# MSKSEMI 美森科
## SEMICONDUCTOR

ESD    TVS    TSS    MOV    GDT    PLED

# MSZD8028IB5TR
**Product specification**

# MSKSEMI
## SEMICONDUCTOR

## GENERAL DESCRIPTION

The MSZD8028IB5TR is a compact 5V Buck Converter which can deliver 1A output current.

MSZD8028IB5TR employs a proprietary control loop to achieve a fast transient load response. It keeps high converting efficiency in both light load and heavy load.

MSZD8028IB5TR is equipped with all kinds of protection, such as input over voltage protection, output short circuit protection, over current protection and over temperature protection.

MSZD8028IB5TR is consists of internal power tree generator, bandgap voltage reference module, under-voltage-lockout (UVLO) module, error amplifier, protection circuitry, driver block, current sensing block and two power MOSFETs.

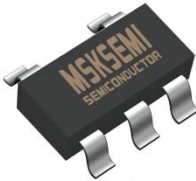MSZD8028IB5TR is housed in a SOT23-5 package.

## FEATURES

- Input operation range: 2.2– 5.5V
- Input over voltage protection at 6V
- 30uA quiescent current in operation
- Output current up to 1A
- Efficiency up to 95%
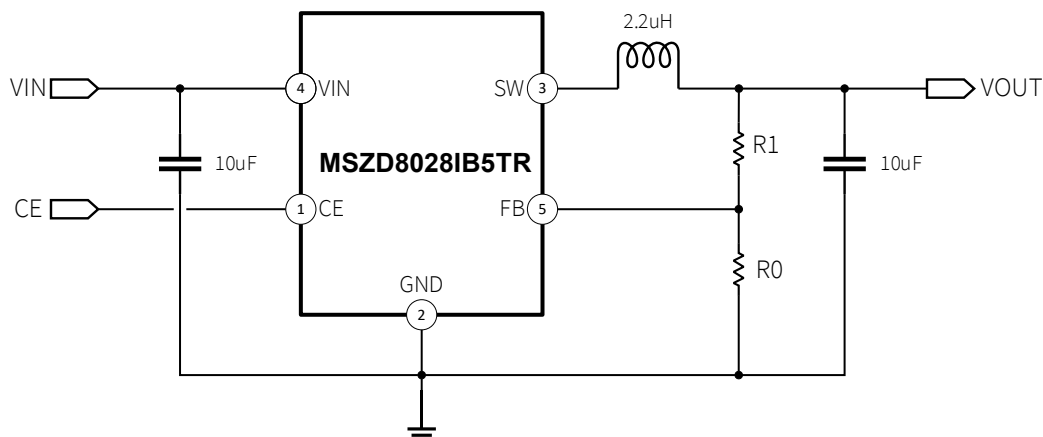- OCP, SCP and OTP protection
- SOT23-5 package

## Applications

- Set-top Box
- Solid State Drive
- WIFI and Network Devices
- Security surveillance system
- Toys
- TV
- All other electronic devices

## Reference News

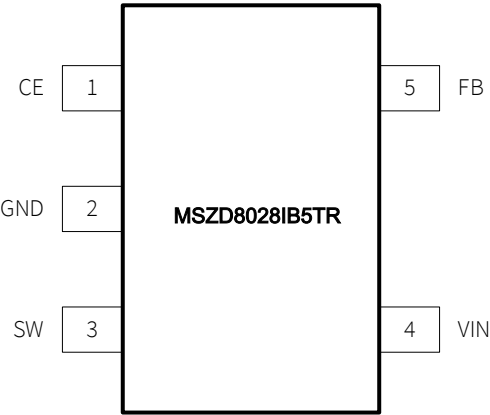| Type No | SOT-23-5 | MARKING |
|---|---|---|
| **MSZD8028IB5TR** | MSKSEMI SEMICONDUCTOR | **A1**✱✱ |

