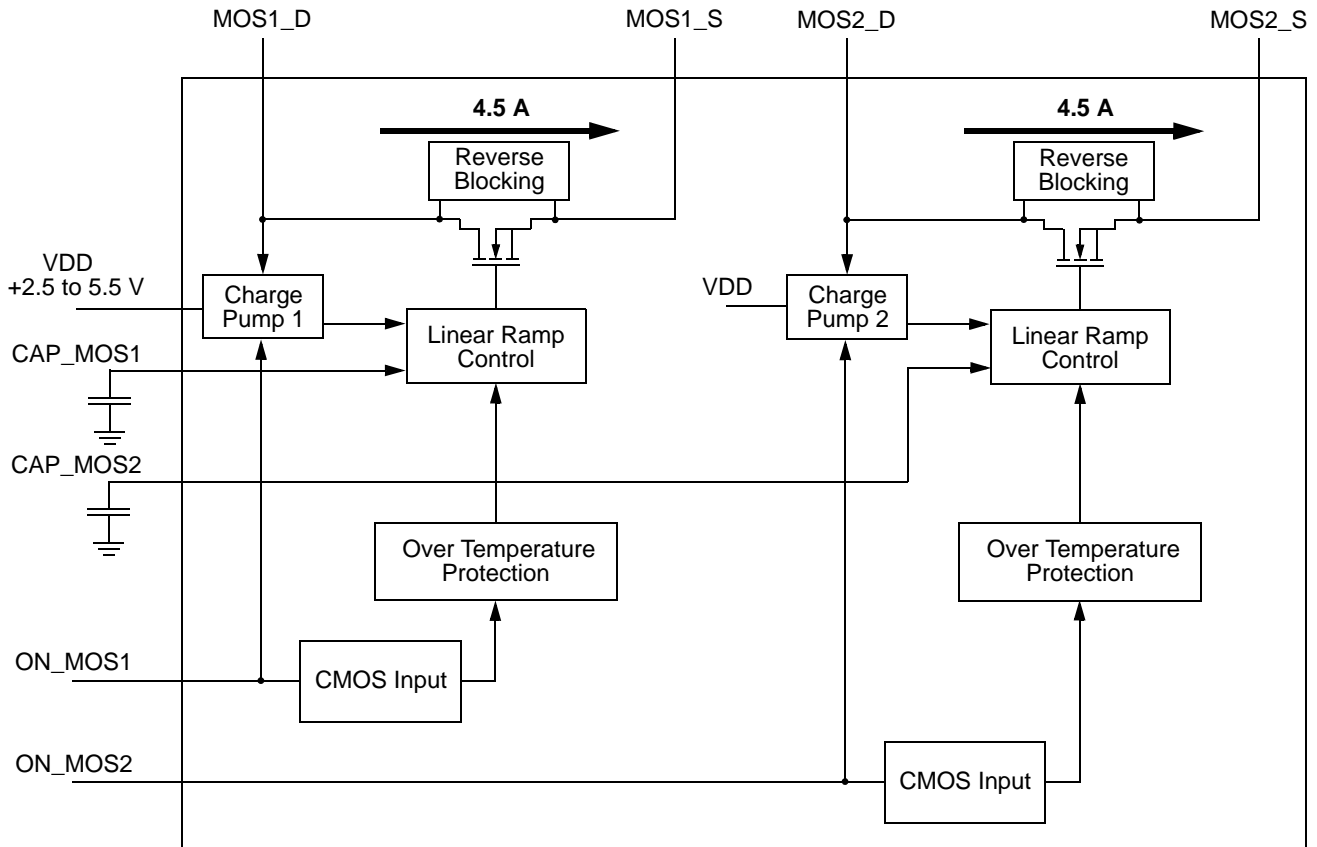


14-pin STDFN
(Top View)

Applications

- Ideal for switching ON and OFF S0 +5.0 and 3.3V power rails with associated support circuitry
- Ideal for switching ON and OFF power rails 5V or less.
- Can use either channel up to 5.5A with combined maximum current of 8.5A
- Maximum load capacitance of 1000 μ F for each Channel Source terminal.

