

GSC2128

CMOS Low Dropout Voltage Regulator

Description

The GSC2128 series of positive, linear regulators feature low quiescent current (45µA typ.) with low dropout voltage, making them ideal for battery applications.

Output voltages are set at the factory and trimmed to 1.5% accuracy.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

In applications requiring a low noise, regulated supply, place a 1000pF capacitor between Bypass and Ground. The GSC2128 is stable with an output capacitance of 4.7µF or greater.

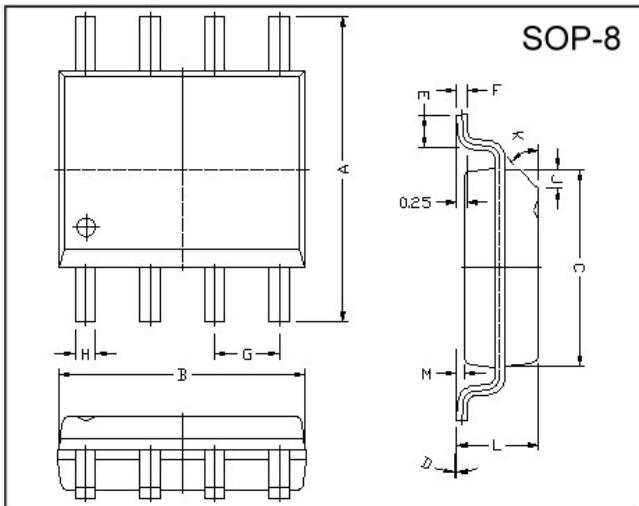
Features

- Very Low Dropout Voltage
- Guaranteed 1.5A output
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Highly Accurate ± 1.5%
- Low Temperature Coefficient
- Noise Reduction Bypass Capacitor
- Power-Saving Shutdown Mode

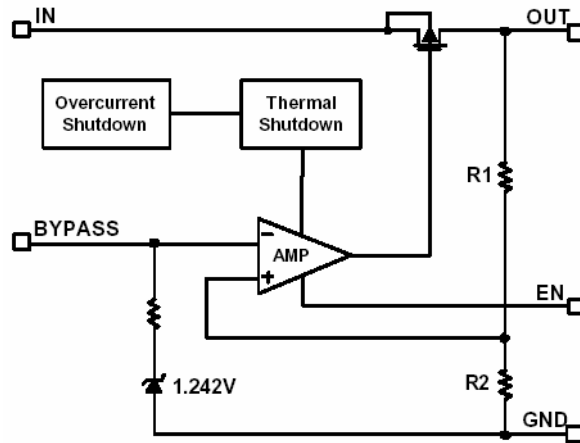
Applications

- Battery Powered Widgets
- Instrumentation
- Wireless Devices
- PC Peripherals
- Portable Electronics

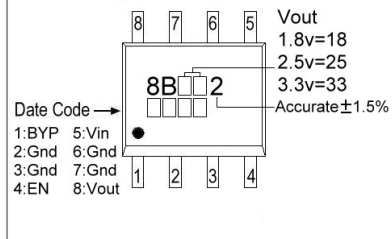
Package Dimensions



Functional Block Diagram

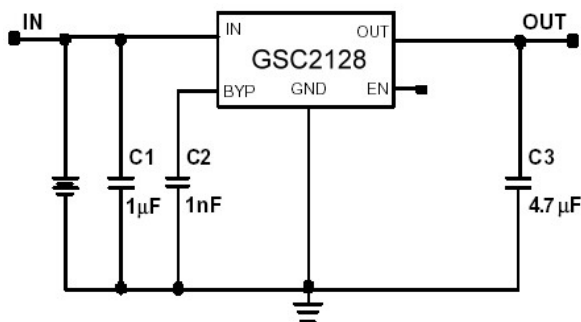


Marking :



| REF. | Millimeter | | REF. | Millimeter | |
|------|------------|------|------|------------|------|
| | Min. | Max. | | Min. | Max. |
| A | 5.80 | 6.20 | M | 0.10 | 0.25 |
| B | 4.80 | 5.00 | H | 0.35 | 0.49 |
| C | 3.80 | 4.00 | L | 1.35 | 1.75 |
| D | 0° | 8° | J | 0.375 REF. | |
| E | 0.40 | 0.90 | K | 45° | |
| F | 0.19 | 0.25 | G | 1.27 TYP. | |

