

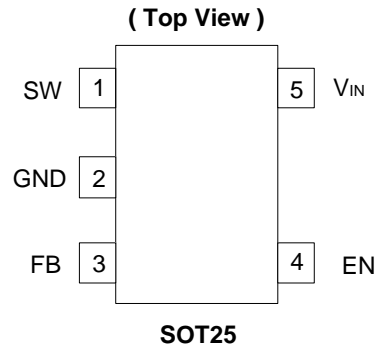
## Description

The AP5727 is a high efficiency boost converter in a compact SOT25 that provides the bias voltages for OLED Sub Display and TFT-LCD (Liquid Crystal Display).

A high 1.2MHz switching frequency and internal compensation minimizes external part count, PCB area and cost. Integrated soft start reduces inrush current.

The AP5727 has a 1.25V feedback voltage making it compatible with industry standard boost converters used to bias LCD panels.

## Pin Assignments



## Features

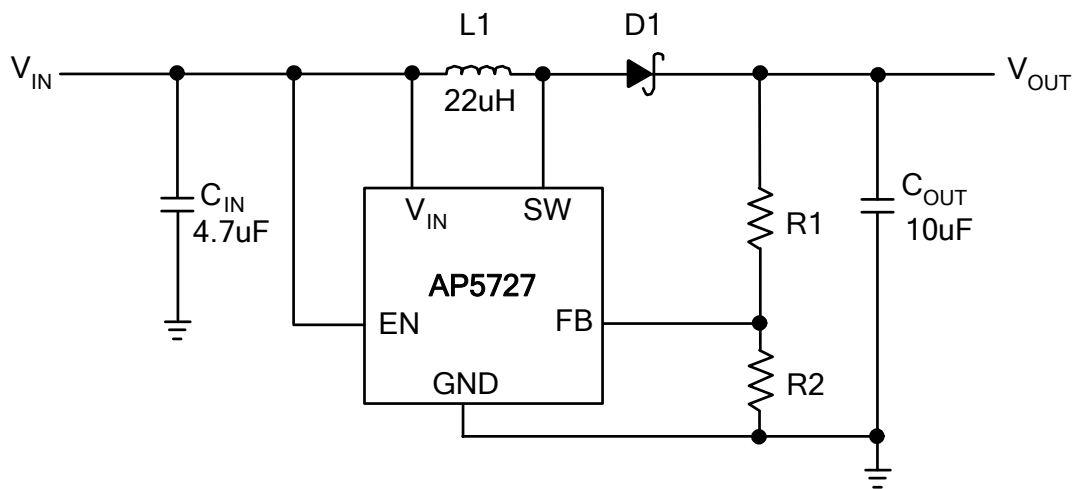
- 30V High Output Voltage
- Fast **1.2MHz** Switching Frequency
- Current limit and UVLO Protections
- Internal Thermal Shutdown
- Maximum 1µA Shutdown Current
- Integrated Soft-start Function
- SOT25: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/RoHS Compliant (Note 1)

## Applications

- Small size TFT-LCD Bias power supply.
- OLED bias supply for a clamshell handset sub display
- RF amplifier bias voltages

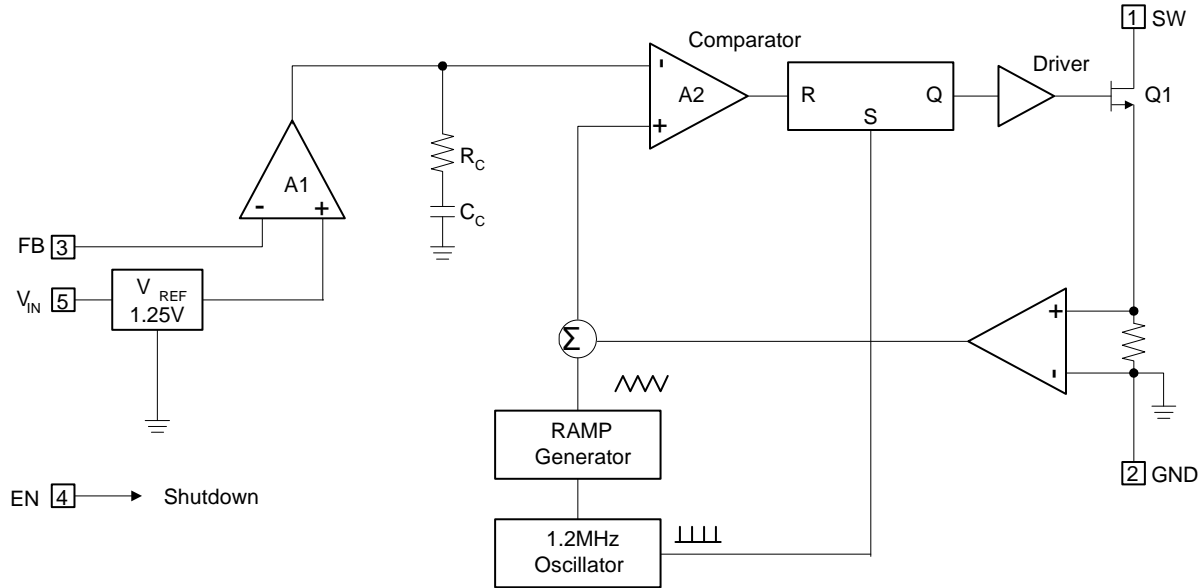
Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).