Block Diagram





Pin Description

| Pin # | Pin Name | Type | Pin Description |
|-------|----------|--------|---|
| 1 | MOS1_D | MOSFET | Drain of MOSFET1 |
| 2 | MOS1_D | MOSFET | Drain of MOSFET1 (fused with pin 1) |
| 3 | ON_MOS1 | Input | Turns on MOS1 (4 M Ω pull down resistor) |
| 4 | VDD | VDD | +5VDD Power |
| 5 | ON_MOS2 | Input | Turns on MOS2 (4 M Ω pull down resistor) |
| 6 | MOS2_D | MOSFET | Drain of MOSFET2 |
| 7 | MOS2_D | MOSFET | Drain of MOSFET2 (fused with pin 6) |
| 8 | MOS2_S | MOSFET | Source of MOSFET2 (fused with pin 9) |
| 9 | MOS2_S | MOSFET | Source of MOSFET2 |
| 10 | CAP_MOS2 | Input | Sets ramp and turn on time for MOSFET2 |
| 11 | GND | GND | Ground |
| 12 | CAP_MOS1 | Input | Sets ramp and turn on time for MOSFET1 |
| 13 | MOS1_S | MOSFET | Source of MOSFET1 (fused with pin 14) |
| 14 | MOS1_S | MOSFET | Source of MOSFET1 |

Ordering Information

| Part Number | Type | Production Flow |
|---------------|---------------------------|-----------------------------|
| SLG59M1606V | STDFN 14L | Industrial, -40 °C to 85 °C |
| SLG59M1606VTR | STDFN 14L (Tape and Reel) | Industrial, -40 °C to 85 °C |



Absolute Maximum Ratings

| Parameter | Description | Conditions | Min. | Typ. | Max. | Unit |
|-------------------|-----------------------------------|---|------|------|------|------|
| V_D | Power Supply | | -- | -- | 6 | V |
| T_S | Storage Temperature | | -65 | -- | 150 | °C |
| ESD_{HBM} | ESD Protection | Human Body Model | 2000 | -- | -- | V |
| W_{DIS} | Package Power Dissipation | | -- | -- | 1.2 | W |
| IDS_{MAX} | Max Operating Current | | | | 4.5 | A |
| MOSFET IDS_{PK} | Peak Current from Drain to Source | For no more than 10 continuous seconds out of every 100 seconds | -- | -- | 6 | 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

$T_A = -40\text{ °C to }85\text{ °C}$ (unless otherwise stated)

| Parameter | Description | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---|--|---------------------------|------|----------|------------------|
| V_{DD} | Power Supply Voltage | | 2.5 | -- | 5.5 | V |
| I_{DD} | Power Supply Current when OFF | | -- | 0.1 | 1 | μA |
| | Power Supply Current ON_MOS_1 & ON_MOS_2 (Steady State) | | -- | 50 | 100 | μA |
| RDS_{ON} | ON Resistance | T_A 25°C MOSFET1 @100 mA | -- | 16.0 | 19.8 | $\text{m}\Omega$ |
| | | T_A 70°C MOSFET1 @100 mA | -- | 18.7 | 24.2 | $\text{m}\Omega$ |
| | | T_A 85°C MOSFET1 @100 mA | | 19.8 | 25.3 | $\text{m}\Omega$ |
| | | T_A 25°C MOSFET2 @100 mA | -- | 16.0 | 19.8 | $\text{m}\Omega$ |
| | | T_A 70°C MOSFET2 @100 mA | -- | 18.7 | 24.2 | $\text{m}\Omega$ |
| | | T_A 85°C MOSFET2 @100 mA | | 19.8 | 25.3 | $\text{m}\Omega$ |
| MOSFET IDS | Current from Drain to Source for each MOSFET | Continuous, each channel | -- | -- | 4.5 | A |
| IDS_{LKG} | IDS Leakage (Reverse Blocking enabled) | $V_S = 1.0\text{ V to }5.0\text{ V}$, $V_{DD} = V_D = 0\text{ V}$, ON_MOS = LOW, 0 to 85 °C, each channel | -- | 0.5 | 1.5 | μA |
| | | $V_S = 1.0\text{ V to }5.0\text{ V}$, $V_{DD} = V_D = 0\text{ V}$, ON_MOS = LOW, -40 to 0 °C, each channel | -- | 3 | 5 | μA |
| V_D | Drain Voltage | | 0.85 | 5.0 | V_{DD} | V |
| T_{ON_Delay} | ON pin Delay Time | 50% ON to Ramp Begin, $R_L = 20\ \Omega$, $C_L = 10\ \mu\text{F}$ | 0 | 300 | 500 | μs |
| T_{Total_ON} | Total Turn On Time | 50% ON to 90% V_S | Configurable ¹ | | | ms |
| | | Example: CAP = 4 nF, $V_{DD} = V_D = 5\text{ V}$, Source_Cap = 10 μF , $R_L = 20\ \Omega$ | -- | 2.0 | -- | ms |
| $T_{SLEWRATE}$ | Slew Rate | 10% V_S to 90% V_S | Configurable ¹ | | | V/ms |
| | | Example: CAP = 4 nF, $V_{DD} = V_D = 5\text{ V}$, Source_Cap = 10 μF , $R_L = 20\ \Omega$ | -- | 3.0 | -- | V/ms |
| CAP_{SOURCE} | Source Cap | Source to GND | -- | -- | 1000 | μF |
| ON_ V_{IH} | High Input Voltage on ON pin | | 0.85 | -- | V_{DD} | V |
| ON_ V_{IL} | Low Input Voltage on ON pin | | -0.3 | 0 | 0.3 | V |
| $THERM_{ON}^2$ | Thermal shutoff turn-on temperature | | -- | 125 | -- | °C |