Typical Application Circuit



Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|--------------------------------------|--------------------|---------------------------------------|------|
| Input Max Voltage | V _{IN} | 8 | V |
| Output Current | I _{OUT} | PD/(V _{IN} -V _O) | A |
| Output Voltage | V _{OUT} | 1.5~5.0 | V |
| Operating Ambient Temperature | T _{opr} | -40 ~ +85 | °C |
| Junction Temperature | T _j | -40 ~ +125 | °C |
| Maximum Junction Temperature | T _{j Max} | 150 | °C |
| Thermal Resistance | θ _{jc} | 40 | °C/W |
| Internal Power Dissipation(ΔT=100°C) | PD | 810 | mW |
| EDS Classification | | B | |

Electrical Characteristics V_{IN}=V_{OUT}(T)+2V, V_{EN}=V_{IN}, T_A=25°C unless otherwise noted

| Parameter | Symbol | Condition | Min | Typ | Max | Unit | |
|--|---------------------------------|---|--------------------------------|---------------------------------|-----------------|--------|----|
| Output Voltage | V _{OUT} (E) (Note1) | V _{EN} =V _{EH} min, I _O =1mA | -1.5% | V _{OUT} (T) (Note2) | 1.5% | V | |
| Output Current | I _O | V _{OUT} >1.2V | 1.5 | - | - | A | |
| Current Limit | I _{LIM} | V _{OUT} >1.2V | 1.5 | 2.0 | - | A | |
| Load Regulation | REG _{LOAD} | I _O =1mA to 1.5A | -1 | 0.2 | 1 | % | |
| Dropout Voltage | V _{DROPOUT} | I _O =1.5A V _O =V _{OUT} (E)-2% | 1.5V<V _{OUT} (T)≤2.0V | - | - | 1300 | mV |
| | | | 2.0V<V _{OUT} (T)≤2.8V | - | - | 800 | |
| | | | 2.8V<V _{OUT} (T) | - | - | 600 | |
| Quiescent Current | I _Q | I _O =0mA | - | 45 | 70 | μA | |
| Ground Pin Current | I _{IGND} | I _O =1mA~1.5A | - | 45 | - | μA | |
| Line Regulation | REG _{LINE} | I _O =1mA V _{IN} =V _{OUT} (T)+1 to V _{OUT} (T)+2 | V _{OUT} (T)<2.0V | -0.15 | - | 0.15 | % |
| | | | 2.0V≤V _{OUT} (T)<4.0V | -0.1 | 0.02 | 0.1 | |
| | | | 4.0V≤V _{OUT} (T) | -0.4 | - | 0.4 | |
| Input Voltage | V _{IN} | | Note3 | - | 7 | V | |
| Over Temperature Shutdown | OTS | | - | 150 | - | °C | |
| Over Temperature Hysteresis | OTH | | - | 30 | - | °C | |
| Output Voltage Temperature Coefficient | TC | | - | 30 | - | ppm/°C | |
| Short Circuit Current | I _{sc} | V _{OUT} <0.4V | - | 750 | - | mA | |
| Power Supply Rejection | PSRR | I _O =100mA C _O =4.7μF ceramic | f=1kHz | - | 50 | - | dB |
| | | | f=10kHz | - | 20 | - | |
| Power Supply Rejection | PSRR | I _O =100mA C _O =4.7μF ceramic C _{BYP} =0.01μF | f=1kHz | - | 75 | - | dB |
| | | | f=10kHz | - | 55 | - | |
| Output Voltage Noise | e _N | f=10Hz~100kHz I _O =10mA, C _{BYP} =0μF | | | | μVrms | |
| Output Voltage Noise | e _N | f=10Hz~100kHz I _O =10mA, C _{BYP} =0.01μF | | | | μVrms | |
| EN Input Threshold | V _{EH} | | 2.0 | - | V _{IN} | V | |
| | V _{EL} | | 0 | - | 0.4 | V | |
| EN Input Bias Current | I _{EH} | V _{IN} =7V | - | - | 0.1 | μA | |
| | I _{EL} | V _{EN} =0V, V _{IN} =7V | - | - | 0.5 | μA | |
| Shutdown Supply Current | I _{SD} | V _{IN} =5V, V _{OUT} =0V, V _{EN} =0V | - | 0.5 | 2 | μA | |