## Typical Application Circuit



**Figure 1. Typical Application Circuit**

## Functional Block Diagram



**Figure 2. Block Diagram**

## Pin Descriptions

| Name            | Description   |
|-----------------|---|
| SW              | Switch Pin. Connect inductor/diode here. Minimize trace area at this pin to reduce EMI.   |
| GND             | GND pin   |
| FB              | Feedback Pin. Reference voltage is 1.25V.   |
| EN              | Regulator On/Off Control Input. A high input at EN turns on the converter, and a low input turns it off. When not used, connect EN to the input source for automatic startup. The EN pin cannot be left floating. |
| V <sub>IN</sub> | Input Supply Pin. Must be locally decoupled - 4.7μF recommended to reduce input noise.  |

**Absolute Maximum Ratings (T<sub>A</sub> = 25°C)**

| Symbol              | Parameter                    | Rating      | Unit |
|---------------------|------------------------------|-------------|------|
| V <sub>IN</sub>     | VIN Pin Voltage              | -0.3~7      | V    |
| V <sub>SW</sub>     | SW Voltage                   | -0.3~32     | V    |
| V <sub>FB</sub>     | Feedback Pin Voltage         | -0.3~7      | V    |
| EN                  | EN                           | -0.3~7      | V    |
| T <sub>J(MAX)</sub> | Maximum Junction Temperature | 150         | °C   |
| T <sub>LEAD</sub>   | Lead Temperature             | 300         | °C   |
| T <sub>ST</sub>     | Storage Temperature Range    | -65 to +150 | °C   |

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any condition.

