



# AP1127

## 3A Bus Terminator Regulator

### ■ Features

- Ideal for DDR-I and DDR-II
- Source and sink up to 3A, no heat sink required
- Integrated power MOSFETs
- Programmable output voltage by external resistors
- Output voltage could go down to 0.6V
- Iccq at VCCA less than 500uA
- Current limit protection and Short Circuit protection
- Thermal shutdown protection
- Shutdown for standby or suspend mode operation
- Minimum external components
- 5-Lead TO252 **Pb-free** Package

### ■ Applications

- Mother Board
- PCI/AGP Graphics
- Game/Play Station
- Set Top Box
- SCSI-III Bus Terminator
- IPC

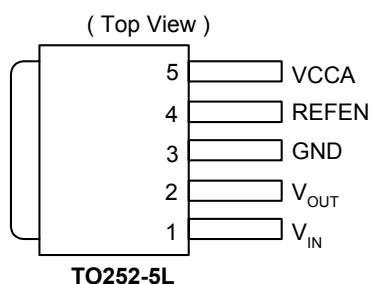
### ■ General Description

The AP1127 is a low cost linear regulator designed to provide a desired output voltage or termination voltage for various applications by converting voltage supplies ranging from 1.6V to 6.0V. The desired output voltage could be programmable by two external voltage divider resistors.

The AP1127 is capable of sourcing or sinking up to 3A of current while regulating an output  $V_{OUT}$  voltage to within 2% (DDR-I), 3%(DDR-II) or less.

The AP1127 provides low profile 5-lead TO-252 package to save system space.

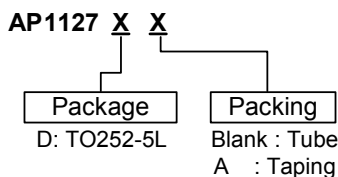
### ■ Pin Assignment



### ■ Pin Descriptions

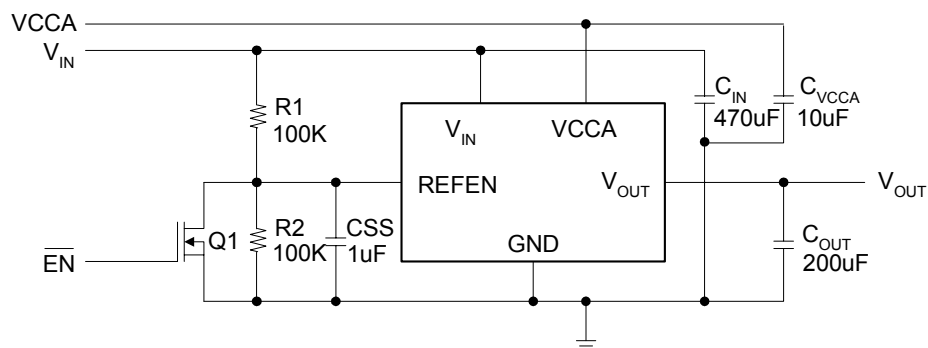
| Pin Name  | Pin No. | Descriptions                            |
|-----------|---------|-----------------------------------------|
| $V_{IN}$  | 1       | Input Power                             |
| $V_{OUT}$ | 2       | Output Voltage                          |
| GND       | 3       | Ground                                  |
| REFEN     | 4       | Reference Voltage Input and Chip Enable |
| VCCA      | 5       | Voltage Supply for Internal Circuits    |

### ■ Ordering Information

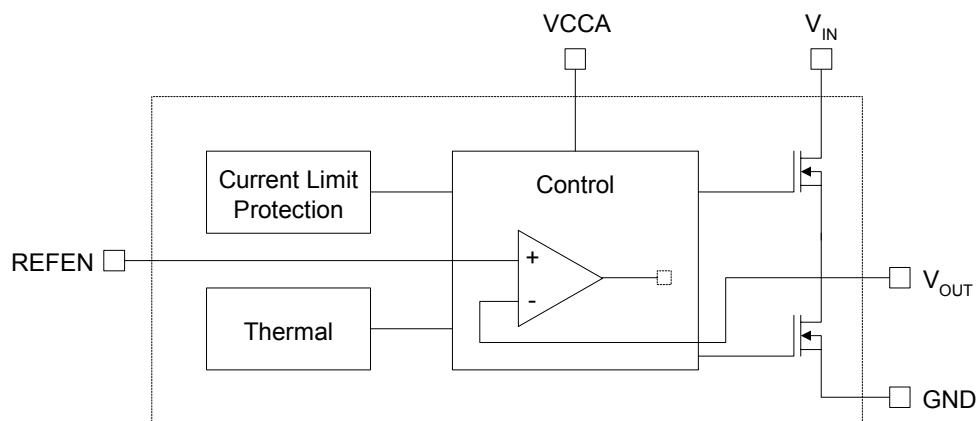


## 3A Bus Terminator Regulator

### ■ Typical Circuit



### ■ Block Diagram



### ■ Absolute Maximum Ratings (Note 1)

Absolute maximum ratings are those values beyond which the device could be permanently damaged.