Note 1: V_{OUT}(E) =Effective Output Voltage (i.e. the output voltage when "V_{OUT}(T) + 2.0V" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value).

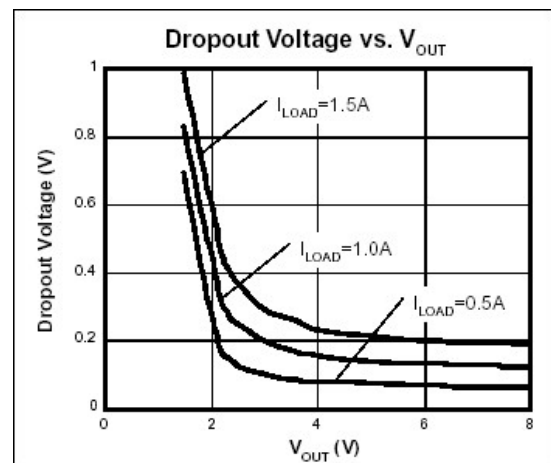
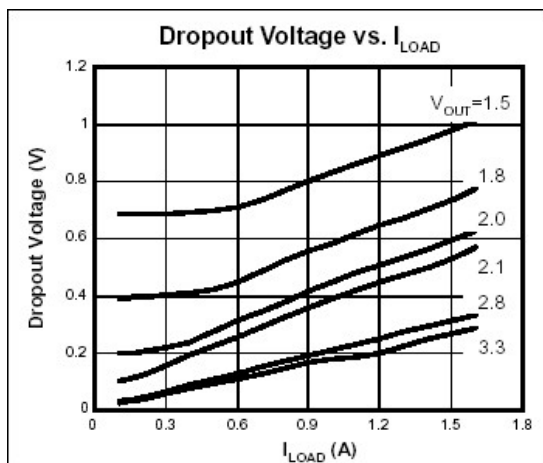
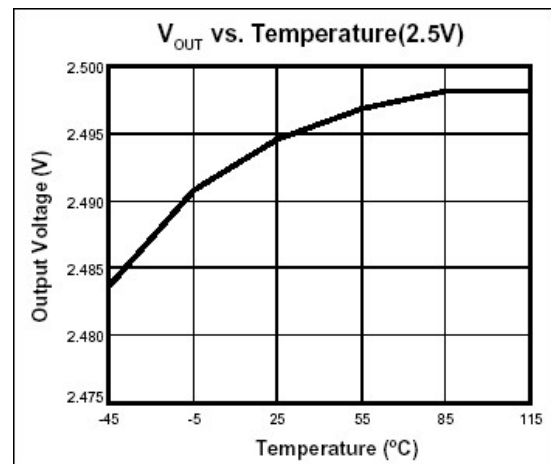
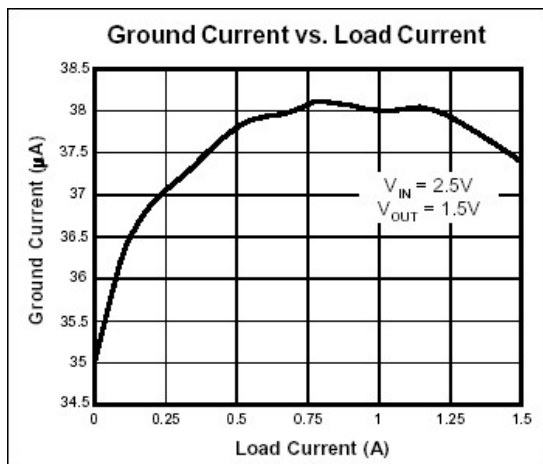
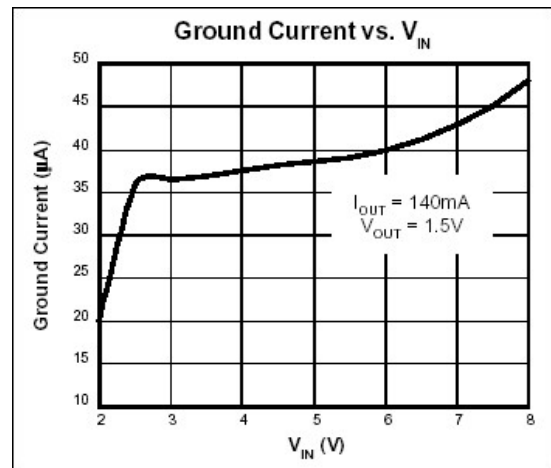
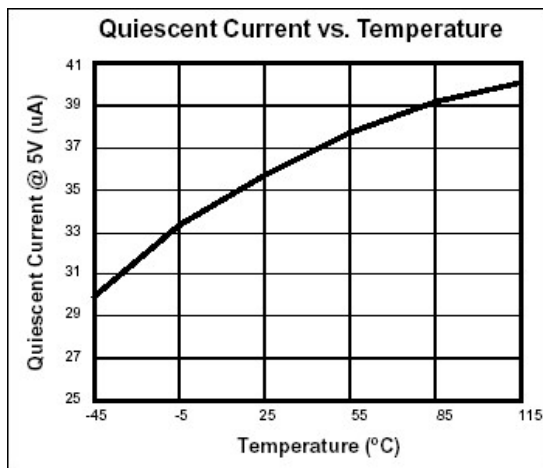
2: V_{OUT}(T) =Specified Output Voltage