**Recommended Operating Conditions**

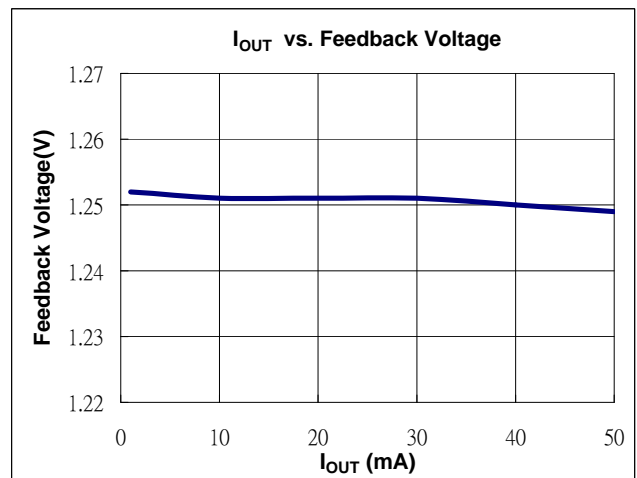
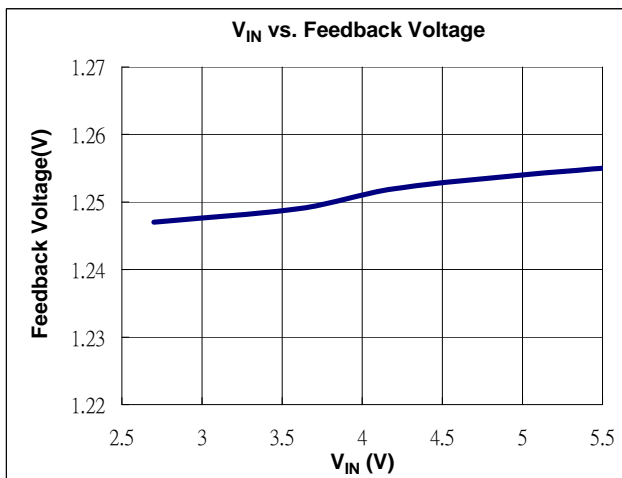
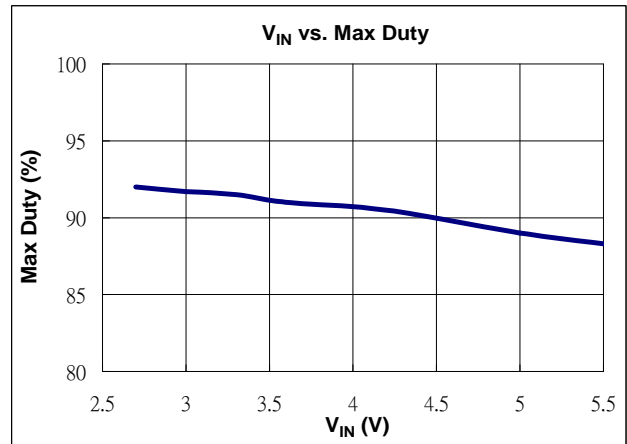
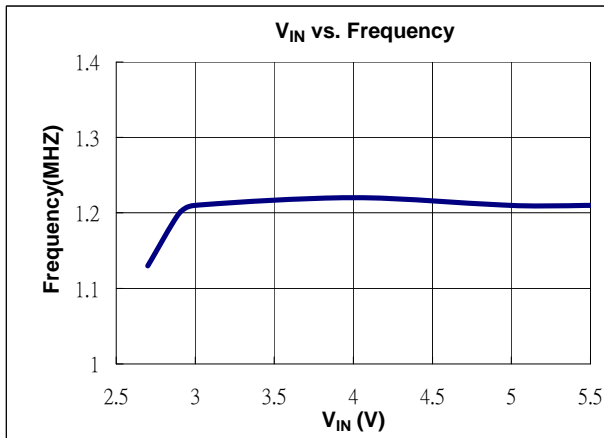
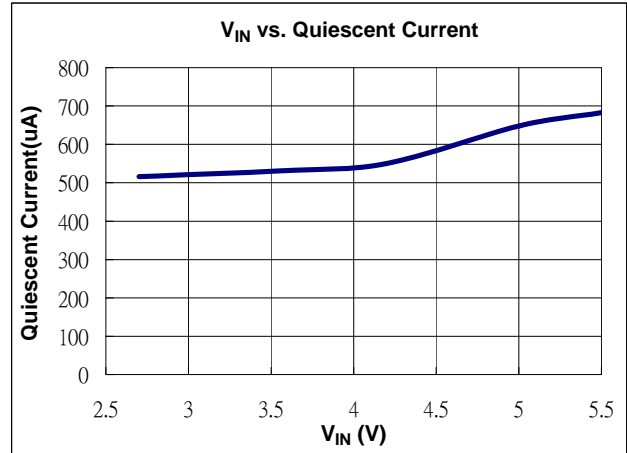
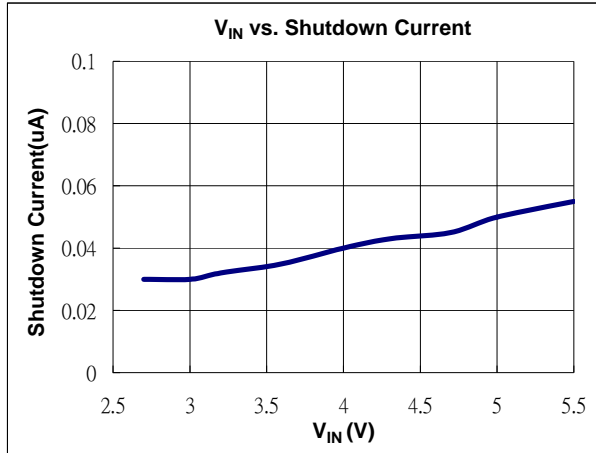
| Symbol          | Parameter                      | Min | Max | Unit |
|-----------------|--------------------------------|-----|-----|------|
| V <sub>IN</sub> | Input Voltage                  | 2.7 | 5.5 | V    |
| T <sub>J</sub>  | Operating Junction Temperature | -40 | 125 | °C   |
| T <sub>A</sub>  | Operating Ambient Temperature  | -40 | 85  | °C   |