| Symbol        | Parameter                            | Rating     | Unit |
|---------------|--------------------------------------|------------|------|
| $V_{IN}$      | Supply Voltage                       | 7          | V    |
| VCCA          | Voltage Supply for internal circuits | 7          | V    |
| $I_{OUT}$     | Output RMS Current, Source or Sink   | 3          | A    |
| $T_{STG}$     | Storage Temperature                  | -65 to 125 | °C   |
| $T_{Lead}$    | Lead Temperature (Soldering, 5 sec)  | 260        | °C   |
| $\theta_{JC}$ | Thermal Resistance                   | 7.7        | °C/W |

**3A Bus Terminator Regulator****■ Electrical Characteristics**

Unless otherwise stated, these specifications apply  $T_A=25^{\circ}\text{C}$ ;  $V_{IN}=+2.5\text{V}$  and  $V_{CCA}=+3.3\text{V}$ ,  $V_{REFEN}=1.25\text{V}$ ) maximum ratings are stress ratings only and functional device operating is not implied. **(Note 1)**

| Symbol                          | Parameter                      | Conditions                                                | Min.   | Typ.    | Max. | Unit               |
|---------------------------------|--------------------------------|-----------------------------------------------------------|--------|---------|------|--------------------|
| $V_{OS}$                        | Output Offset Voltage          | $I_{OUT}=0\text{A}$ (Note 2)                              | -20    | -       | 20   | mV                 |
| $I_{OP}$                        | Operating Current at $V_{IN}$  | No load, $C_{OUT}=200\mu\text{F}$                         | -      | -       | 1    | mA                 |
| $ \Delta V_{LOAD} $             | Load Regulation (DDR I/II)     | $I_L: 0\text{A}\sim 3\text{A}$                            | -      | 0.8/1.2 | 2/3  | %                  |
|                                 |                                | $I_L: 0\text{A}\sim 3\text{A}$                            | -      | 0.8/1.2 | 2/3  |                    |
| $I_{CCQ}$                       | Quiescent Current at $V_{CCA}$ | At room temp.                                             | -      | 190     | 230  | $\mu\text{A}$      |
| $I_{SHDN}$                      | Current in Shutdown Mode       | $REFEN < 0.2\text{V}$ ,<br>$R_L=10\Omega$                 | -      | 90      | 110  | $\mu\text{A}$      |
| $V_{IN}$                        | Input Voltage Range (Note 3)   | No load                                                   | 1.35/1 | 2.5/1.8 | 6    | V                  |
| $V_{CCA}$                       | Input Voltage Range (Note 3)   | $R_L=10\Omega$                                            | 3.75   | -       | 6    | V                  |
| <b>Short Circuit Protection</b> |                                |                                                           |        |         |      |                    |
| $I_{LIMIT}$                     | Current Limit                  |                                                           | -      | 5       | -    | A                  |
| $I_{SC\_VIN}$                   | Short Current                  | Sinking                                                   | 2      | -       | -    | A                  |
| $I_{SC\_GND}$                   | Short Current                  | Sourcing                                                  | 3      | -       | -    | A                  |
| <b>Over Thermal Protection</b>  |                                |                                                           |        |         |      |                    |
| THSD                            | Thermal Shutdown Temperature   | $3.75\text{V} \leq V_{CCA} \leq 6\text{V}$                | 125    | 150     | -    | $^{\circ}\text{C}$ |
|                                 | Thermal Shutdown Hysteresis    |                                                           | 25     | 30      | 35   | $^{\circ}\text{C}$ |
| <b>REFEN Function</b>           |                                |                                                           |        |         |      |                    |
|                                 | REFEN Threshold                | $V_{REFEN} < V_{IN}$<br>$V_{REFEN} < V_{CCA}-2.5\text{V}$ | 0.4    | 0.5     | 0.6  | V                  |

**Note 1:** Limits are guaranteed by 100% testing, sampling, or correlation with worst case test conditions.

**Note 2:**  $V_{OS}=V_{REFEN}-V_{OUT}$

**Note 3:** Keep  $V_{CCA} \geq V_{IN}$  and  $V_{CCA} \geq V_{REFEN} + 2.5\text{V}$  on operation power on and power off sequences.