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

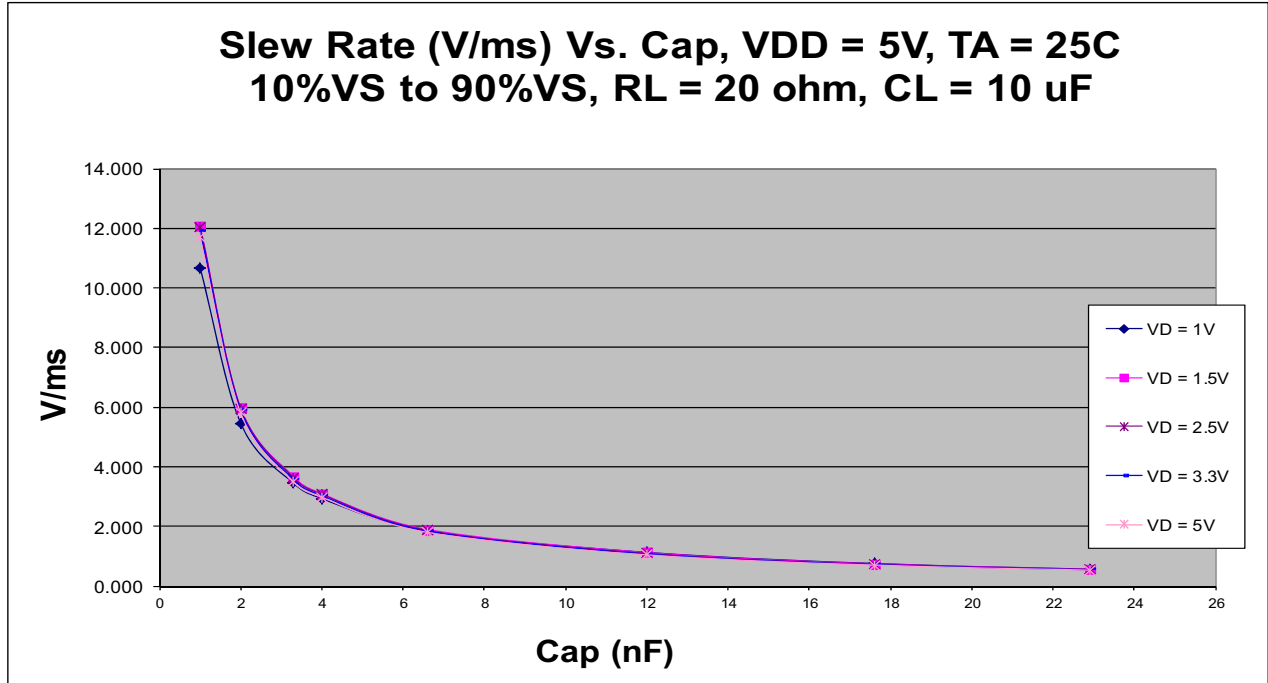
| Parameter | Description | Conditions | Min. | Typ. | Max. | Unit |
|------------------------|--------------------------------------|--|------|------|------|------|
| THERM _{OFF} | Thermal shutoff turn-off temperature | | -- | 100 | -- | °C |
| THERM _{TIME} | Thermal shutoff time | | -- | -- | 1 | ms |
| T _{OFF_Delay} | OFF Delay Time | 50% ON to V _S Fall, V _{DD} = V _D = 5 V, R _L = 20 Ω, no C _L | -- | -- | 15 | μs |