**Electrical Characteristics (V<sub>IN</sub> = 3.6V, T<sub>A</sub> = 25°C, unless otherwise specified)**

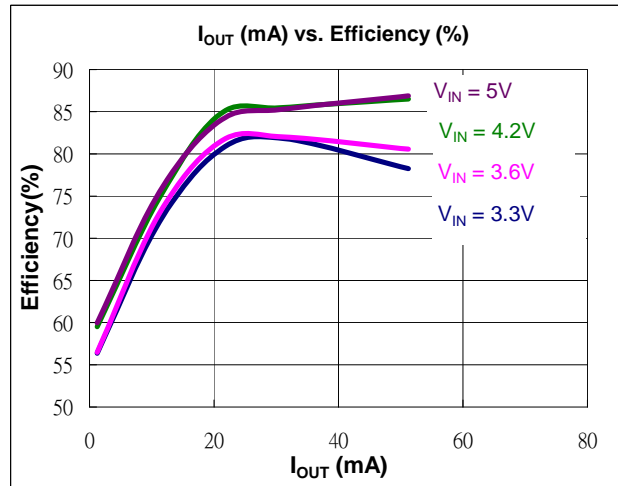
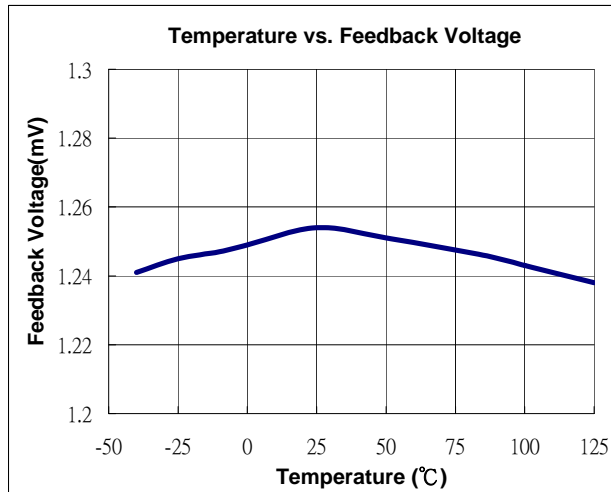
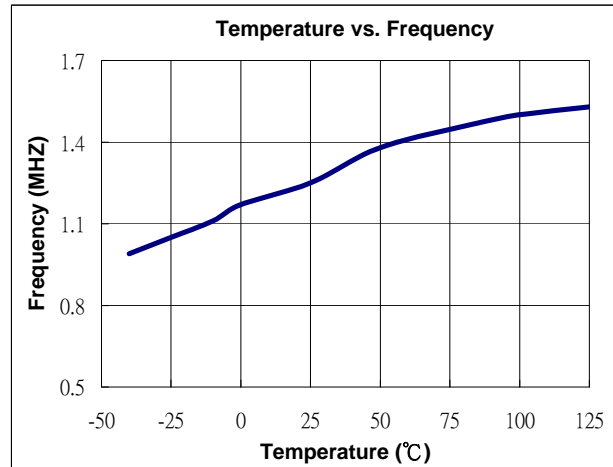
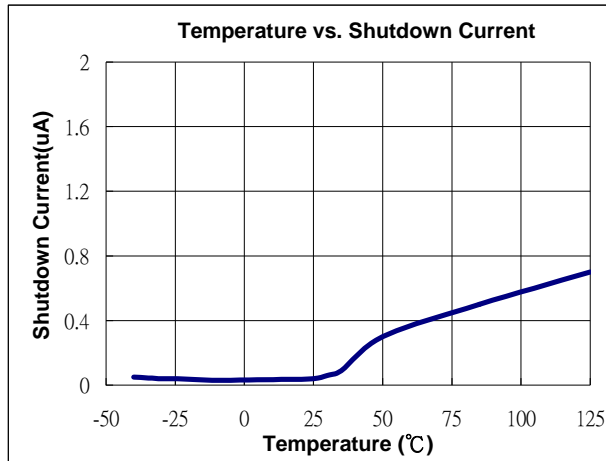
| Symbol                        | Parameter                              | Conditions             | Min.  | Typ. | Max.  | Unit |
|-------------------------------|--|------------------------|-------|------|-------|------|
| <b>System Supply Input</b>    |  |                        |       |      |       |      |
| V <sub>IN</sub>               | Operating Input Voltage                |                        | 2.7   | -    | 5.5   | V    |
| UVLO                          | Under Voltage Lockout                  |                        | -     | 2.2  | 2.4   | V    |
|                               | Under Voltage Lockout Hysteretic       |                        | -     | 85   | -     | mV   |
| I <sub>Q</sub>                | Quiescent Current                      | FB=1.3V, No Switching  | -     | 500  | -     | μA   |
| I <sub>SD</sub>               | Shutdown Current                       | V <sub>EN</sub> < 0.4V | -     | 0.1  | 1     | μA   |
| <b>Oscillator</b>             |  |                        |       |      |       |      |
| F <sub>OSC</sub>              | Operation Frequency                    |                        | 1     | 1.2  | 1.4   | MHz  |