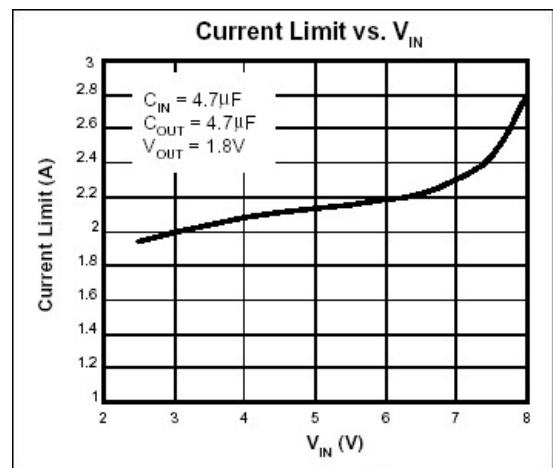
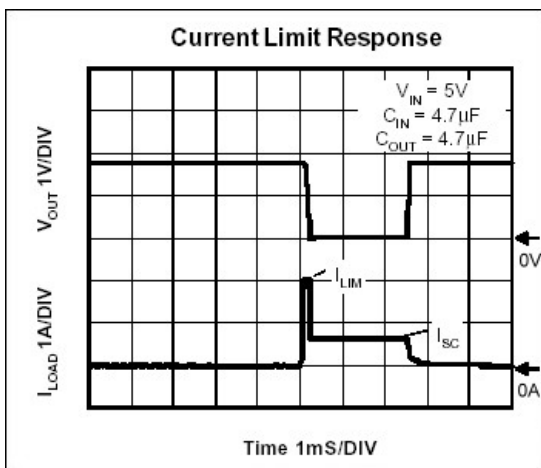
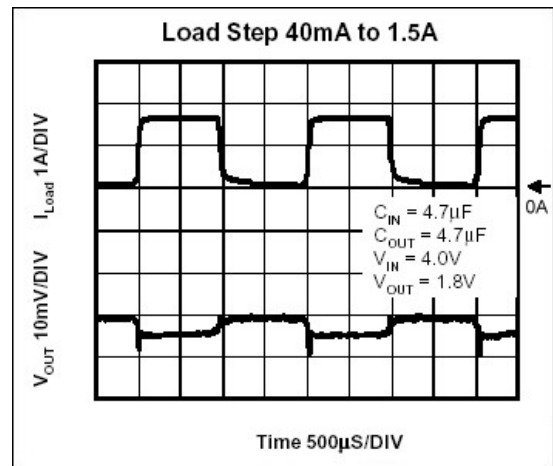
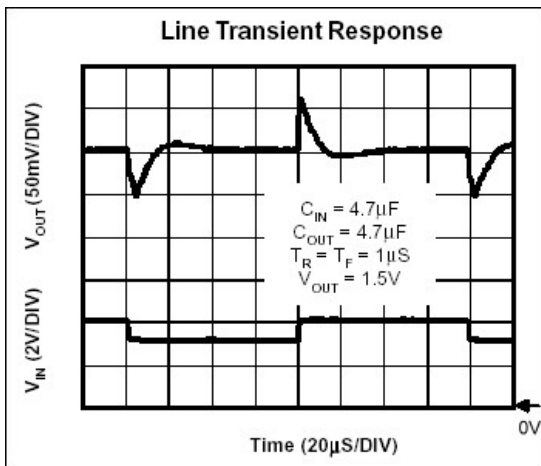
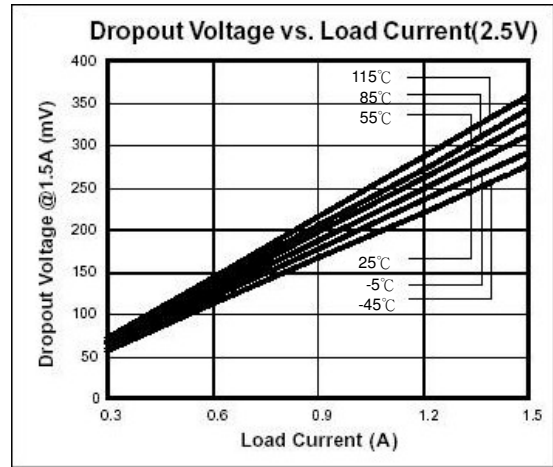
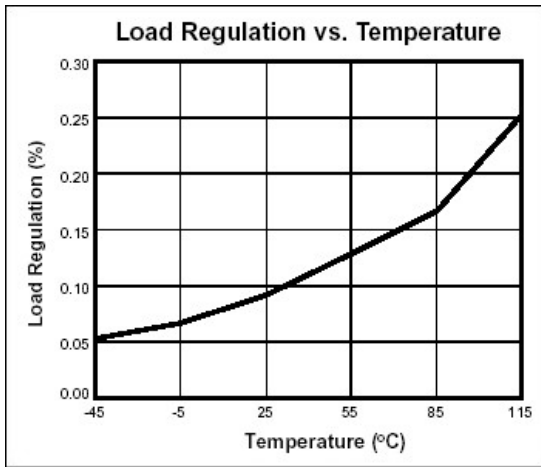
3: V_{IN}(MIN) =V_{OUT}+V_{DROPOUT}

