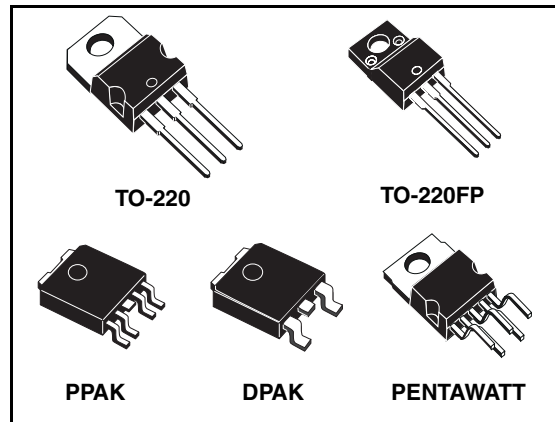


Very low drop voltage regulators with inhibit

Feature summary

- Very low dropout voltage (0.45V)
- Very low quiescent current (TYP. 50 μ A in OFF mode, 500 μ A in ON mode)
- Output current up to 500 mA
- Logic-controlled electronic shutdown
- Output voltages of 1.5; 1.8; 2.5; 2.7; 3; 3.3; 3.5; 4; 5; 6; 8; 8.5; 9; 12V
- Internal current and thermal limit
- Only 2.2 μ F for stability
- Available in $\pm 1\%$ (AB) or $\pm 2\%$ (C) selection at 25°C
- Supply voltage rejection: 80db (typ.)
- Temperature range: -40 to 125°C



suitable for Low Noise, Low Power applications and specially in battery powered systems.

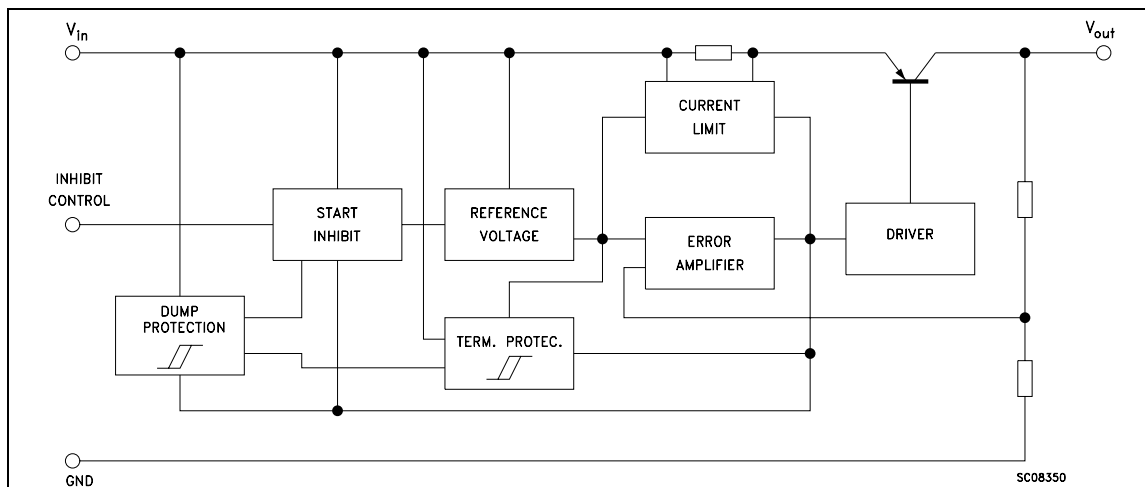
In the 5 pins configuration (PENTAWATT and PPAK) a Shutdown Logic Control function is available (pin 2, TTL compatible). This means that when the device is used as a local regulator, it is possible to put a part of the board in standby, decreasing the total power consumption. In the three terminal configuration the device has the same electrical performance, but is fixed in the ON state. It requires only a 2.2 μ F capacitor for stability allowing space and cost saving.

Description

The LF00 series are very Low Drop regulators available in PENTAWATT, TO-220, TO-220FP, DPAK and PPAK package and in a wide range of output voltages.

The very Low Drop voltage (0.45V) and the very low quiescent current make them particularly