| D <sub>max</sub>              | Maximum Duty Cycle                     |                        | 86    | 90   | -     | %    |
| <b>Reference Voltage</b>      |  |                        |       |      |       |      |
| V <sub>FB</sub>               | Feedback Voltage                       |                        | 1.225 | 1.25 | 1.275 | V    |
| I <sub>FB</sub>               | FB Pin Bias Current                    |                        | 10    | 45   | 100   | nA   |
| <b>MOSFET</b>                 |  |                        |       |      |       |      |
| R <sub>DS(on)</sub>           | On Resistance of MOSFET                |                        | -     | 0.95 | 1.2   | Ω    |
| I <sub>OCP</sub>              | Switching Current Limit                | Normal Operation       | -     | 750  | -     | mA   |
| <b>Control and Protection</b> |  |                        |       |      |       |      |
| EN                            | Voltage High                           | ON                     | 1.5   | -    | -     | V    |
| EN                            | Voltage Low                            | OFF                    | -     | -    | 0.4   | V    |
| I <sub>EN</sub>               | EN Pin Pull Low Current                |                        | -     | 4    | 6     | μA   |
| θ <sub>JA</sub>               | Thermal Resistance Junction-to-Ambient | SOT25 (Note 2)         |       | 162  |       | °C/W |
| θ <sub>JC</sub>               | Thermal Resistance Junction-to-Case    | SOT25 (Note 2)         |       | 36   |       | °C/W |