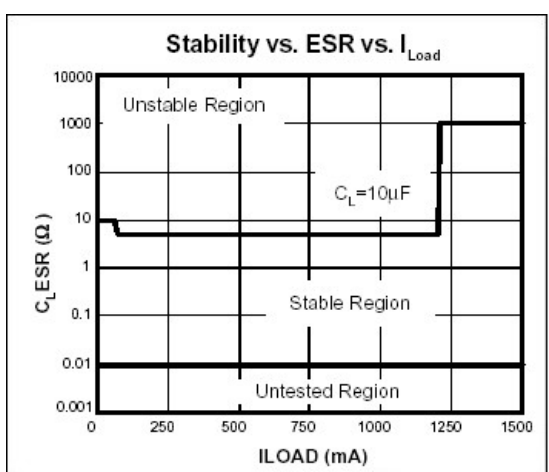
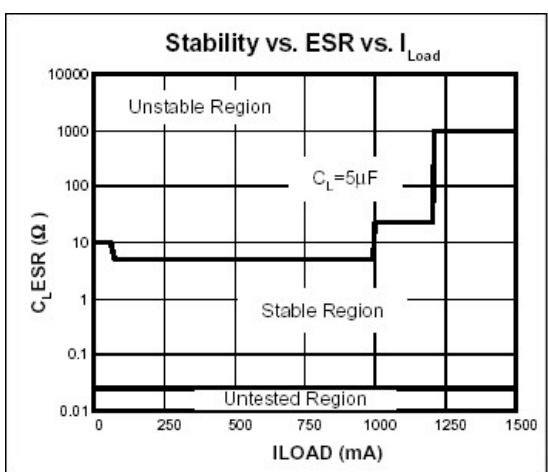
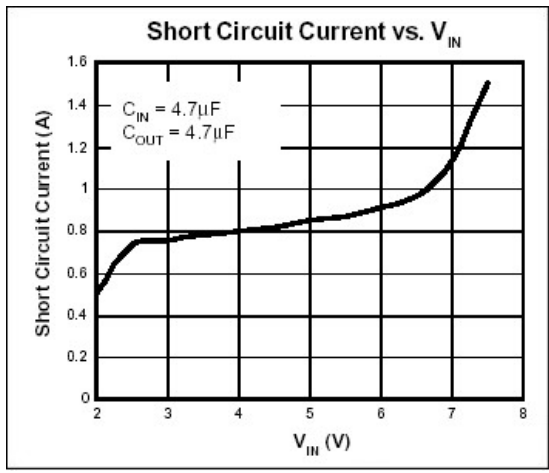
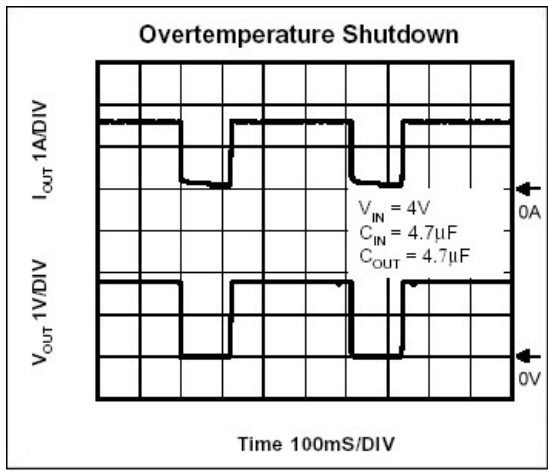
Ordering Information (contd.)