Schematic diagram

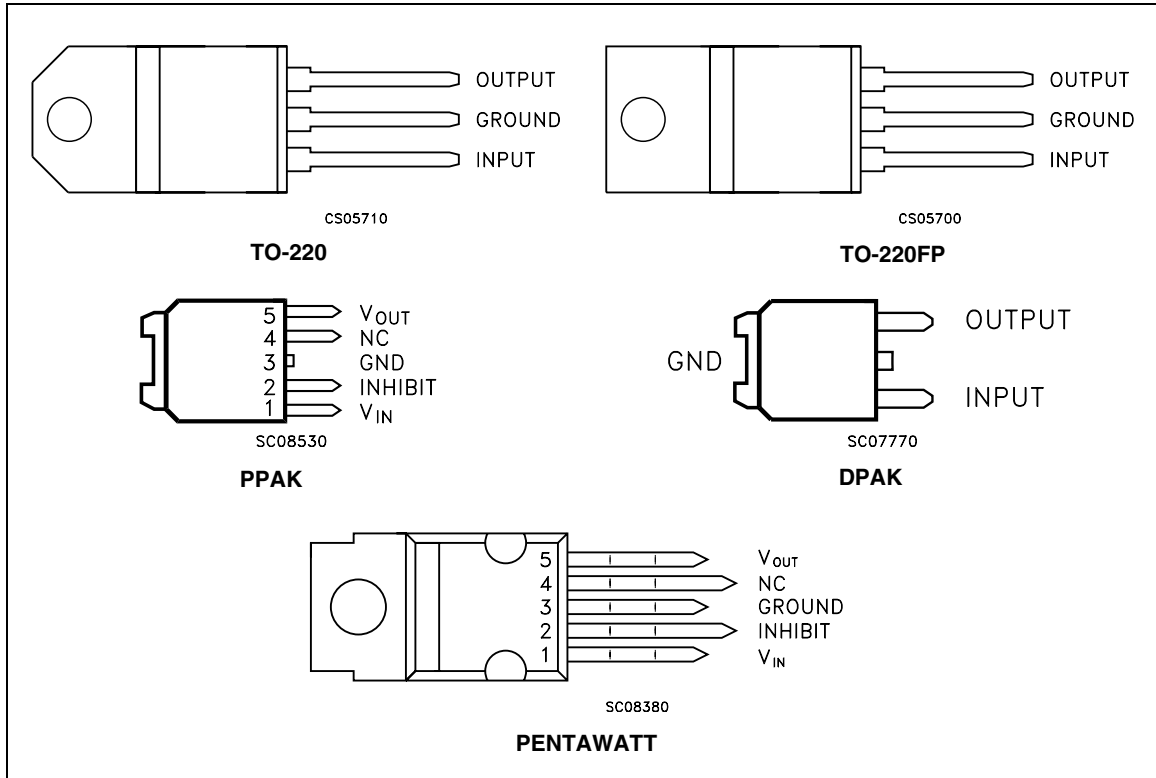


Contents

| | | |
|----------|--|-----------|
| 1 | Pin configuration | 3 |
| 2 | Maximum ratings | 4 |
| 3 | Electrical characteristics | 5 |
| 4 | Typical performance characteristics | 33 |
| 5 | Package mechanical data | 37 |
| 6 | Order code | 44 |
| 7 | Revision history | 45 |

1 Pin configuration

Figure 1. Pin connections (top view)



2 Maximum ratings

Table 1. Absolute maximum ratings

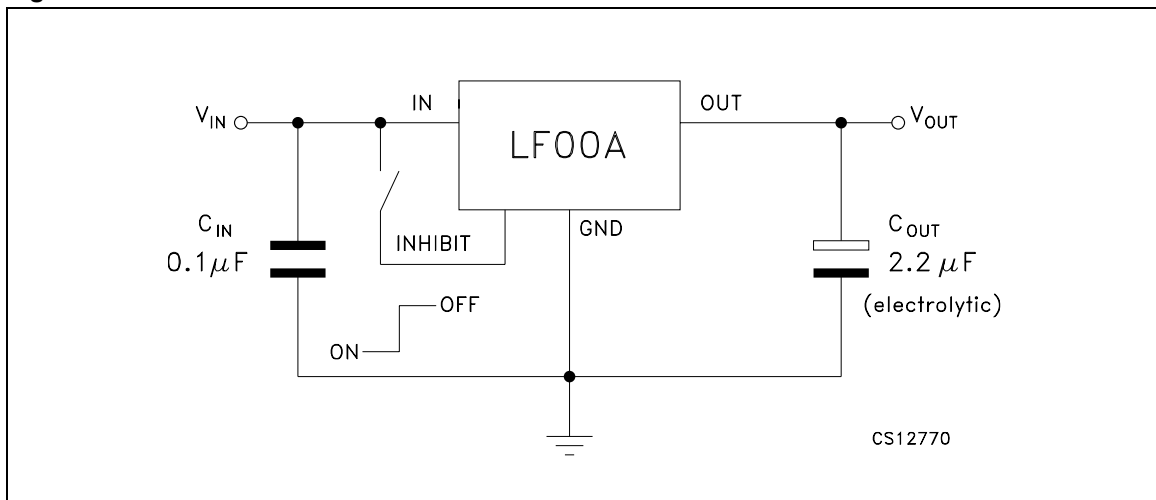
| Symbol | Parameter | Value | Unit |
|-----------|--------------------------------------|---------------------------|------|
| V_I | DC Input Voltage | -0.5 to 40 ⁽¹⁾ | V |
| I_O | Output Current | Internally Limited | |
| P_{TOT} | Power Dissipation | Internally Limited | |
| T_{STG} | Storage Temperature Range | -40 to 150 | °C |
| T_{OP} | Operating Junction Temperature Range | -40 to 125 | °C |

1. For $18 < V_I < 40$ the regulator is in shut-down

Table 2. Thermal data

| Symbol | Parameter | PENTAWATT | TO-220 | TO-220FP | DPAK/PPAK | Unit |
|------------|-------------------------------------|-----------|--------|----------|-----------|------|
| R_{thJC} | Thermal resistance junction-case | 3 | 3 | 5 | 8 | °C/W |
| R_{thJA} | Thermal resistance junction-ambient | 50 | 50 | 60 | 100 | °C/W |

Figure 2. Test circuit



3 Electrical characteristics

Table 3. Electrical characteristics for LF15AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit | |
|--------------|---------------------------|--|----------------------|------|-------|---------------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 3.5 \text{ V}$ | 1.485 | 1.5 | 1.515 | V | |
| | | $I_O = 50 \text{ mA}$, $V_I = 3.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 1.470 | | 1.530 | | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | 2.5 | | 16 | V | |
| I_O | Output current limit | | | 1 | | A | |
| ΔV_O | Line regulation | $V_I = 2.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 10 | mV | |
| ΔV_O | Load regulation | $V_I = 2.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 10 | mV | |
| I_d | Quiescent current | $V_I = 2.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | | 0.5 | 1 | mA |
| | | $V_I = 2.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 3.5 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | | 82 | dB | |
| | | | $f = 1 \text{ KHz}$ | | 77 | | |
| | | | $f = 10 \text{ KHz}$ | | 65 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV | |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 1 | | V | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V | |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V | |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA | |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF | |

Table 4. Electrical characteristics for LF15C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 3.5 \text{ V}$ | 1.47 | 1.5 | 1.53 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 3.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 1.44 | | 1.56 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | 2.5 | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 2.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 10 | mV |
| ΔV_O | Load regulation | $V_I = 2.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 10 | mV |
| I_d | Quiescent current | $V_I = 2.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 2.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 3.5 \pm 1 \text{ V}$ | f = 120 Hz | 82 | | dB |
| | | | f = 1 KHz | 77 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 1 | | V |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 5. Electrical characteristics for LF18AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 3.3 \text{ V}$ | 1.782 | 1.8 | 1.818 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 3.3 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 1.764 | | 1.836 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | 3 | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 2.8 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 12 | mV |
| ΔV_O | Load regulation | $V_I = 3.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 10 | mV |
| I_d | Quiescent current | $V_I = 2.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 3.1 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 3.5 \pm 1 \text{ V}$ | f = 120 Hz | 82 | | dB |
| | | | f = 1 KHz | 77 | | |
| | | | f = 10 KHz | 60 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.7 | | V |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 6. Electrical characteristics for LF18C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit | |
|--------------|---------------------------|--|----------------------|------|-------|---------------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 3.5 \text{ V}$ | 1.764 | 1.8 | 1.836 | V | |
| | | $I_O = 50 \text{ mA}$, $V_I = 3.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 1.728 | | 1.872 | | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | 3 | | 16 | V | |
| I_O | Output current limit | | | 1 | | A | |
| ΔV_O | Line regulation | $V_I = 2.8 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 12 | mV | |
| ΔV_O | Load regulation | $V_I = 3.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 10 | mV | |
| I_d | Quiescent current | $V_I = 2.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | | 0.5 | 1 | mA |
| | | $V_I = 3.1 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 3.5 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | | 82 | dB | |
| | | | $f = 1 \text{ KHz}$ | | 77 | | |
| | | | $f = 10 \text{ KHz}$ | | 60 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV | |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.7 | | V | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V | |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V | |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA | |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF | |

Table 7. Electrical characteristics for LF25AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 4.5 \text{ V}$ | 2.475 | 2.5 | 2.525 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 4.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 2.450 | | 2.550 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 3.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 12 | mV |
| ΔV_O | Load regulation | $V_I = 3.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 12 | mV |
| I_d | Quiescent current | $V_I = 3.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 3.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 4.5 \pm 1 \text{ V}$ | f = 120 Hz | 82 | | dB |
| | | | f = 1 KHz | 77 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 8. Electrical characteristics for LF25C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 4.5 \text{ V}$ | 2.45 | 2.5 | 2.55 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 4.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 2.4 | | 2.6 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 3.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 12 | mV |
| ΔV_O | Load regulation | $V_I = 3.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 12 | mV |
| I_d | Quiescent current | $V_I = 3.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 3.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 4.5 \pm 1 \text{ V}$ | f = 120 Hz | 82 | | dB |
| | | | f = 1 KHz | 77 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 9. Electrical characteristics for LF27AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 4.7 \text{ V}$ | 2.673 | 2.7 | 2.727 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 4.7 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 2.646 | | 2.754 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 3.7 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 13 | mV |
| ΔV_O | Load regulation | $V_I = 4 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 13 | mV |
| I_d | Quiescent current | $V_I = 3.7 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 4.7 \pm 1 \text{ V}$ | f = 120 Hz | 82 | | dB |
| | | | f = 1 KHz | 77 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 10. Electrical characteristics for LF27C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 4.7 \text{ V}$ | 2.646 | 2.7 | 2.754 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 4.7 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 2.592 | | 2.808 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 3.7 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 2 | 13 | mV |
| ΔV_O | Load regulation | $V_I = 4 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 2 | 13 | mV |
| I_d | Quiescent current | $V_I = 3.7 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 4.7 \pm 1 \text{ V}$ | f = 120 Hz | 82 | | dB |
| | | | f = 1 KHz | 77 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 11. Electrical characteristics for LF30AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 5 \text{ V}$ | 2.970 | 3 | 3.03 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 2.94 | | 3.06 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 4 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 3 | 15 | mV |
| ΔV_O | Load regulation | $V_I = 4.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 3 | 15 | mV |
| I_d | Quiescent current | $V_I = 4 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 5 \pm 1 \text{ V}$ | f = 120 Hz | 81 | | dB |
| | | | f = 1 KHz | 76 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 12. Electrical characteristics for LF30C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 5 \text{ V}$ | 2.94 | 3 | 3.06 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 2.88 | | 3.12 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 4 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 3 | 15 | mV |
| ΔV_O | Load regulation | $V_I = 4.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 3 | 15 | mV |
| I_d | Quiescent current | $V_I = 4 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 5 \pm 1 \text{ V}$ | f = 120 Hz | 81 | | dB |
| | | | f = 1 KHz | 76 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 13. Electrical characteristics for LF33AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 5.3 \text{ V}$ | 3.267 | 3.3 | 3.333 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 5.3 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 3.234 | | 3.366 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 4.3 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 3 | 16 | mV |
| ΔV_O | Load regulation | $V_I = 4.6 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 3 | 16 | mV |
| I_d | Quiescent current | $V_I = 4.3 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4.6 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 5.3 \pm 1 \text{ V}$ | f = 120 Hz | 80 | | dB |
| | | | f = 1 KHz | 75 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 14. Electrical characteristics for LF33C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 5.3 \text{ V}$ | 3.234 | 3.3 | 3.366 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 5.3 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 3.168 | | 3.432 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 4.3 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 3 | 16 | mV |
| ΔV_O | Load regulation | $V_I = 4.6 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 3 | 16 | mV |
| I_d | Quiescent current | $V_I = 4.3 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4.6 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 5.3 \pm 1 \text{ V}$ | f = 120 Hz | 80 | | dB |
| | | | f = 1 KHz | 75 | | |
| | | | f = 10 KHz | 65 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 15. Electrical characteristics for LF35AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|----------------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 5.5 \text{ V}$ | 3.465 | 3.5 | 3.535 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 5.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 3.430 | | 3.570 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 4.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 3 | 17 | mV |
| ΔV_O | Load regulation | $V_I = 4.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 3 | 17 | mV |
| I_d | Quiescent current | $V_I = 4.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 5.5 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 79 | | dB |
| | | | $f = 1 \text{ KHz}$ | 74 | | |
| | | | $f = 10 \text{ KHz}$ | 60 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 16. Electrical characteristics for LF35C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 5.5 \text{ V}$ | 3.43 | 3.5 | 3.57 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 5.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 3.36 | | 3.64 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 4.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 3 | 17 | mV |
| ΔV_O | Load regulation | $V_I = 4.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 3 | 17 | mV |
| I_d | Quiescent current | $V_I = 4.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 4.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 5.5 \pm 1 \text{ V}$ | f = 120 Hz | 79 | | dB |
| | | | f = 1 KHz | 74 | | |
| | | | f = 10 KHz | 60 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 17. Electrical characteristics for LF40AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|----------------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 6 \text{ V}$ | 3.96 | 4 | 4.04 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 6 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 3.92 | | 4.08 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 4 | 20 | mV |
| ΔV_O | Load regulation | $V_I = 5.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 4 | 20 | mV |
| I_d | Quiescent current | $V_I = 5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 5.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 6 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 78 | | dB |
| | | | $f = 1 \text{ KHz}$ | 73 | | |
| | | | $f = 10 \text{ KHz}$ | 60 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 18. Electrical characteristics for LF40C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|----------------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 6 \text{ V}$ | 3.92 | 4 | 4.08 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 6 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 3.84 | | 4.16 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 4 | 20 | mV |
| ΔV_O | Load regulation | $V_I = 5.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 4 | 20 | mV |
| I_d | Quiescent current | $V_I = 5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 5.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 6 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 78 | | dB |
| | | | $f = 1 \text{ KHz}$ | 73 | | |
| | | | $f = 10 \text{ KHz}$ | 60 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 19. Electrical characteristics for LF50AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|----------------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 7 \text{ V}$ | 4.95 | 5 | 5.05 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 7 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 4.9 | | 5.1 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 6 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 5 | 25 | mV |
| ΔV_O | Load regulation | $V_I = 6.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 5 | 25 | mV |
| I_d | Quiescent current | $V_I = 6 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 6.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 7 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 76 | | dB |
| | | | $f = 1 \text{ KHz}$ | 71 | | |
| | | | $f = 10 \text{ KHz}$ | 60 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 20. Electrical characteristics for LF50C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 7 \text{ V}$ | 4.9 | 5 | 5.1 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 7 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 4.8 | | 5.2 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 6 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 5 | 25 | mV |