Notes: 2. Test condition for SOT25: Device mounted on FR-4 substrate, single-layer PC board, 2oz copper, with minimum recommended pad layout

**Typical Performance Characteristics ( $V_{IN} = 3.3V$ ;  $V_{OUT} = 15V$   $I_{OUT} = 20mA$ )**

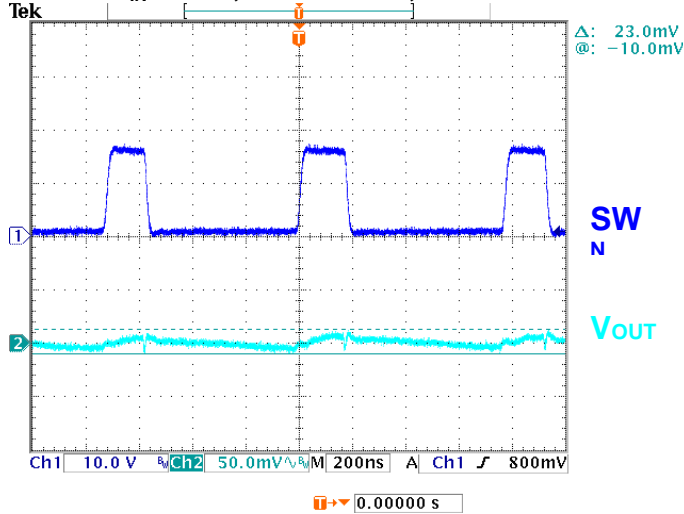


**Typical Performance Characteristics ( $V_{IN} = 3.3V$ ;  $V_{OUT} = 15V$   $I_{OUT} = 20mA$ )**

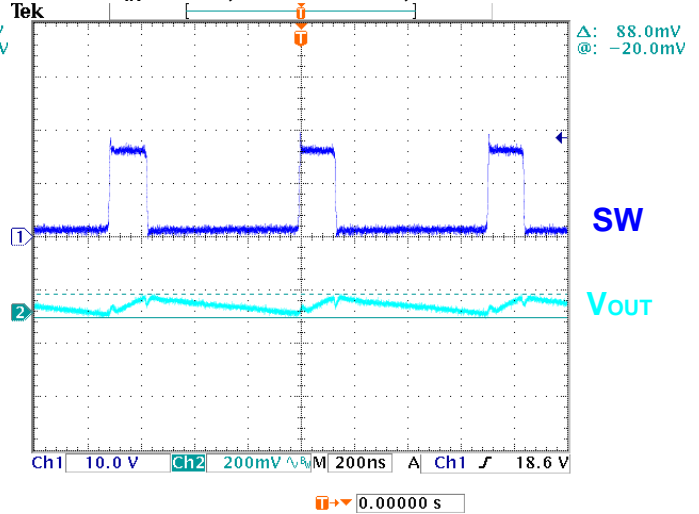


**Typical Performance Characteristics (Continued)**

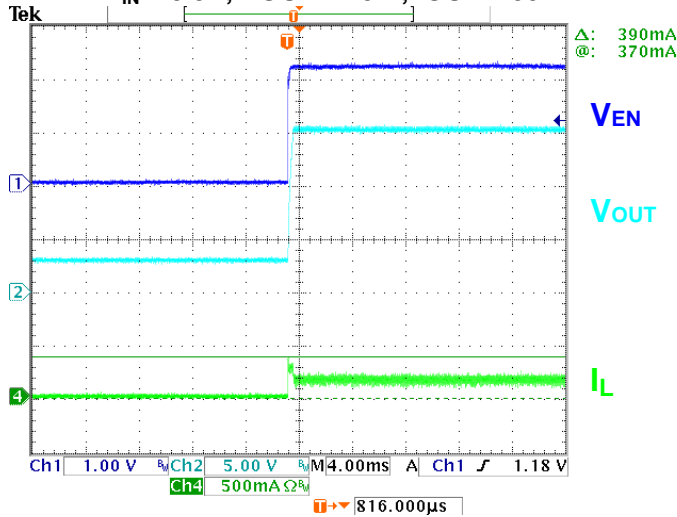
**V<sub>OUT</sub> Ripple**  
**V<sub>IN</sub> = 3.3V; V<sub>OUT</sub> = 15V ; I<sub>OUT</sub> = 5mA**



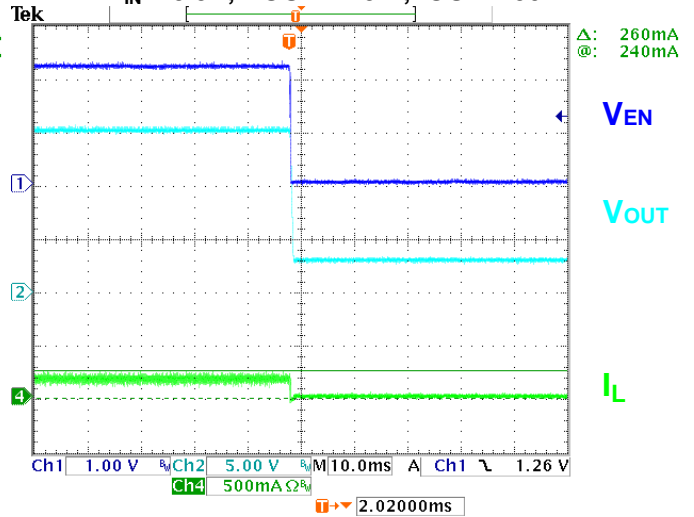
**V<sub>OUT</sub> Ripple**  
**V<sub>IN</sub> = 3.3V; V<sub>OUT</sub> = 15V ; I<sub>OUT</sub> = 50mA**



