

FAN7547A LCD Backlight Inverter Drive IC

Features

- Backlight Lamp Ballast and Soft Dimming
- Reduced Number of Components
- Wide Range of Operating Voltage (6 to 30V)
- Precision Voltage Reference Reduced to 3.4%
- Low Standby Current (Typically 50µA)
- Soft-Start Function
- PWM Control
- Analog, Mixed, and PWM Dimming Function
- P-Channel MOSFET Drive
- Open-Lamp Protections (OLP)
- Shutdown Protections (SDP)
- 14-Pin SOP

Description

The FAN7547A provides all control functions for a current-fed, push-pull, self-oscillation type converter and also contains a pulse-width-modulated (PWM) controller to develop a supply voltage. Typical operating frequency range is from 30kHz to 100kHz, depending on the cold cathode fluorescent lamp (CCFL) and the transformer's characteristics.

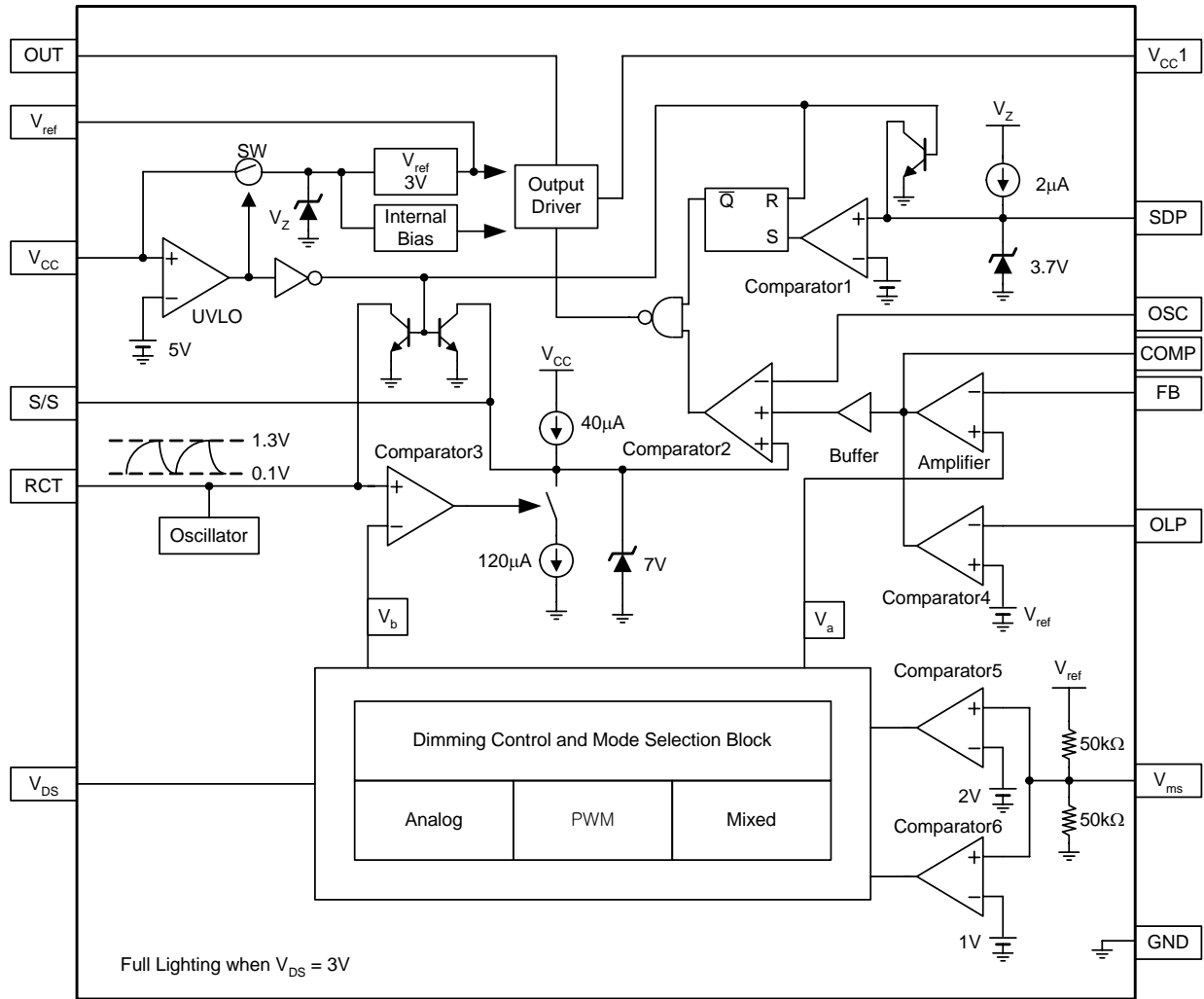
14-SOP



Ordering Information

| Part Number | Package | Pb-Free | Operating Temperature Range | Packing Method |
|-------------|---------|---------|-----------------------------|----------------|
| FAN7547AM | 14-SOP | Yes | -25°C ~ +85°C | Tube |
| FAN7547AMX | | | | Tape & Reel |

Internal Block Diagram



FAN7547A Rev. 1.01

Figure 1. Functional Block Diagram of FAN7547A

Pin Configuration

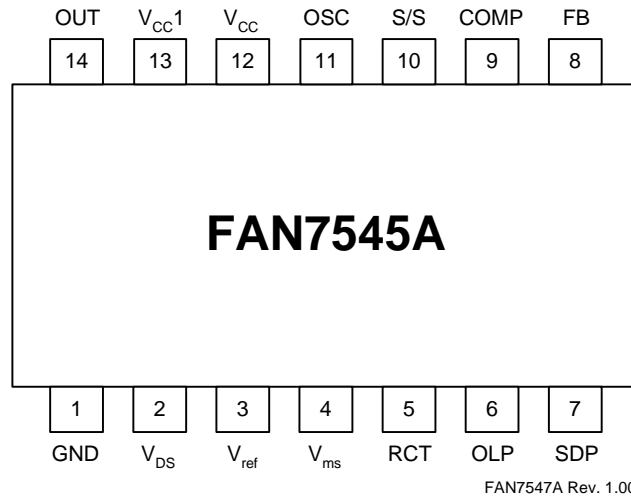


Figure 2. Pin Configuration (Top View)

Pin Definitions

| Pin # | Name | I/O | Description |