| ΔV_O | Load regulation | $V_I = 6.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 5 | 25 | mV |
| I_d | Quiescent current | $V_I = 6 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.5 | 1 | mA |
| | | $V_I = 6.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 6 \text{ V}$ | OFF MODE | 50 | 100 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 7 \pm 1 \text{ V}$ | f = 120 Hz | 76 | | dB |
| | | | f = 1 KHz | 71 | | |
| | | | f = 10 KHz | 60 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 6 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 21. Electrical characteristics for LF60AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 8 \text{ V}$ | 5.94 | 6 | 6.06 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 8 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 5.88 | | 6.12 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 7 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 6 | 30 | mV |
| ΔV_O | Load regulation | $V_I = 7.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 6 | 30 | mV |
| I_d | Quiescent current | $V_I = 7 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 7.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 9 \text{ V}$ | OFF MODE | 70 | 140 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 8 \pm 1 \text{ V}$ | f = 120 Hz | 75 | | dB |
| | | | f = 1 KHz | 70 | | |
| | | | f = 10 KHz | 60 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 9 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 22. Electrical characteristics for LF60C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|--|----------------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 8 \text{ V}$ | 5.88 | 6 | 6.12 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 8 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 5.76 | | 6.24 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 7 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 6 | 30 | mV |
| ΔV_O | Load regulation | $V_I = 7.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 6 | 30 | mV |
| I_d | Quiescent current | $V_I = 7 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 7.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 9 \text{ V}$ | OFF MODE | 70 | 140 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 8 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 75 | | dB |
| | | | $f = 1 \text{ KHz}$ | 70 | | |
| | | | $f = 10 \text{ KHz}$ | 60 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 9 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 23. Electrical characteristics for LF80AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 10 \text{ V}$ | 7.92 | 8 | 8.08 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 10 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 7.84 | | 8.16 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 9 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 8 | 40 | mV |
| ΔV_O | Load regulation | $V_I = 9.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 8 | 40 | mV |
| I_d | Quiescent current | $V_I = 9 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 9.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 9 \text{ V}$ | OFF MODE | 70 | 140 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 10 \pm 1 \text{ V}$ | f = 120 Hz | 72 | | dB |
| | | | f = 1 KHz | 67 | | |
| | | | f = 10 KHz | 57 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 9 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 24. Electrical characteristics for LF80C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 10 \text{ V}$ | 7.84 | 8 | 8.16 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 10 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 7.68 | | 8.32 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 9 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 8 | 40 | mV |
| ΔV_O | Load regulation | $V_I = 9.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 8 | 40 | mV |
| I_d | Quiescent current | $V_I = 9 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 9.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 9 \text{ V}$ | OFF MODE | 70 | 140 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 10 \pm 1 \text{ V}$ | f = 120 Hz | 72 | | dB |
| | | | f = 1 KHz | 67 | | |
| | | | f = 10 KHz | 57 | | |
| eN | Output noise voltage | B = 10 Hz to 100 KHz | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 9 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | ESR = 0.1 to 10 Ω , $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 25. Electrical characteristics for LF85AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|----------------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 10.5 \text{ V}$ | 8.415 | 8.5 | 8.585 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 10.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 8.33 | | 8.67 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 9.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 8 | 42 | mV |
| ΔV_O | Load regulation | $V_I = 9.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 8 | 42 | mV |
| I_d | Quiescent current | $V_I = 9.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 9.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 9 \text{ V}$ | OFF MODE | 70 | 140 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 10.5 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 72 | | dB |
| | | | $f = 1 \text{ KHz}$ | 67 | | |
| | | | $f = 10 \text{ KHz}$ | 57 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 9 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 26. Electrical characteristics for LF85C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|----------------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 10.5 \text{ V}$ | 8.33 | 8.5 | 8.67 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 10.5 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 8.16 | | 8.84 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 9.5 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 8 | 42 | mV |
| ΔV_O | Load regulation | $V_I = 9.8 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 8 | 42 | mV |
| I_d | Quiescent current | $V_I = 9.5 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 9.8 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 9 \text{ V}$ | OFF MODE | 70 | 140 | μA |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 10.5 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 72 | | dB |
| | | | $f = 1 \text{ KHz}$ | 67 | | |
| | | | $f = 10 \text{ KHz}$ | 57 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 9 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 27. Electrical characteristics for LF90AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|----------------------|------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 11 \text{ V}$ | 8.91 | 9 | 9.09 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 11 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 8.82 | | 9.18 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 10 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 9 | 45 | mV |
| ΔV_O | Load regulation | $V_I = 10.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 9 | 45 | mV |
| I_d | Quiescent current | $V_I = 10 \text{ to } 16\text{V}$, $I_O = 0\text{mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 10.3 \text{ to } 16\text{V}$, $I_O = 500\text{mA}$ | | | 12 | |
| | | $V_I = 10 \text{ V}$ | OFF MODE | | 70 | 140 |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 11 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 71 | | dB |
| | | | $f = 1 \text{ KHz}$ | 66 | | |
| | | | $f = 10 \text{ KHz}$ | 56 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 10 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 28. Electrical characteristics for LF90C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|----------------------|----------|------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 11 \text{ V}$ | 8.82 | 9 | 9.18 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 11 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 8.64 | | 9.36 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 10 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 9 | 45 | mV |
| ΔV_O | Load regulation | $V_I = 10.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 9 | 45 | mV |
| I_d | Quiescent current | $V_I = 10 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 10.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 10 \text{ V}$ | | OFF MODE | | 70 |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 11 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 71 | | dB |
| | | | $f = 1 \text{ KHz}$ | 66 | | |
| | | | $f = 10 \text{ KHz}$ | 56 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 10 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 29. Electrical characteristics for LF120AB (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_1 = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|----------------------|----------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 15 \text{ V}$ | 11.88 | 12 | 12.12 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 15 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 11.76 | | 12.24 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 13 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 12 | 60 | mV |
| ΔV_O | Load regulation | $V_I = 13.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 12 | 60 | mV |
| I_d | Quiescent current | $V_I = 13 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 13.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 13 \text{ V}$ | | OFF MODE | | 70 |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 14 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 69 | | dB |
| | | | $f = 1 \text{ KHz}$ | 64 | | |
| | | | $f = 10 \text{ KHz}$ | 54 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 13 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