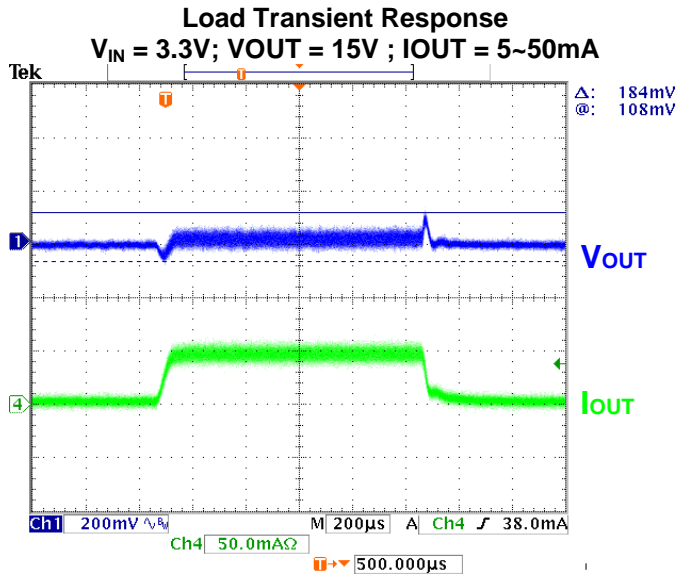
**POWER ON**  
**V<sub>IN</sub> = 3.3V; V<sub>OUT</sub> = 15V ; I<sub>OUT</sub> = 50mA**



**POWER OFF**  
**V<sub>IN</sub> = 3.3V; V<sub>OUT</sub> = 15V ; I<sub>OUT</sub> = 50mA**



## Typical Performance Characteristics (Continued)



## Application Information

### Inductor Selection

A 10µH~22µH inductor is recommended for most AP5727 applications. Although small size and high efficiency are major concerns, the inductor should have low core loss at 1.2MHz and low DCR.

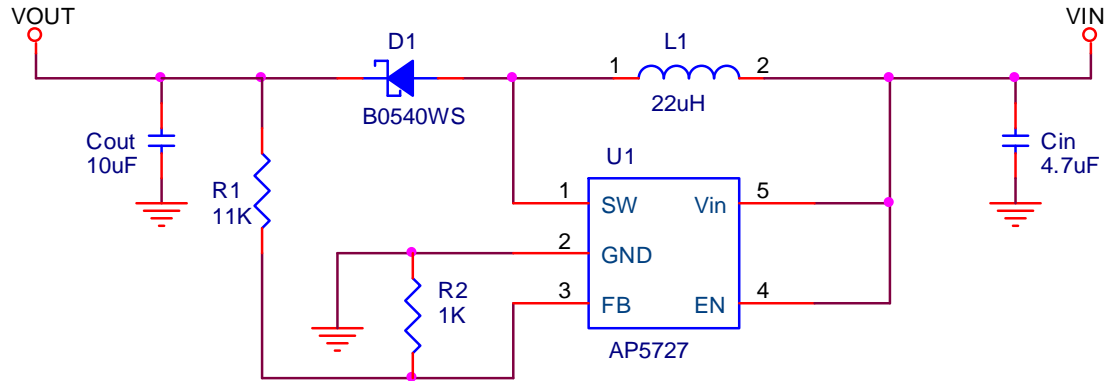
### Capacitor Selection

Ceramic capacitors, due to their small size, are ideal for AP5727 applications. X5R and X7R types are recommended because they retain their capacitance over wider voltage and temperature ranges than other types such as X5R and X7R. A 4.7µF input capacitor and a 10µF output capacitor are sufficient for most AP5727 applications.

### Diode Selection

Schottky diodes, with their low forward voltage drop and fast reverse recovery, are the ideal choices for AP5727 applications. The forward voltage drop of a Schottky diode represents the conduction loss in the diode, while the diode capacitance ( $C_T$ ) represents the switching loss. For diode selection, both forward voltage drop and diode capacitance need to be considered. Schottky diodes with higher current ratings usually have lower forward voltage drop and larger diode capacitance, which can cause significant switching loss at the 1.2MHz switching frequency of the AP5727.

