## FEATURES

- 8V to 30V operating input range
- 2000mA output current
- Up to 92% efficiency
- High efficiency (>80%) at light load
- Internal Soft-Start
- 400kHz switching frequency
- CC/CV control mode
- Input under voltage lockout
- Input over voltage lockout
- Start-up current run-away protection
- Short circuit protection
- Thermal protection
- 4000V ESD

## DESCRIPTION

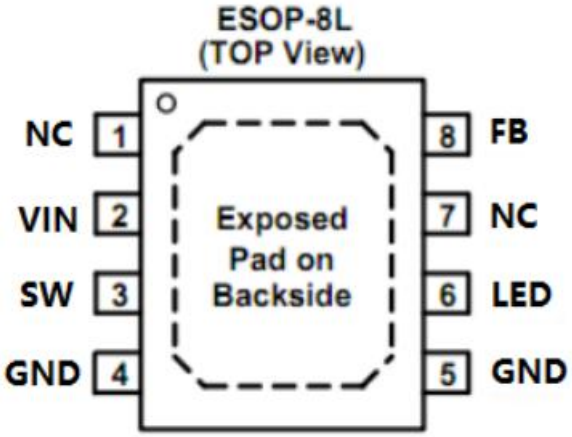
The HM1595 is a CC/CV control mode monolithic buck switching regulator. Operating with an input range of 8-30V, the HM1595 delivers 2000mA of continuous output current, It adopts NMOS for the main switch and PMOS for the synchronous switch. The internal synchronous power switches provide high efficiency without the use of an external Schottky diode. At light loads, regulators operate in low frequency to maintain high efficiency and low output ripple. Current mode control provides tight load transient response and cycle-by-cycle current limit.

The HM1595 guarantees robustness with short-circuit protection, thermal protection, start-up current run-away protection, and input under/over voltage lockout.
The HM1595 is available in 8-pin ESOP8 package, which provides a compact solution with minimal external components.

## APPLICATIONS

- Distributed Power Systems
- Automotive Systems
- High Voltage Power Conversion
- Industrial Power Systems
- Battery Powered Systems

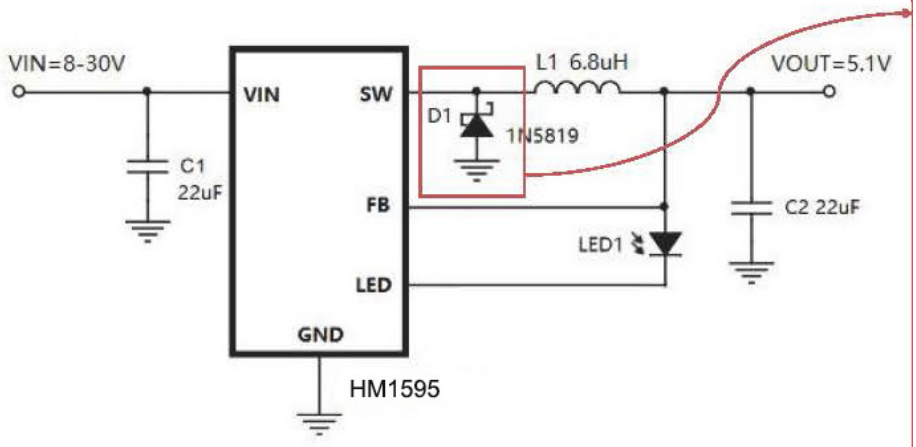
## PIN CONFIGURATION



# ORDER INFORMATION

| PART MARKING | OUTPUT VOLTAGE | PACKAGE DESCRIPTION | TEMPERATURE RANGE |
|---|---|---|---|
| HM1595 | 5.1V | ESOP8 | -40°C to +85°C |
| HM1595-56 | 5.6V | ESOP8 | -40°C to +85°C |
| HM1595-ADJ | ADJ | ESOP8 | -40°C to +85°C |

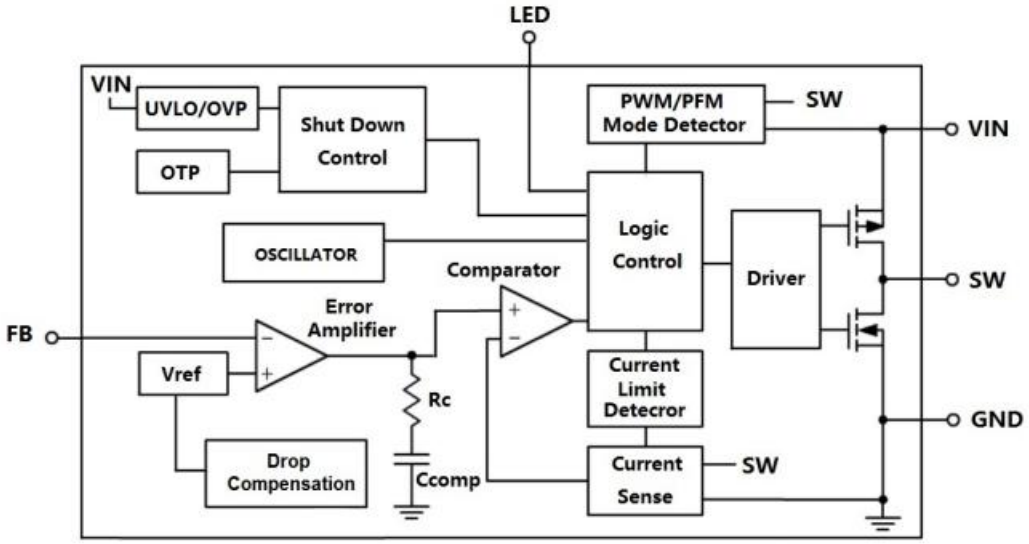
# TYPICAL APPLICATION




## Optional Schottky Diode

During the transition between high-side switch and low-side switch, the body diode of the low side power MOSFET conducts the inductor current. The forward voltage of this body diode is high. An optional Schottky diode may be paralleled between the SW pin and GND pin to improve overall efficiency.