Table 30. Electrical characteristics for LF120C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $C_I = 0.1 \mu\text{F}$, $C_O = 2.2 \mu\text{F}$ unless otherwise specified).

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|---|----------------------|------|-------|---------------|
| V_O | Output voltage | $I_O = 50 \text{ mA}$, $V_I = 14 \text{ V}$ | 11.76 | 12 | 12.24 | V |
| | | $I_O = 50 \text{ mA}$, $V_I = 14 \text{ V}$, $T_a = -25 \text{ to } 85^\circ\text{C}$ | 11.52 | | 12.48 | |
| V_I | Operating input voltage | $I_O = 500 \text{ mA}$ | | | 16 | V |
| I_O | Output current limit | | | 1 | | A |
| ΔV_O | Line regulation | $V_I = 13 \text{ to } 16 \text{ V}$, $I_O = 5 \text{ mA}$ | | 12 | 60 | mV |
| ΔV_O | Load regulation | $V_I = 13.3 \text{ V}$, $I_O = 5 \text{ to } 500 \text{ mA}$ | | 12 | 60 | mV |
| I_d | Quiescent current | $V_I = 13 \text{ to } 16 \text{ V}$, $I_O = 0 \text{ mA}$ | ON MODE | 0.7 | 1.5 | mA |
| | | $V_I = 13.3 \text{ to } 16 \text{ V}$, $I_O = 500 \text{ mA}$ | | | 12 | |
| | | $V_I = 13 \text{ V}$ | OFF MODE | | 70 | 140 |
| SVR | Supply voltage rejection | $I_O = 5 \text{ mA}$, $V_I = 14 \pm 1 \text{ V}$ | $f = 120 \text{ Hz}$ | 69 | | dB |
| | | | $f = 1 \text{ KHz}$ | 64 | | |
| | | | $f = 10 \text{ KHz}$ | 54 | | |
| eN | Output noise voltage | $B = 10 \text{ Hz to } 100 \text{ KHz}$ | | 50 | | μV |
| V_d | Dropout voltage | $I_O = 200 \text{ mA}$ | | 0.2 | 0.35 | V |
| | | $I_O = 500 \text{ mA}$ | | 0.4 | 0.7 | |
| V_{IL} | Control input logic low | $T_a = -40 \text{ to } 125^\circ\text{C}$ | | | 0.8 | V |
| V_{IH} | Control input logic high | $T_a = -40 \text{ to } 125^\circ\text{C}$ | 2 | | | V |
| I_I | Control input current | $V_I = 13 \text{ V}$, $V_C = 6 \text{ V}$ | | 10 | | μA |
| C_O | Output bypass capacitance | $\text{ESR} = 0.1 \text{ to } 10 \Omega$, $I_O = 0 \text{ to } 500 \text{ mA}$ | 2 | 10 | | μF |