|-------|-----------|-----|-----------------------------|
| 1 | GND | | Ground |
| 2 | V_{DS} | I | Dimming Voltage Input |
| 3 | V_{ref} | O | Reference Voltage |
| 4 | V_{ms} | I | Dimming Mode Selection |
| 5 | RCT | | Burst Dimming Frequency Set |
| 6 | OLP | I | Open-Lamp Protection |
| 7 | SDP | I | Shutdown Protection |
| 8 | FB | I | Feedback Input |
| 9 | COMP | | Error Amplifier Output |
| 10 | S/S | | Soft-Start |
| 11 | OSC | I | Main Ct |
| 12 | V_{CC} | I | Supply Voltage |
| 13 | V_{CC1} | I | Output Drive Source Voltage |
| 14 | OUT | O | Output Drive |

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. $-25^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$ and $V_{CC}=10\text{V}$ unless otherwise specified.

| Symbol | Parameter | Value | Unit |
|-----------|--------------------------------|------------|--------------------|
| V_{CC} | Supply Voltage | 6 to 30 | V |
| T_J | Operating Junction Temperature | 150 | $^{\circ}\text{C}$ |
| T_A | Operating Temperature Range | -25 to 85 | $^{\circ}\text{C}$ |
| T_{STG} | Storage Temperature Range | -65 to 150 | $^{\circ}\text{C}$ |
| P_D | Power Dissipation | 0.5 | W |

Electrical Characteristics

Unless otherwise noted, these specifications apply to the operating ambient temperatures for the FAN7547A with $-25^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$ and $V_{CC} = 10\text{V}$.

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------|------------------------------------|---|------|------|------|---------------|
| UVLO SECTION | | | | | | |
| V_{ST} | Start Voltage | | 4.9 | 5.4 | 5.9 | V |
| I_{ST} | Start Current | $V_{CC} = 4.5\text{V}$ | | 50 | 200 | μA |
| I_{CC} | Operating Current | $7\text{V} < V_{CC} < 30\text{V}$ | | 5.5 | 8.0 | mA |
| REFERENCE SECTION | | | | | | |
| V_{ref} | Reference Voltage | $T_J = 25^{\circ}\text{C}$, $I_{ref} = 0\text{mA}$, $7\text{V} < V_{CC} < 30\text{V}$ | 2.95 | 3.05 | 3.15 | V |
| SOFT-START SECTION | | | | | | |
| I_{SS} | Soft -Start Charge Current | $C_{SS} = 4\text{V}$ | 33 | 40 | 47 | μA |
| I_{pwm} | PWM Discharge Current | $C_{SS} = 4\text{V}$ | 48 | 70 | 85 | μA |
| OSCILLATOR SECTION | | | | | | |
| f_{pwm} | Operating Frequency | $7\text{V} < V_{CC} < 30\text{V}$ | 170 | 200 | 230 | Hz |
| V_{pwmh} | Osc High Voltage | | | 1.3 | | V |
| V_{pwml} | Osc Low Voltage | | | 0.1 | | V |
| DIMMING SECTION | | | | | | |
| V_a | Analog Dimming Range | $V_{ms} > 2\text{V}$ | 0 | | 3 | V |
| V_b | | | | 3 | | V |
| V_a | PWM Dimming Range | $V_{ms} < 1\text{V}$ | 2.1 | 2.5 | 2.9 | V |
| V_b | | | 0 | | 2.5 | V |
| V_a | Mixed Dimming Range | $V_{ms} = 1.5\text{V}$ or open | 1.2 | | 3.0 | V |
| V_b | | | 0 | | 3 | V |
| MODE SELECTION | | | | | | |
| V_{sa} | Analog Dimming Select Voltage | | 1.5 | 2.0 | 2.5 | V |
| V_{sp} | PWM Dimming Select Voltage | | 0.7 | 1.0 | 1.3 | V |
| V_{sc} | Mixed Dimming Select Voltage | | 1.2 | 1.5 | 1.8 | V |
| OPEN-LAMP PROTECTION | | | | | | |
| V_{open} | Open-Lamp Detect Voltage | $7\text{V} < V_{CC} < 30\text{V}$ | 2.5 | 3.0 | 3.5 | V |
| SHUTDOWN PROTECTION | | | | | | |
| I_{sd} | Shutdown Current | $7\text{V} < V_{CC} < 30\text{V}$ | 1 | 2 | 3 | μA |
| V_{sd} | Shutdown Voltage | | 2.5 | 3.0 | 3.5 | V |
| OUTPUT SECTION | | | | | | |
| V_{OH} | Output High Voltage | $V_{CC} = 10\text{V}$ | 8 | 9 | 10 | V |
| V_{OL} | Output Low Voltage | $V_{CC} = 10\text{V}$ | | | 1 | V |
| t_r | Rising Time | $V_{CC} = 10\text{V}$ | | 120 | 200 | ns |
| t_f | Falling Time | $V_{CC} = 10\text{V}$ | | 60 | 120 | ns |
| V_{UV} | Output Voltage with UVLO Activated | $V_{CC} = 4\text{V}$ | 2 | | 4 | V |