Notes:

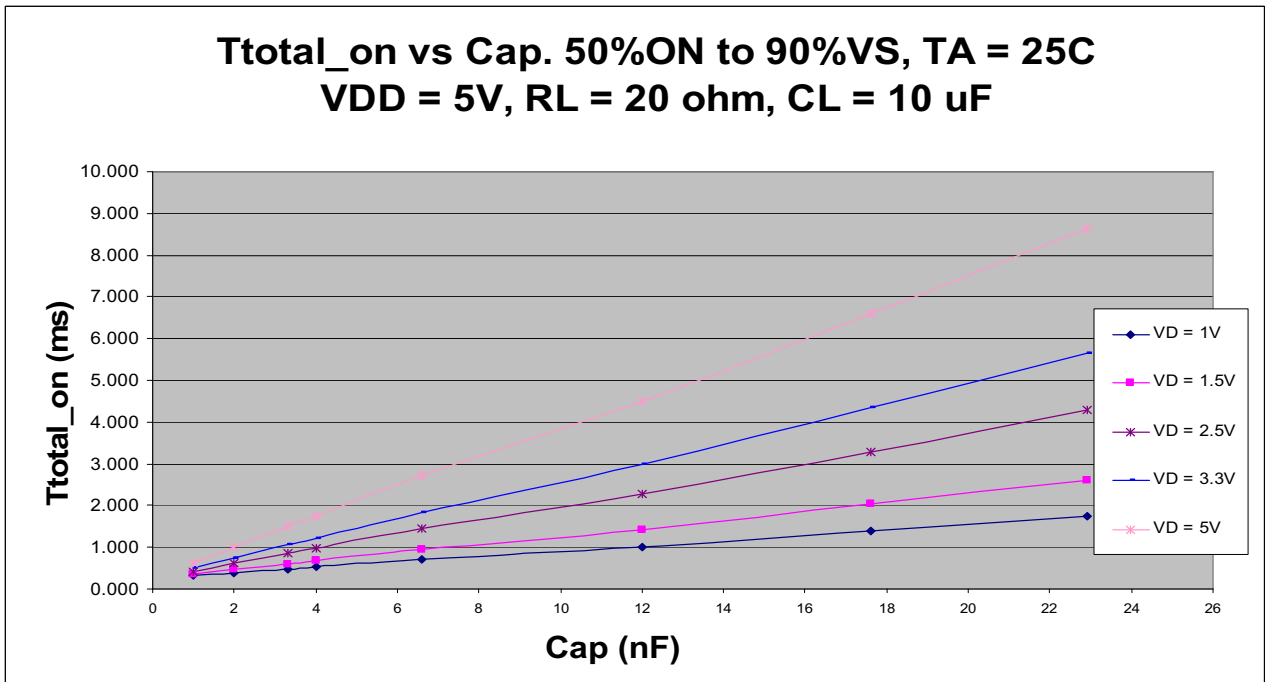
1. Refer to table for configuration details.
2. When device enters thermal shutdown, both channels will turn off.