### Application Circuit



**Table 1. Suggested Inductors**

| Vendor            | Inductors (uH) | Current Rating (A) | Type | Dimensions (mm)  | Series        |
|-------------------|----------------|--------------------|------|------------------|---------------|
| Würth Electronics | 22             | 0.51A              | SMD  | 3.8X 3.8 X 1.6   | 744031220     |
| GOTREND           | 22             | 0.56A              | SMD  | 3.8 X 3.8 X 1.05 | GLP3810PH220N |
| TAIYO YUDEN       | 22             | 0.51A              | SMD  | 4.0 X 4.0 X 1.25 | NR4012        |

**Table 2. Suggested Capacitors for C<sub>IN</sub> and C<sub>OUT</sub>**

| Vendor      | Capacitance | Type | Series            |
|-------------|-------------|------|-------------------|
| TAIYO YUDEN | 4.7uF       | SMD  | LMK316 B7 475KL-T |
| TAIYO YUDEN | 10uF        | SMD  | LMK316 F 106ZL-T  |

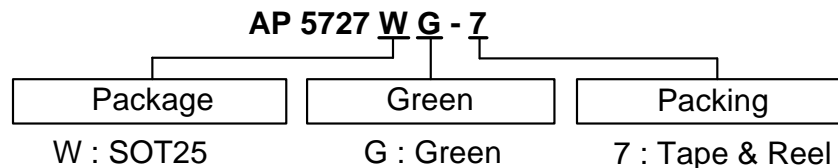
**Table 3. Suggested Diodes**

| Vendor | Rating    | Type   | Series   |
|--------|-----------|--------|----------|
| ZETEX  | 40V/0.5A  | SOD323 | ZLLS400  |
| DIODES | 40V/0.5A  | SOD323 | B0540WS  |
| DIODES | 40V/0.25A | SOD523 | SDM20U40 |

**Table 4. Suggested Resistor**

| Vendor | Type | Series |
|--------|------|--------|
| YAGEO  | SMD  | FR-SK  |

### Ordering Information



| Device     | Package Code | Packaging (Note 3) | 7" Tape and Reel |                    |
|------------|--------------|--------------------|------------------|--------------------|
|            |              |                    | Quantity         | Part Number Suffix |
| AP5727WG-7 | W            | SOT25              | 3000/Tape & Reel | -7                 |

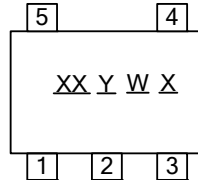
Note: 3. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.



## Marking Information

### (1) SOT25

( Top View )

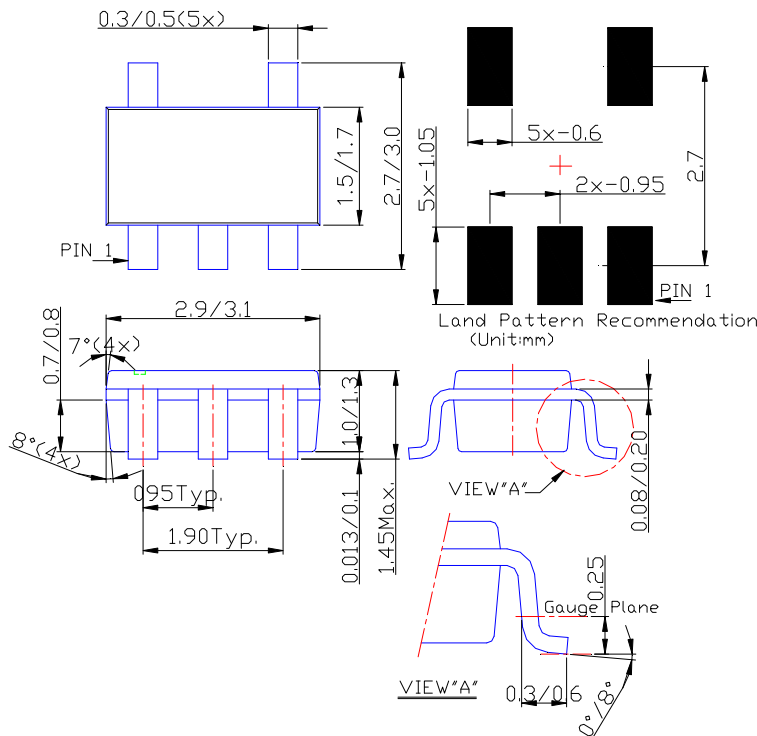


XX : Identification Code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week  
X : A~Z : Green

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AP5727      | SOT25   | H8                  |

## Package Outline Dimensions (All Dimensions in mm)

### (1) Package Type: SOT25



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