4 Typical performance characteristics

(unless otherwise specified $V_{O(NOM)} = 3.3\text{ V}$)

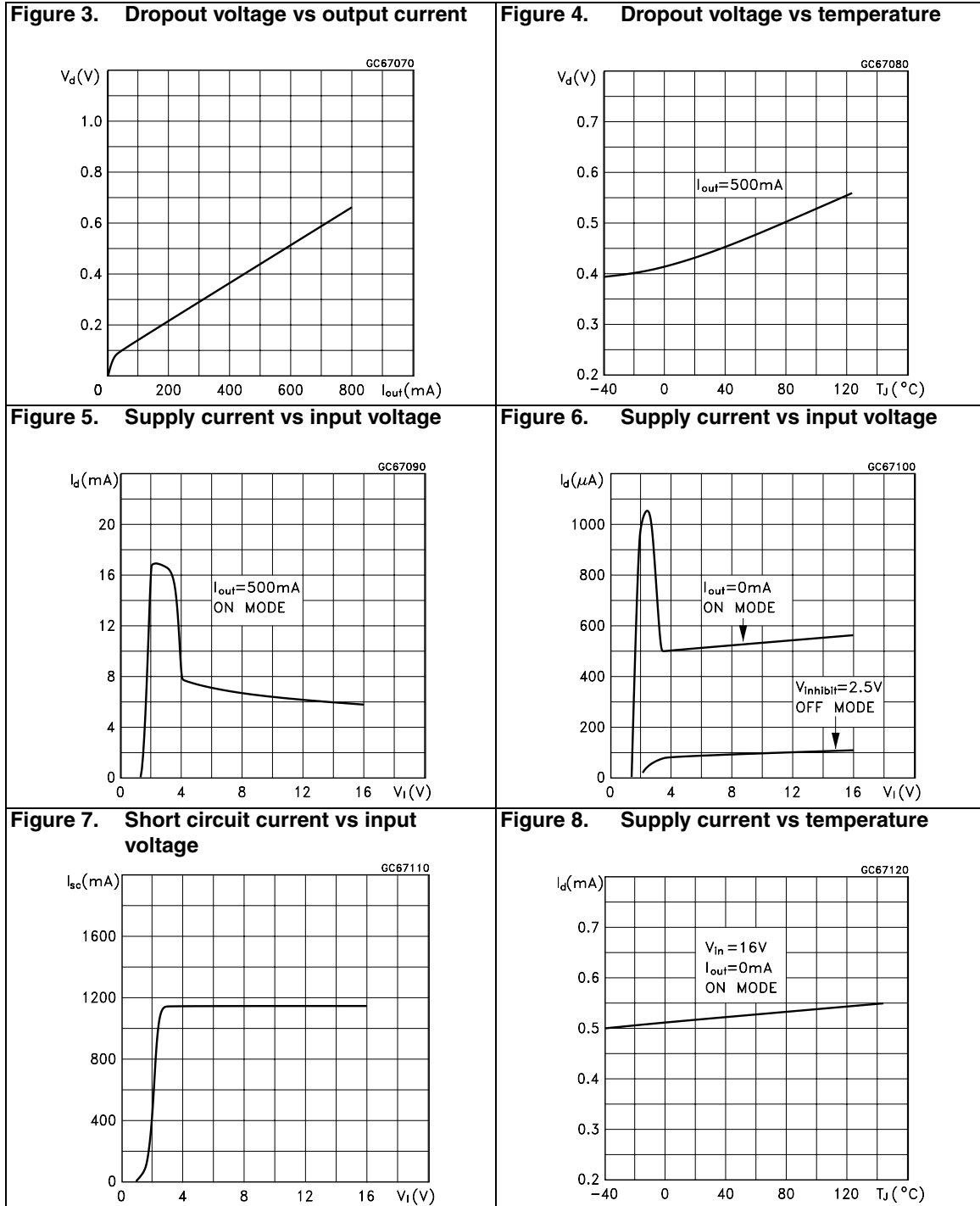


Figure 9. Logic controlled precision 3.3/5.0v selectable output

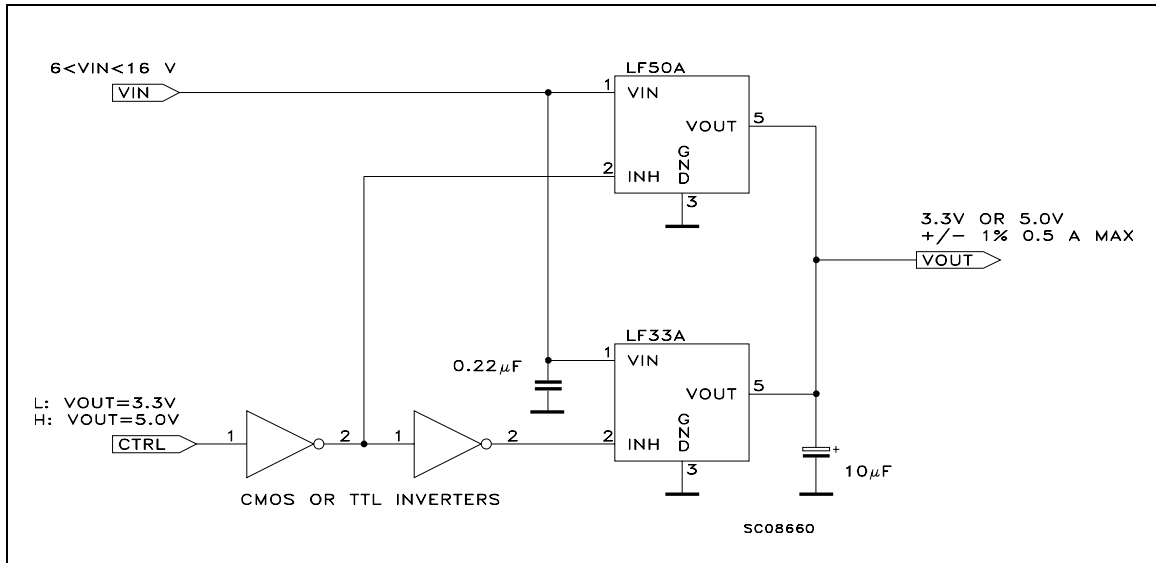


Figure 10. Sequential multi-output supply