## Typical Application Circuit

## ORDER INFORMATION

| P/N | PKG | QTY |
|---|---|---|
| MSZD8028IB5TR | SOT-23-5 | 3000 |

## Pin Assignment



The package of MSZD8028IB5TR is SOT-23-5 , with pin assignment shown in following ta ble:

| Pin No | Name | Description |
|---|---|---|
| 1 | CE | Chip enable pin, pull high to turn on the chip |
| 2 | GND | Ground |
| 3 | SW | The switching node, connecting a 2.2uH inductor to this node |
| 4 | VIN | The input power node, connecting a 10uF capacitor to ground. |
| 5 | FB | Feedback node, with Vfb at 0.6V |

## Absolute Maximum Ratings

$V_{IN}$ [1]…………………………………………………………………………………………………………-0.3V to 6V

$V_{OUT}$ [1]…………………………………………………………………………………………………...………-0.3V to 5.5V

Continuous Power Dissipation  ($T_A$ = 25°C) [2]

     SOT-23-5  …………………………………………………………………...……………………0.4W

Junction Temperature…………………………………………………………………...………-40°C to 125°C

Lead Temperature…………………………………………………………………………...…………260°C

Storage Temperature…………………………………………………………………...…………-65°C to +150°C

Thermal Resistance [3]                                       $\theta_{JA}$                $\theta_{JC}$

     SOT-23-5…………………………………………………………………...……170°C /W…...…75°C /W

*Notes:*

*(1) Exceeding these ratings may damage the device.*

*(2) The maximum allowable power dissipation is a function of the maximum junction temperature $T_J(MAX)$, the junction-to-ambient thermal resistance $\theta_{JA}$, and the ambient temperature $T_A$. The maximum allowable continuous power dissipation at any ambient temperature is calculated by $P_D(MAX)=(T_J(MAX)-T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.*

*(3) Measured on JESD51-7, 4-layer PCB.*

## Electrical Characteristics

All typical values are at Tj=25°C (unless otherwise noted)

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| Input voltage range, $V_{IN}$ | | 2.2 | | 5.5 | V |
| Input over voltage protection | | 5.8 | 6 | 6.5 | V |
| Quiescent current, $I_Q$ | $V_{IN}$ = 5V | 20 | 30 | 60 | μA |
| Shutdown current, $I_{OFF}$ | $V_{IN}$ = 5V, $V_{CE}$ = 0 | | 0.1 | 2 | μA |
| Input voltage UVLO | Rising | | 2.55 | 2.65 | V |
| | Falling | 2.25 | 2.37 | | V |
| Feedback voltage | $V_{IN}$ = 5V | 0.588 | 0.6 | 0.612 | V |
| Output current Limit | $V_{IN}$ = 5V, $V_{OUT}$ = 3.3V | 1 | 1.2 | | A |
| Line regulation | $V_{IN}$ = 3 to 5V | | 0.2 | | %/V |
| Load regulation | $I_{OUT}$= 0.1 – 1A | | 0.1 | 2 | %/A |
| Switching frequency | $V_{IN}$ = 5V | 1 | 1.5 | 2 | MHz |
| ON resistance PMOS | $V_{IN}$ = 5V | | 0.38 | | Ω |
| ON resistance NMOS | $V_{IN}$ = 5V | | 0.25 | | Ω |
| CE input threshold ON | $V_{IN}$ = 5V | | 0.9 | 1.1 | V |
| CE input threshold OFF | $V_{IN}$ = 5V | 0.4 | 0.7 | | V |
| CE input pull down resistor | | | 750 | | KΩ |
| Output discharge resistor, $R_{pd}$ | $V_{IN}$ = 5V | | 600 | | Ω |
| Over temperature protection | | | 150 | | °C |
| OTP hysteresis | | | 40 | | °C |

## Application Information

### Output Voltage Setting

MSZD8028IB5TR 's feedback voltage is set at 0.6V, and it requires a resistor from FB node to ground, named R0, which is suggeste d t o b e less than 120K. Assuming the resistor between output node and FVB node is R1, the output voltage of DC-DC converting s yst e m is given by

$$Vout = \frac{0.6V}{R0} \times (R1+R0)$$

### Capacitor Selection

MSZD8028IB5TR requires one minimal 10uF MLCC capacitor at VIN node and one 10uF MLCC capacitor at VOUT node, however, it is alw a ys r ecommended to have two 10uF MLCC capacitors placed in parallel both at VIN and VOUT node to minimize the noise and withstand the current surge. It is also essential to place both input capacitors and output capacitors as close to MSME3103AM5G's VIN p in and VOUT pin as possible. An PCB layout example is shown at PCB layout recommendation section.
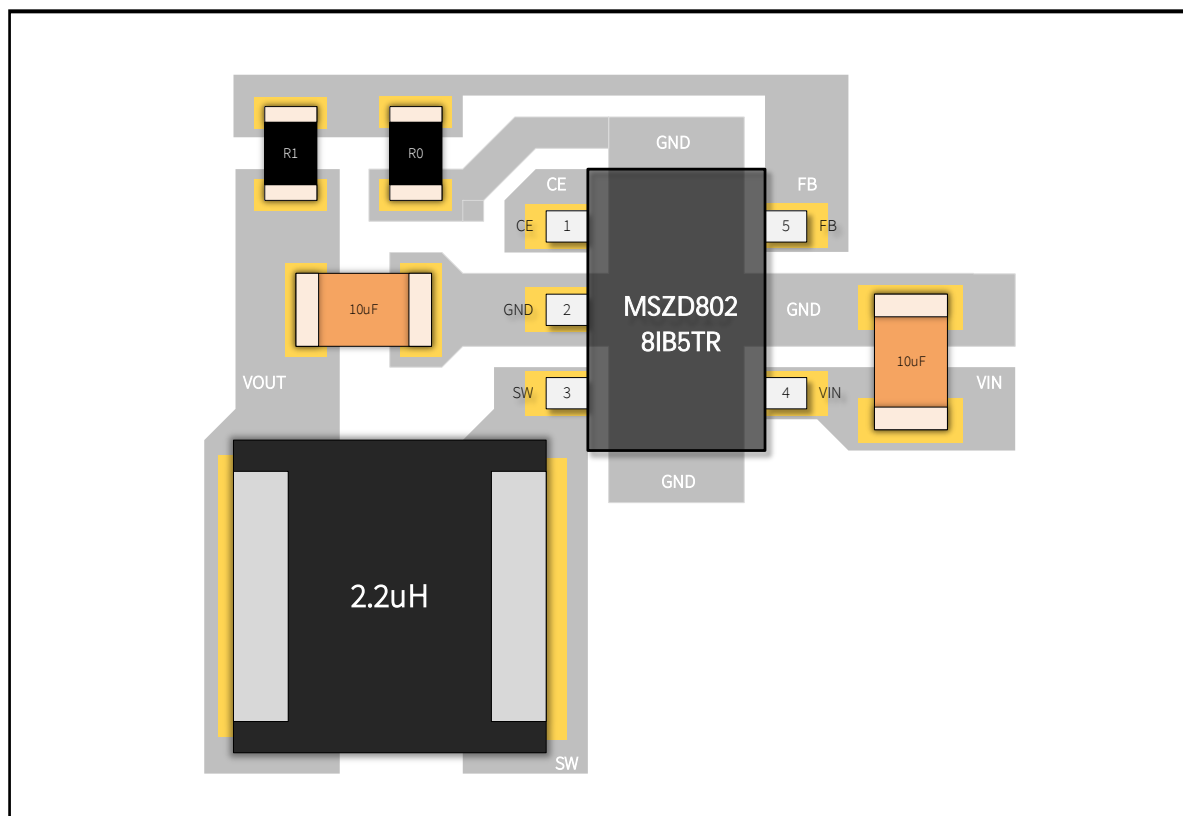
### Inductor Selection

MSZD8028IB5TR works at a 1.5MHz oscillating frequency which helps to have a small voltage ripple at output. And 2.2uH inductor is fo un d t he most suitable value while meeting requirements on small output voltage ripple as well as a high-power conversion efficiency.
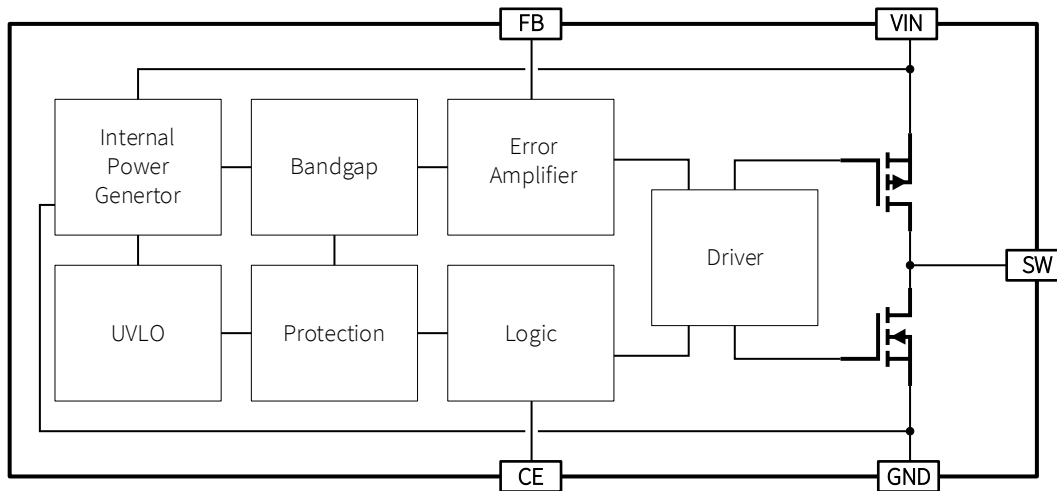
### Thermal Considerations

Though MSZD8028IB5TR is a high efficiency DC/DC converter, there will always be some power lost during conversion, most of which be c o m es heat to make junction temperature higher. PCB design to ensure a good heat dissipation is important. Because the heat dissip at i o n of the SOT-23-5 package is conducted through the pin No. 2, which is GND node of MSZD8028IB5TR, please make sure the grou n d p l a te of PC B is big enough to carry away the heat generated in the chip.

### PCB Layout

An illustration of PCB layout recommendation with key elements is laid out as following. Please follow this PCB instruction to place t h e k ey peripheral devices such as input capacitors, output capacitors and inductor. And star-like connection for ground node is e sse ntial . And keeping power loop area as small as possible will improve the EMI performance.
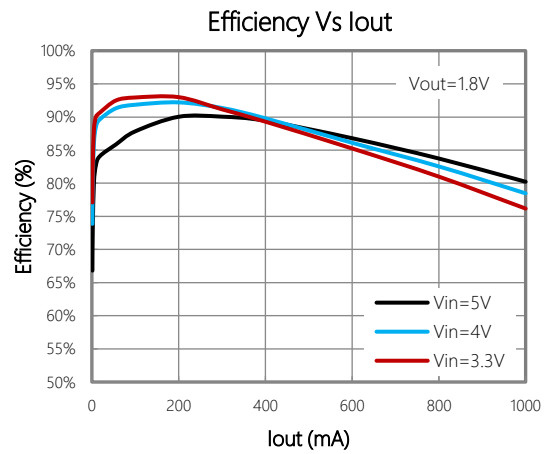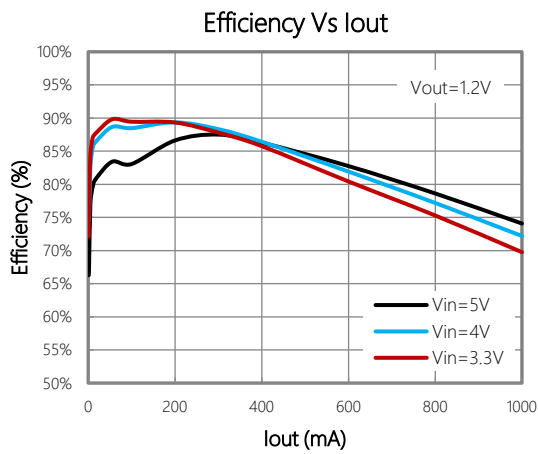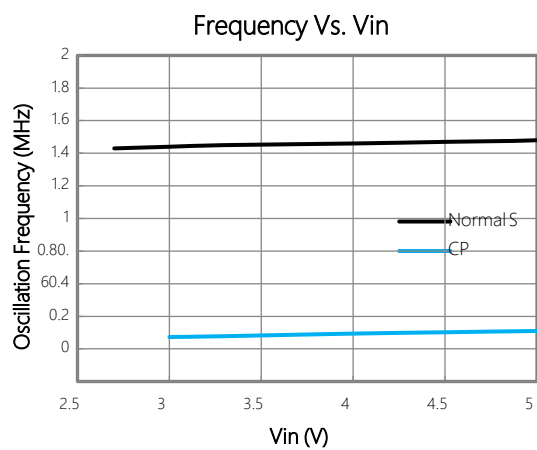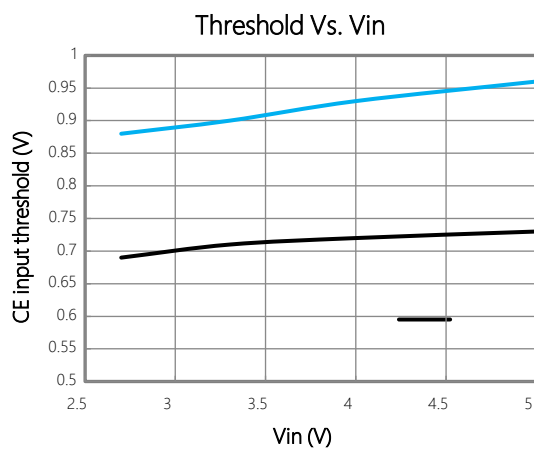
## Block Diagram



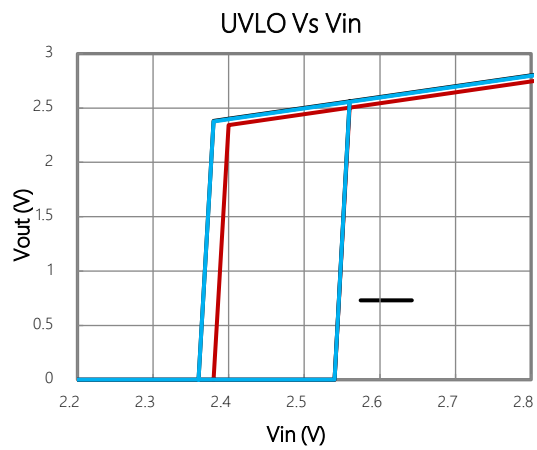## Typical Characteristics

$C_{IN}=C_{OUT}=10uF$, $T_A = 25°C$, unless otherwise specified



Efficiency Vs Iout

Vout=1.2V

Efficiency (%)

Iout (mA)

Vin=5V
Vin=4V
Vin=3.3V



Efficiency Vs Iout

Vout=1.8V

Efficiency (%)

Iout (mA)

Vin=5V
Vin=4V
Vin=3.3V

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## Typical Characteristics (cont')

$C_{IN}=C_{OUT}=10uF$, $T_A = 25°C$, unless otherwise specified

### Efficiency Vs Iout



### Vout Vs. Iout



### Iq Vs. Vin



### UVLO Vs Vin



### Threshold Vs. Vin



### Frequency Vs. Vin
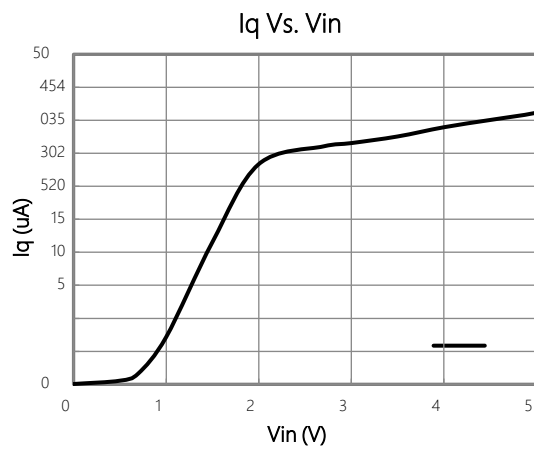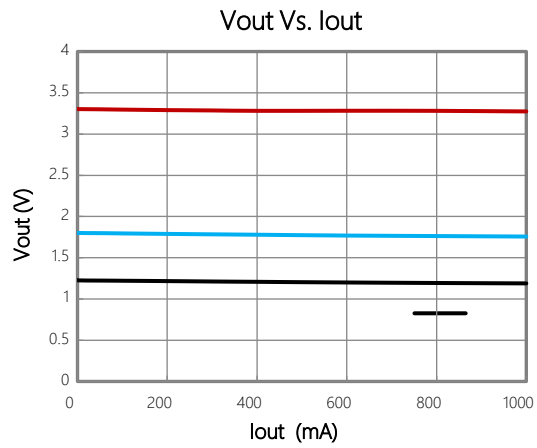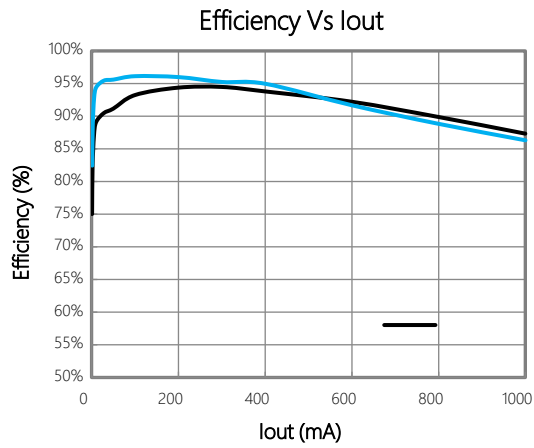
## Package Outline

Package        SOT-23-5                                    Devices per reel

Package dimension (mm):
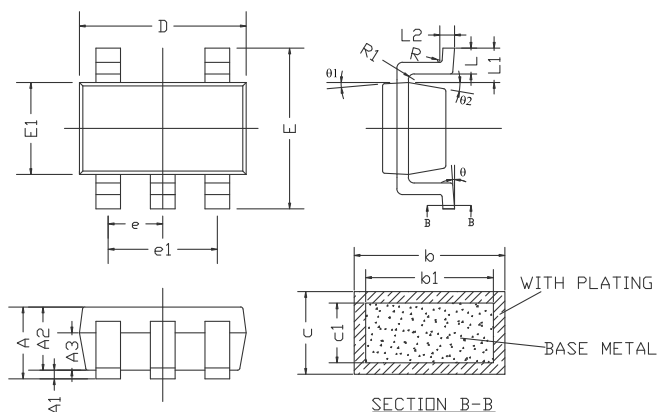


| Symbol | MIN | NORM | MAX |
|---|---|---|---|
| A | - | - | 1.25 |
| A1 | 0.00 | - | 0.15 |
| A2 | 1.00 | 1.10 | 1.20 |
| A3 | 0.60 | 0.65 | 0.70 |
| b | 0.36 | - | 0.50 |
| b1 | 0.36 | 0.38 | 0.45 |
| c | 0.14 | - | 0.20 |
| c1 | 0.14 | 0.15 | 0.16 |
| D | 2.826 | 2.926 | 3.026 |
| E | 2.60 | 2.80 | 3.00 |
| E1 | 1.526 | 1.626 | 1.726 |
| e | 0.90 | 0.95 | 1.00 |
| e1 | 1.80 | 1.90 | 2.00 |
| L | 0.35 | 0.45 | 0.60 |
| L1 | 0.59 REF | | |
| L2 | 0.25 BSC | | |
| R | 0.05 | - | - |
| R1 | 0.05 | - | 0.20 |
| Θ | 0° | - | 8° |
| Θ1 | 3° | 5° | 7° |
| Θ2 | 6° | - | 14° |

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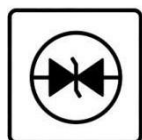■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. Whendesigning equipment, referto the "Delivery Specification" for the MSKSEMI Semiconductor productthat you intend to use.

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## SEMICONDUCTOR

ESD   TVS   TSS   MOV   GDT   PLED

## MSNCP1529ASNT1G
**Product specification**