# BLOCK DIAGRAM



## PIN DESCRIPTION

| Pin | Name | Description |
|---|---|---|
| 4/5 | GND | Ground. |
| 8 | FB | Adjustable Version Feedback input. |
| 6 | LED | Output indicator led. |
| 2 | VIN | Input voltage pin. VIN supplies power to the IC. Connect a 8V to 30V supply to VIN and bypass VIN to GND with a suitably large capacitor to eliminate noise on the input to the IC. |
| 3 | SW | SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load. |

## ABSOLUTE MAXIMUM RATING

| Item | Extreme value |
|---|---|
| VIN,SW | -0.3V to +30V |
| FB,LED | -0.3V to +18V |
| Junction Temperature | 125 ºC |
| Lead Temperature | 260 ºC |
| Storage Temperature | -65 ºC to +150 ºC |

## RECOMMENDED OPERATING CONDITIONS

| Item | Extreme value |
|---|---|
| Input Voltage VIN | 8V to 28V |
| Output voltage Vout | 1.2V to 15V |
| Operating Junction Temperature ($T_J$) | -40 °C to +85 °C |

## ELECTRICAL CHARATERISTICS

*$V_{IN}$ = 24V, $T_A$ = 25ºC, unless otherwise stated.*

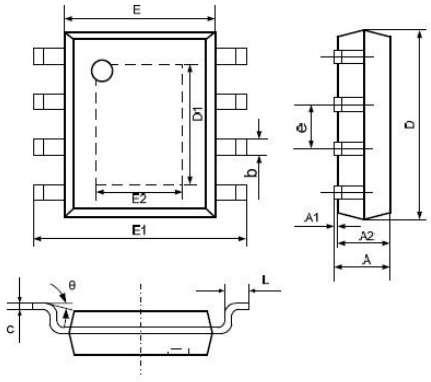
| Item | Symbol | Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Maximum Input voltage | $V_{IN\_BREAKDOWN}$ | $I_Q$>2mA,no switching | | 40 | | V |
| $V_{IN}$ Undervoltage Lockout Thershold | $V_{IN\_MIN}$ | $V_{IN}$ falling | 7 | 7.5 | 8 | V |
| $V_{IN}$ Undervoltage Lockout Hysteresis | $V_{IN\_MIN\_HYST}$ | $V_{IN}$ rising | | 100 | | mV |
| $V_{IN}$ Overvoltage Lockout Thershold | $V_{IN\_MAX}$ | $V_{IN}$ rising | 30 | 31 | 32 | V |
| $V_{IN}$ Overvoltage Lockout Hysteresis | $V_{IN\_MAX\_HYST}$ | $V_{IN}$ falling | | 100 | | mV |
| Supply Current | $I_Q$ | $V_{FB}$=1.156V | | | 2 | mA |
| Feedback Voltage | $V_{FB}$ | 8V<$V_{VIN}$<28V | 1.132 | 1.156 | 1.17 | V |
| Output Voltage | $V_{OUT}$ | HM1595-51 | 5.0 | 5.15 | 5.3 | V |
| Output Voltage | $V_{OUT}$ | HM1595-56 | 5.3 | 5.45 | 5.6 | V |
| Top Switch Resistance | $R_{DS(ON)T}$ | | | 400 | | mΩ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Bottom Switch Resistance | $R_{DS(ON)B}$ | | | 200 | | mΩ |
| Top Switch Leakage Current | $I_{LEAK\_TOP}$ | $V_{IN}$=24V,$V_{SW}$=0V | | 1 | | uA |
| Bottom Switch Leakage Current | $I_{LEAK\_BOT}$ | $V_{IN}$= $V_{SW}$ = 24V | | 1 | | uA |
| Top Switch Current Limit | $I_{LIM\_TOP}$ | Minimum Duty Cycle | | 2 | | A |
| Bottom Switch Current Limit | $I_{LIM\_BOT}$ | Minimum Duty Cycle | | 2 | | A |
| Switch Frequency | $F_{SW}$ | | | 400 | | kHz |
| Minimum On Time | $T_{ON\_MIN}$ | | | 200 | | ns |
| Minimum Off Time | $T_{OFF\_MIN}$ | $V_{FB}$=0V | | 200 | | ns |
| Maximum Duty Cycle | $D_{MAX}$ | | | | 100 | % |
| Internal soft-start time | $T_{SS}$ | | | 400 | | us |
| Thermal Shutdown Temperature | $T_{TSD}$ | | | 150 | | °C |
| Thermal Shutdown Hysteresis | $T_{TSDHYS}$ | | | 40 | | °C |

# PACKAGE OUTLINE

ESOP8 UNIT: mm

SOP-8EP Package Outline Diagram




| SYMBOL | DIMENSION IN MILLIMETERS | | DIMENSION IN INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 1.350 | 1.700 | 0.053 | 0.067 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| D1 | 3.202 | 3.402 | 0.126 | 0.134 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| E2 | 2.313 | 2.513 | 0.091 | 0.099 |
| e | 1.270 TYP | | 0.050 TYP | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |