# AP21X10-EVM

## Single-channel Current-limited Power Switch

## DESCRIPTION

The AP21410 and AP21510 are integrated high-side power switches optimized for Universal Serial Bus (USB) and other hot-swap applications. The family of devices complies with USB 2.0 and available with both polarities of Enable input. They offer current and thermal limiting and short circuit protection as well as controlled rise time and under-voltage lockout functionality.

All devices are available in U-DFN2018-6 packages

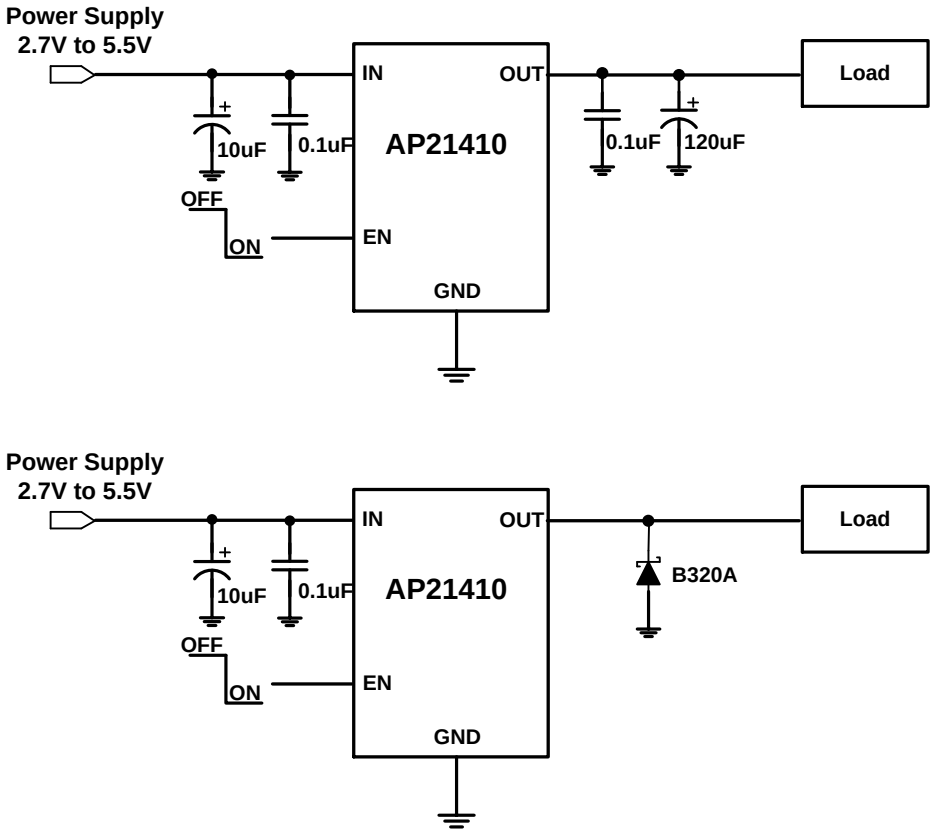
## FEATURES

- Single USB Port Power Switches
- Over-Current and Thermal Protection
- 0.4A Typical Current Limiting
- Reverse Current Blocking
- 95mΩ On-Resistance
- Input Voltage Range: 2.7V - 5.5V
- 0.4ms Typical Rise Time
- Very Low Shutdown Current: 1µA (max)
- ESD Protection: 4KV HBM, 400V MM
- Active Low (AP21410) or Active High (AP21510) Enable
- Ambient Temperature Range -40°C to +85°C
- U-DFN2018-6: Available in “Green” Molding Compound (No Br, Sb)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- 15kV ESD Protection per IEC 61000-4-2 (with external capacitance)
- UL Recognized, File Number E322375
- IEC60950-1 CB Scheme Certified

## APPLICATIONS

- Consumer Electronics – LCD TV & Monitor, Game Machines
- Communications – Set-Top-Box, GPS, Smartphone
- Computing – Laptop, Desktop, Servers, Printers, Docking Station, HUB

## TYPICAL APPLICATIONS CIRCUIT




## RECOMMENDED OPERATING CONDITIONS

| Symbol | Characteristic | Min | Max | Rating | Unit |
|---|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | 2.7 | 5.5 | 6.5 | V |
| $V_{OUT}$ | Output Voltage | | | VIN + 0.3 | V |
| $V_{EN}$ | Enable Voltage | | | 6.5 | V |
| $I_{LOAD}$ | Maximum Continuous Load Current | | | Internal Limited | A |
| $T_A$ | Operating Ambient Temperature | -40 | +85 | +150 | $^0$C |

## ORDERING INFORMATION

| Device | Package Code | Output Current (A) | Enable | Packaging | EVM Part Number |
|---|---|---|---|---|---|
| AP21410FM-7 | FM | 0.2 | Low | DFN2018-6 | AP21X10FMG-EVM |
| AP21510FM-7 | FM | 0.2 | High | DFN2018-6 | AP21X10FMG-EVM |

## EVALUATION BOARD

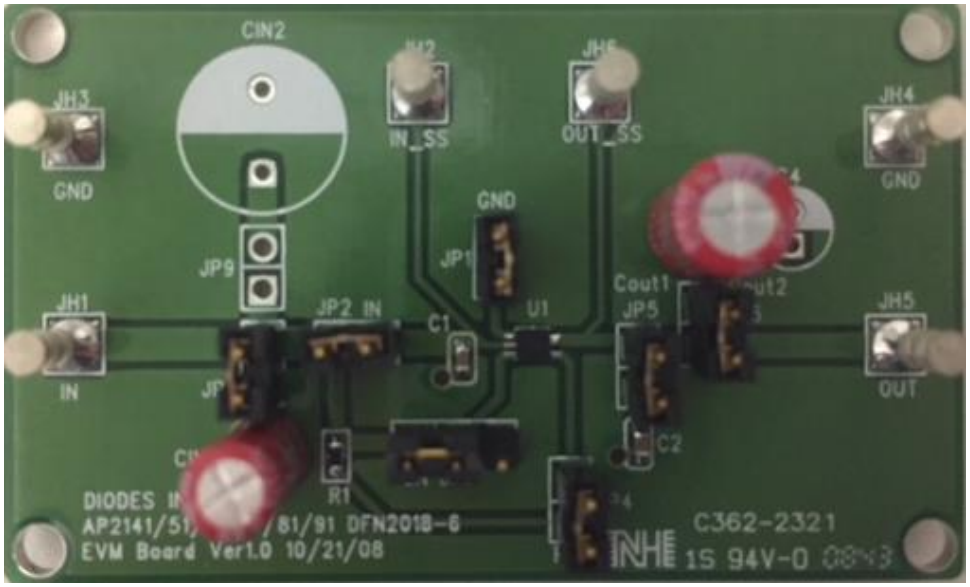



**Figure 1 . AP21X10FMG-EVM**

## QUICK START GUIDE

1. Insert jumpers to configure the input capacitance and output capacitance as described in the Application Information sections of the device datasheet.
2. Place the Enable jumper in the enable position.
3. Connect a +5V power supply between the IN and GND terminals. Make sure the power supply is turned off.
4. Connect an adjustable current or resistive load to the OUT and GND terminals.
5. Turn on the power supply.
6. Increase the load current and observe that the load current will stop increasing after reaching certain level. That is an indication that the device is limiting the load current.