Typical Characteristics

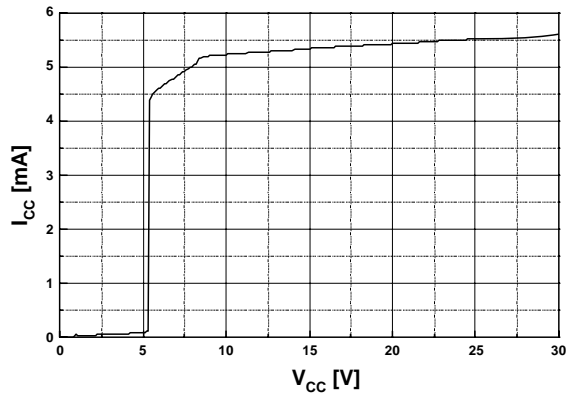


Figure 3. Start Voltage

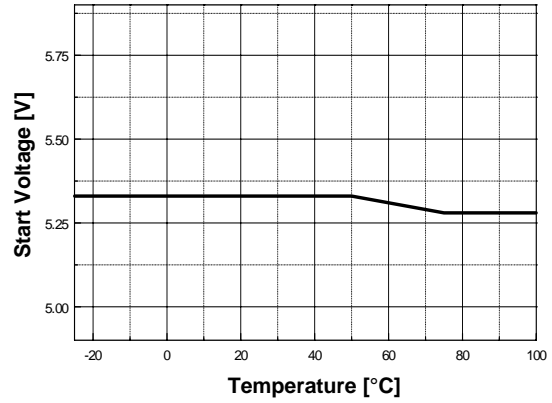


Figure 4. Start Voltage vs. Temperature

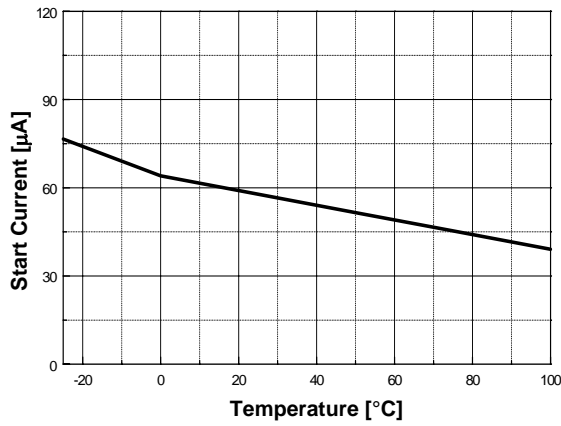


Figure 5. Output vs. Temperature

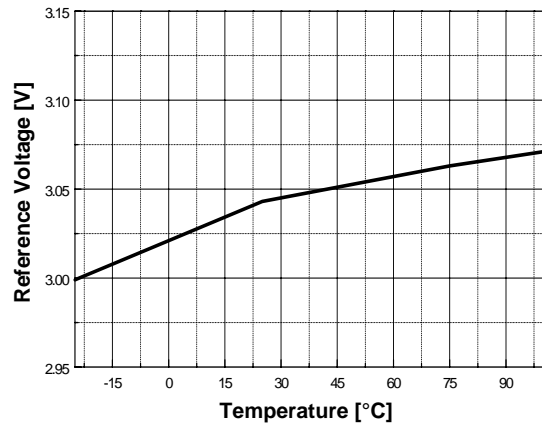


Figure 6. Reference Voltage vs. Temperature

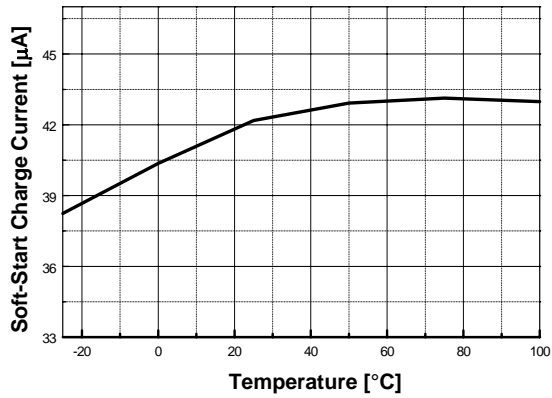


Figure 7. Soft-Start Charge Current vs. Temperature

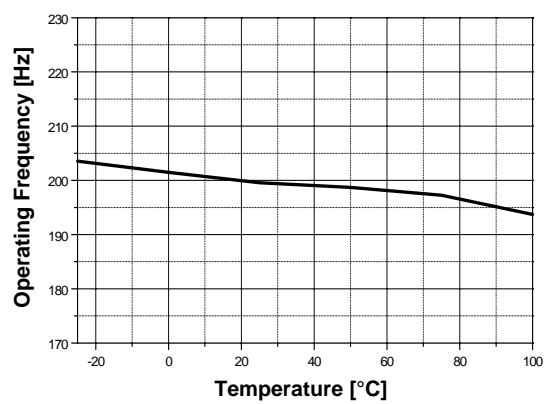


Figure 8. Operating Frequency vs. Temperature

Typical Characteristics (Continued)