**Note 4:** Guaranteed by design, not 100% test.

**■ Function Description**

The AP1127 is a linear regulator that is capable of sinking and sourcing 3A of current without an external heat sink.

The AP1127 integrates power MOSFETs that are capable of source and sink 3A of current while maintaining excellent voltage regulation. The output voltage can be regulated within 3% or less by using the external feedback. Separate voltage supply inputs have been added to fit applications with various power supplies for the data bus and power buses.

**Outputs**

The output voltage pins ( $V_{OUT}$ ) are tied to the data bus, address, or clock lines via an external inductor. Output voltage is determined by the  $V_{IN}$ .

**Inputs**

The input voltage pins ( $V_{IN}$ ) determine the output voltages ( $V_{OUT}$ ). At AP1127, the desired output voltage could be programmable by two external voltage divider resistors.  $V_{IN}$  is suggested to connect to VDDQ of memory module for better tracking with memory VDDQ.

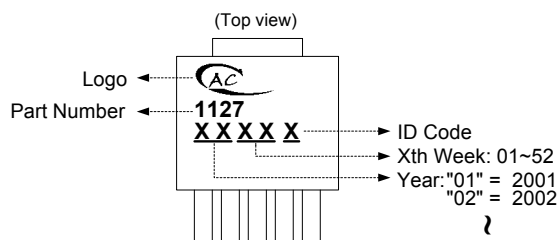
**Other Supply Voltages**

$V_{CCA}$  provide the voltage supply to the logic section and internal error amplifiers of AP1127.

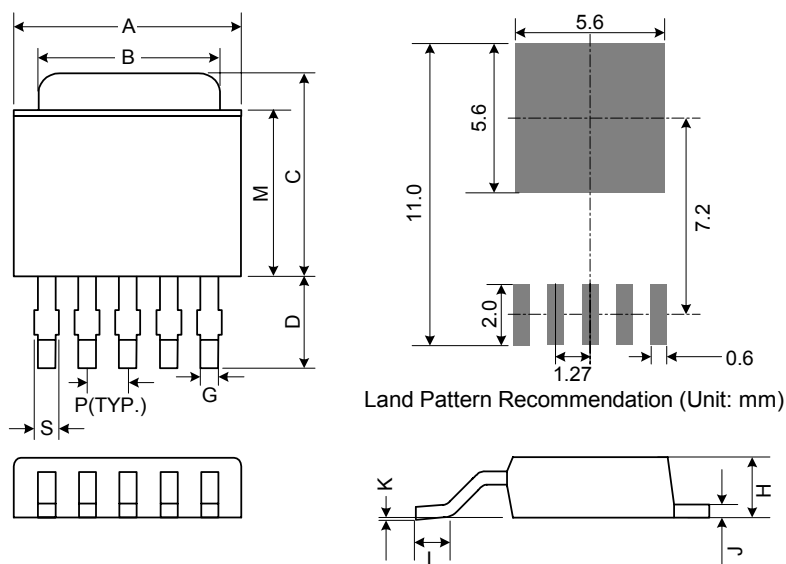
## 3A Bus Terminator Regulator

### ■ Marking Information

TO252-5L



### ■ Package Information



| Symbol | Dimensions In Millimeters |      |      | Dimensions In Inches |       |       |
|--------|---------------------------|------|------|----------------------|-------|-------|
|        | Min.                      | Nom. | Max. | Min.                 | Nom.  | Max.  |
| A      | 6.35                      | 6.60 | 6.85 | 0.250                | 0.260 | 0.270 |
| B      | 5.20                      | 5.35 | 5.50 | 0.205                | 0.211 | 0.217 |
| C      | 6.80                      | 7.00 | 7.30 | 0.268                | 0.276 | 0.287 |
| D      | 2.20                      | 2.50 | 2.80 | 0.087                | 0.098 | 0.110 |
| P      | 1.27 REF.                 |      |      | 0.050 REF.           |       |       |
| S      | 0.50                      | 0.65 | 0.80 | 0.020                | 0.026 | 0.031 |
| G      | 0.40                      | 0.50 | 0.63 | 0.016                | 0.020 | 0.025 |
| H      | 2.20                      | 2.30 | 2.40 | 0.087                | 0.091 | 0.094 |
| J      | 0.45                      | 0.52 | 0.58 | 0.018                | 0.020 | 0.023 |
| K      | 0.00                      | 0.08 | 0.15 | 0.000                | 0.003 | 0.006 |
| L      | 0.90                      | 1.20 | 1.63 | 0.035                | 0.047 | 0.064 |
| M      | 5.40                      | 5.80 | 6.20 | 0.213                | 0.228 | 0.244 |