## EVALUATION BOARD SCHEMATIC

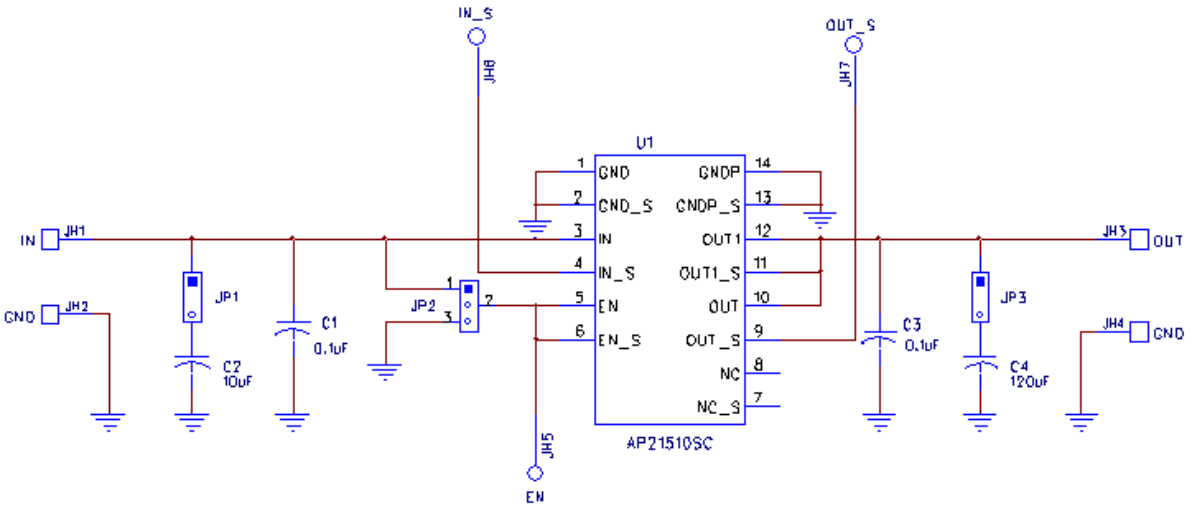
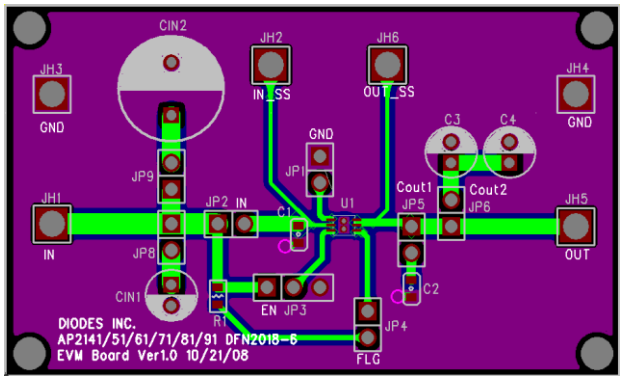



**Figure 2 . AP21X10FMG-EVM**

## BILL OF MATERIALS for AP21X10FMG-EVM

| Item | Qty | Reference | Value | Part # | Manufacturer | Description |
|---|---|---|---|---|---|---|
| 1 | 2 | C1, C3 | 0.1µF | CGA3E2X7R1H104KTOYON | TDC | Ceramic Capacitor, 0603, 50V, X7R, 10% |
| 2 | 1 | C2 | 10µF | 860020472003 | Wurth | Electrolytic Capacitor, 5x11, 20%, 25V |
| 3 | 1 | C4 | 120µF | 860040373003 | Wurth | Electrolytic Capacitor,6,3x11, 20%, 16V |
| 4 | 1 | JP2 | | 2340-6111TG | 3M | PCB Header, Straight 40 POS, 1X3 |
| 5 | 2 | JP1,3,4 | | 2340-6111TG | 3M | PCB Header, Straight 40 POS, 1X2 |
| 6 | 4 | IN, GND, OUT | | 1598-2 | Keystone Electronics | Circuit Board Hardware - PCB TERM .094X1/16 |
| 7 | 3 | JH5,JH7,JH8 | | 1573-2 | Keystone Electronics | Circuit Board Hardware - PCB 3 Turret Term .082" |
| 8 | 1 | U1 | AP21510 | AP21510FMG | Diodes | AP21510 |

## PCB LAYOUT



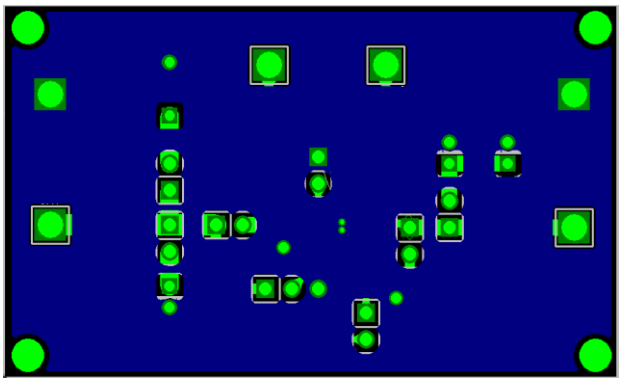



**Figure 3 . AP21X10FMG-EVM – Top Layer** **Figure 4 . AP21X10FMG-EVM – Bottom Layer**

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