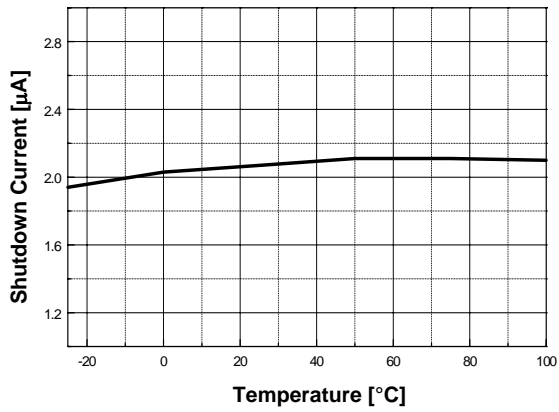


Figure 9. Protection Current vs. Temperature

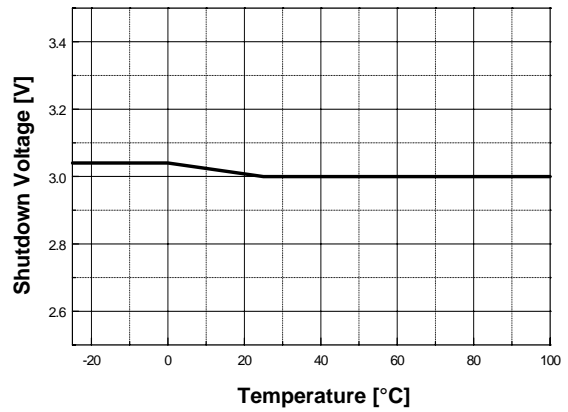


Figure 10. Protection Voltage vs. Temperature

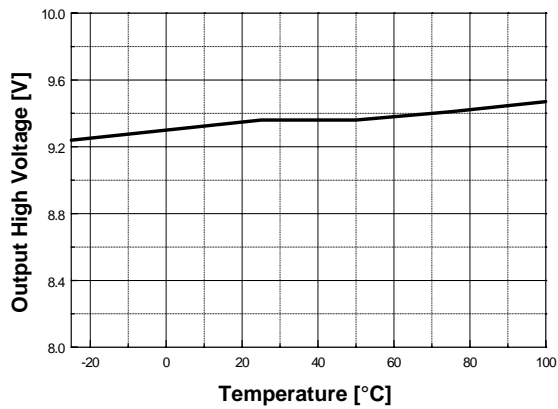


Figure 11. Output High Voltage vs. Temperature

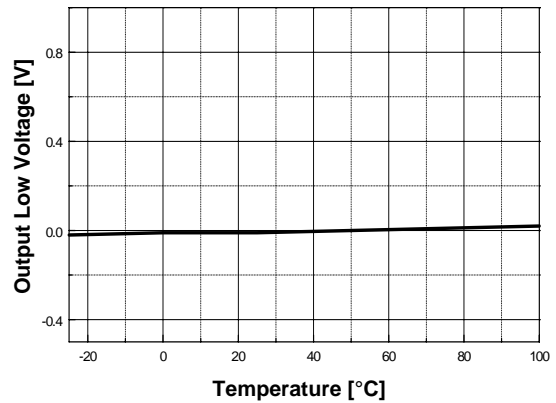


Figure 12. Output Low Voltage vs. Temperature

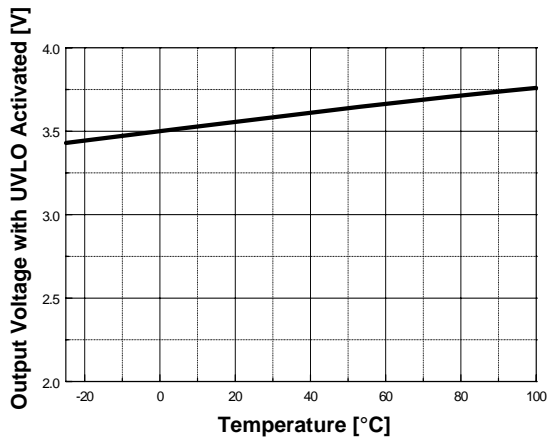
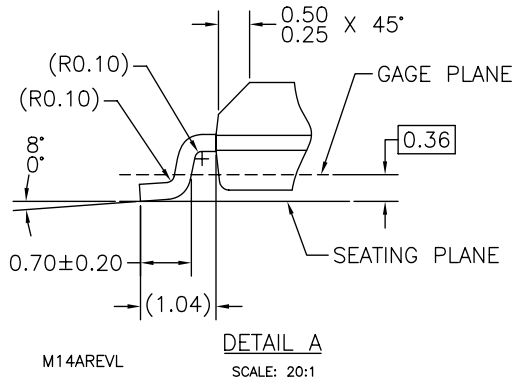
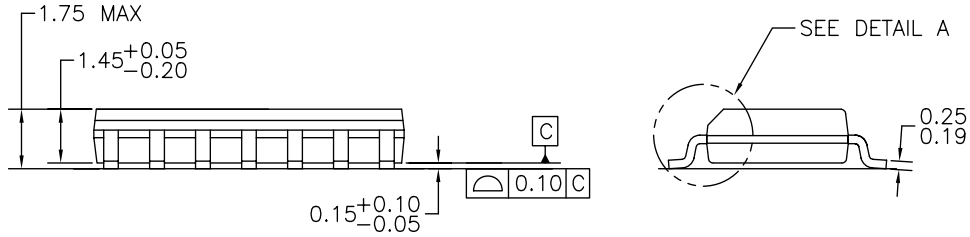