T_{SLEW} vs. CAP

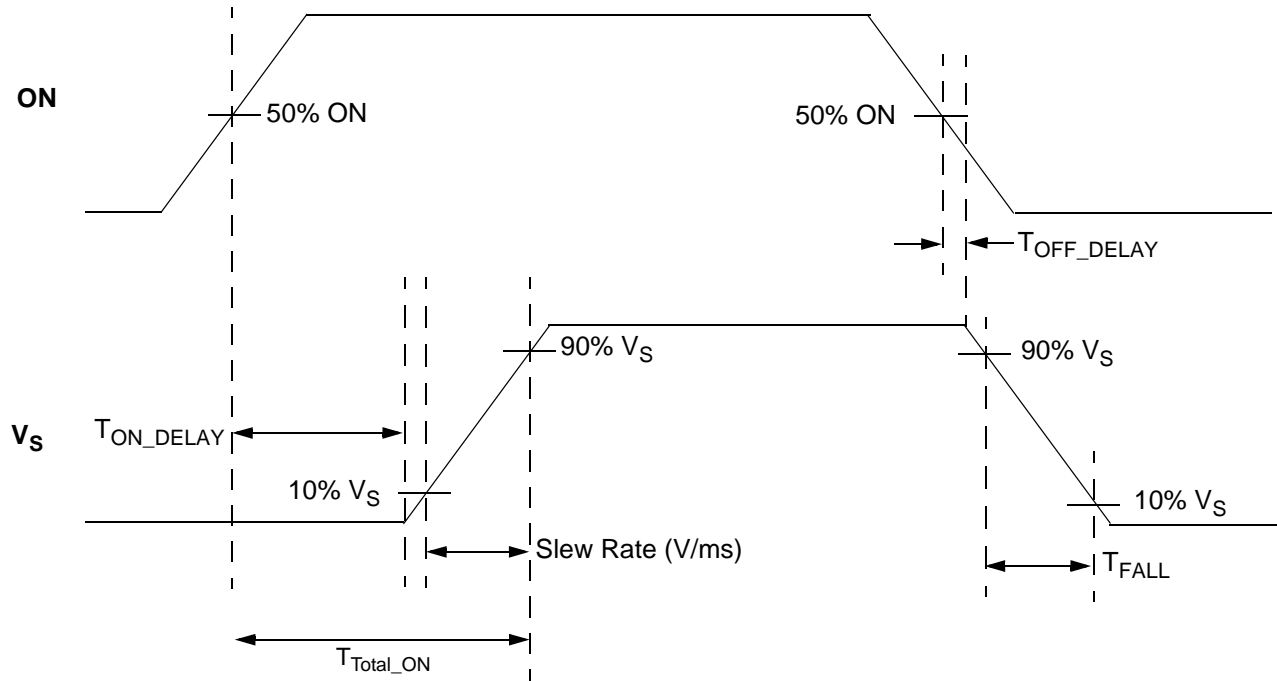


T_{TOTAL_ON} vs. CAP





T_{Total_ON} , T_{ON_Delay} and Slew Rate Measurement





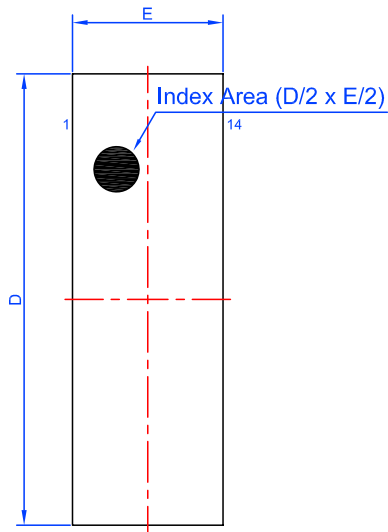
Package Top Marking System Definition



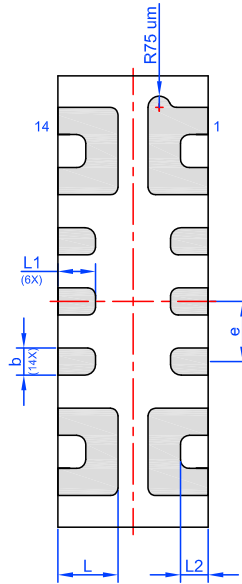


Package Drawing and Dimensions

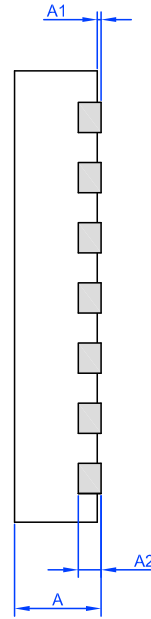
14 Lead STDFN Package 1 mm x 3 mm (Fused Lead)