| Part Number | Marking | Output Voltage | Part Number | Marking | Output Voltage |
|-------------|---------------|----------------|-------------|---------------|----------------|
| GSC2128-15 | 8B152 XXXX | 1.5V | GSC2128-18 | 8B182 XXXX | 1.8V |
| GSC2128-25 | 8B252 XXXX | 2.5V | GSC2128-33 | 8B332 XXXX | 3.3V |
| GSC2128-47 | 8B472 XXXX | 4.75V | GSC2128-50 | 8B502 XXXX | 5.0V |

Characteristics Curve







Detailed Description

The GSC2128 series of COMS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 140°C, or the current exceeds 2.2A. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C.

The GSC2128 behaves like a current source when the load reaches 2.2A. However, if the load impedance drops below 0.3Ω, the current drops back to 600mA to prevent excessive power dissipation. Normal operation is restored when the load resistance exceeds 0.75Ω.

External Capacitors

The GSC2128 is stable with an output capacitance to ground of 4.7μF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1μF ceramic capacitor with a 10μF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize Vin. The input capacitor should be at least 0.1μF to have a beneficial effect.

A third capacitor can be connected between the BY-PASS pin and GND. This capacitor can be a low cost Polyester Film variety between the value of 0.001~0.01μF. A large capacitor improves the AC ripple rejection, but also makes the output come up slowly. This "Soft" turn-on is desirable in some applications to limit turn-on surges.

All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

Enable

When pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 1μA. This pin behaves much like an electronic switch.

100kΩ resistor is necessary between VEN source and EN pin when VEN is higher than VIN.

(Note: there is no internal pull-up for EN PIN)

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