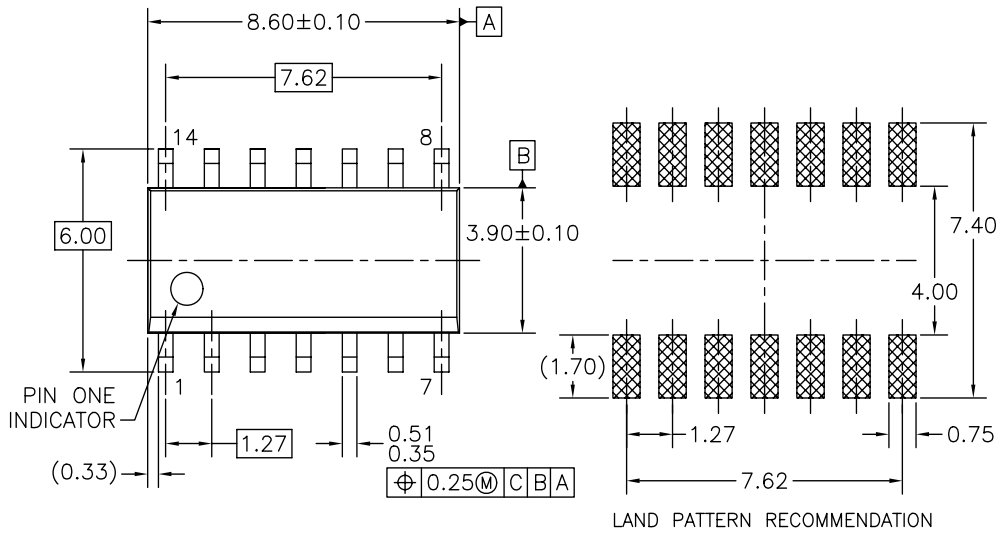


Figure 13. Output Voltage with UVLO Activated vs. Temperature

Package Dimensions

14-SOP

Dimensions are in millimeters unless otherwise noted.



NOTES: UNLESS OTHERWISE SPECIFIED


- A) THIS PACKAGE CONFORMS TO JEDEC MS-012, VARIATION AB, ISSUE C, DATED MAY 1990.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.

Figure 14. 14-Lead Small Outline Package (SOP)



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