Top View



BTM View



SIDE View

Unit: mm

| Symbol | Min | Nom. | Max | Symbol | Min | Nom. | Max |
|--------|----------|------|-------|--------|------|------|------|
| A | 0.50 | 0.55 | 0.60 | D | 2.95 | 3.00 | 3.05 |
| A1 | 0.005 | - | 0.050 | 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 | 0.20 | 0.25 | 0.30 |
| e | 0.40 BSC | | | L2 | 0.06 | 0.11 | 0.16 |

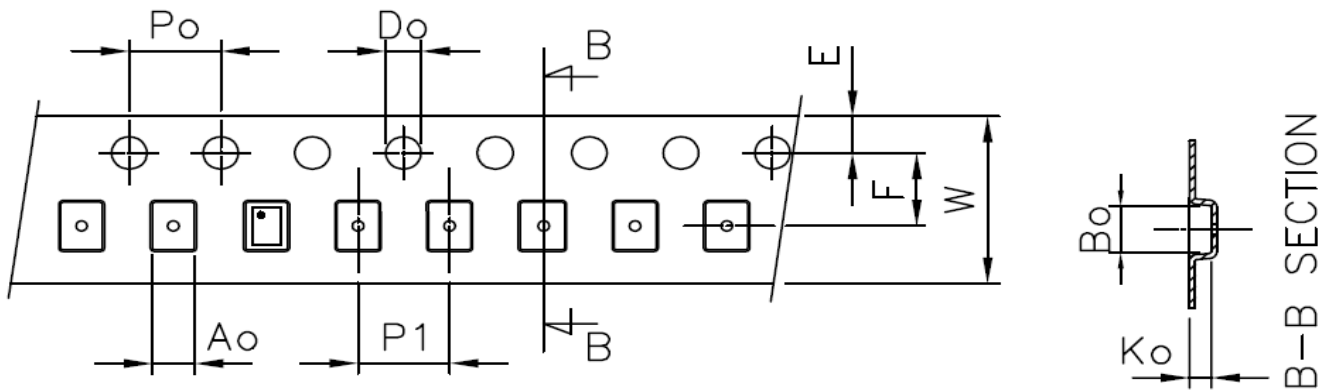


Tape and Reel Specifications

| Package Type | # of Pins | Nominal Package Size | Units per Reel | Max Units per Box | Reel & Hub Size (mm) | Trailer A | | Leader B | | Pocket Tape (mm) | |
|--------------|-----------|----------------------|----------------|-------------------|----------------------|-----------|-------------|----------|-------------|------------------|-------|
| | | | | | | Pockets | Length (mm) | Pockets | Length (mm) | Width | Pitch |
| STDFN 14L | 14 | 1x3x0.55mm | 3000 | 3000 | 178/60 | 100 | 400 | 100 | 400 | 8 | 4 |

Carrier Tape Drawing and Dimensions

| Package Type | Pocket BTM Length [mm] | Pocket BTM Width [mm] | Pocket Depth [mm] | Index Hole Pitch [mm] | Pocket Pitch [mm] | Index Hole Diameter [mm] | Index Hole to Tape Edge [mm] | Index Hole to Pocket Center [mm] | Tape Width [mm] |
|--------------|------------------------|-----------------------|-------------------|-----------------------|-------------------|--------------------------|------------------------------|----------------------------------|-----------------|
| | A0 | B0 | K0 | P0 | P1 | D0 | E | F | W |
| STDFN 14L | 1.15 | 3.15 | 0.7 | 4 | 4 | 1.5 | 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 1.65 mm³ (nominal). More information can be found at www.jedec.org.



Revision History

| Date | Version | Change |
|-----------|---------|---|
| 10/8/2015 | 1.01 | Updated Block Diagram Updated VD min to 0.85 V |
| 9/9/2015 | 1.00 | Production Release Updated Electrical Characteristics conditions |