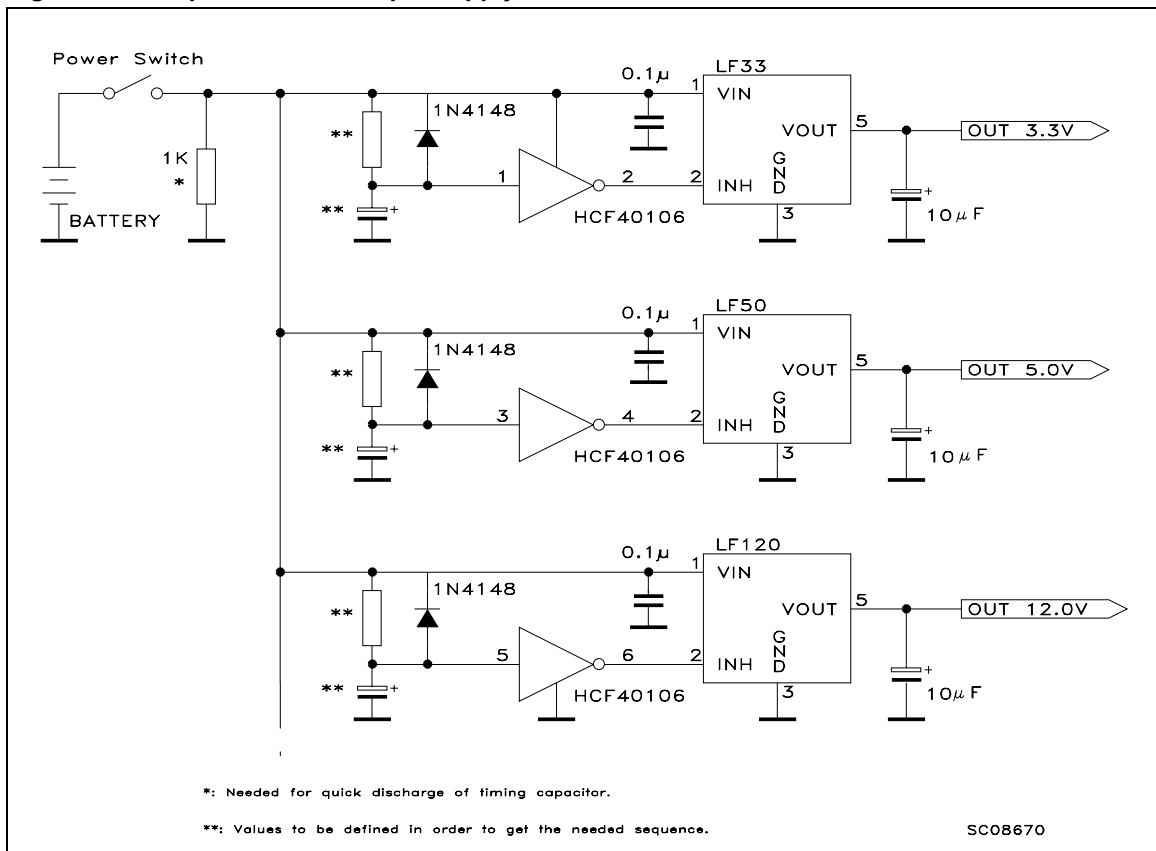


Figure 11. Multiple supply with ON/OFF toggle switch

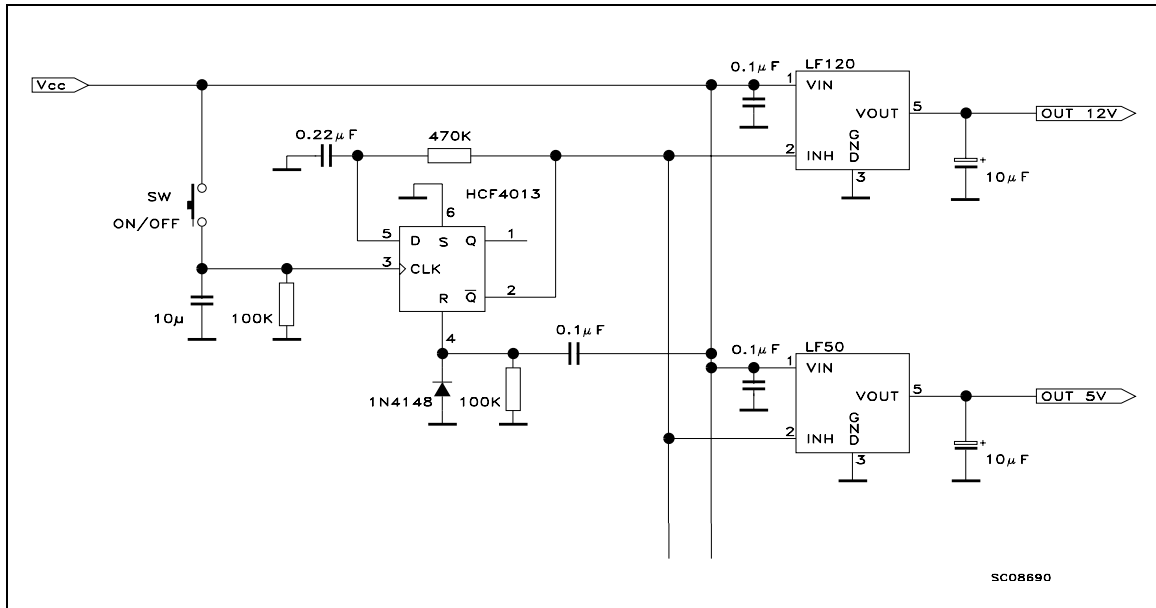


Figure 12. Basic inhibit functions

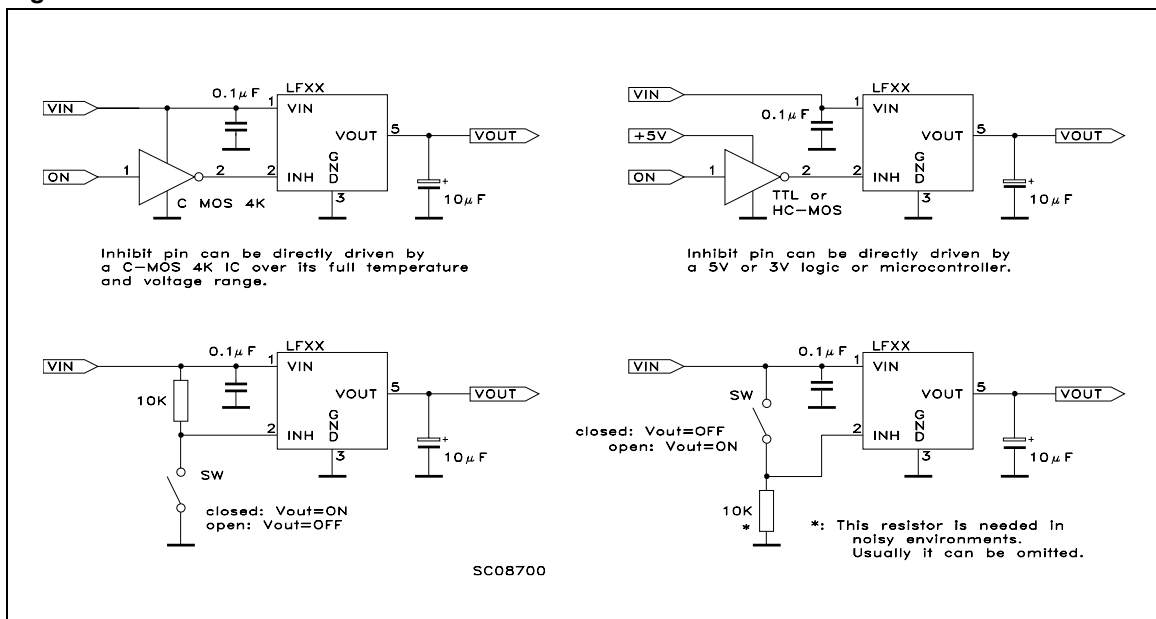


Figure 13. Delayed Turn-On

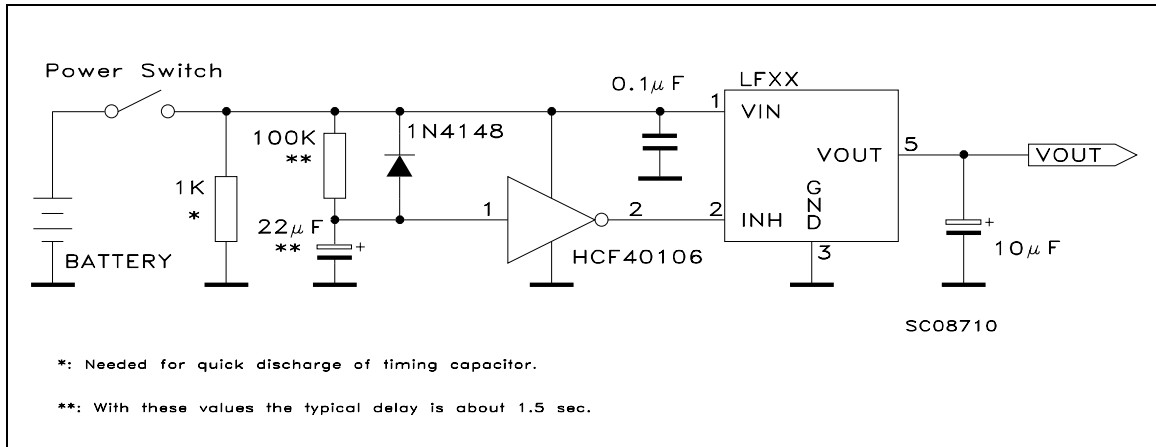
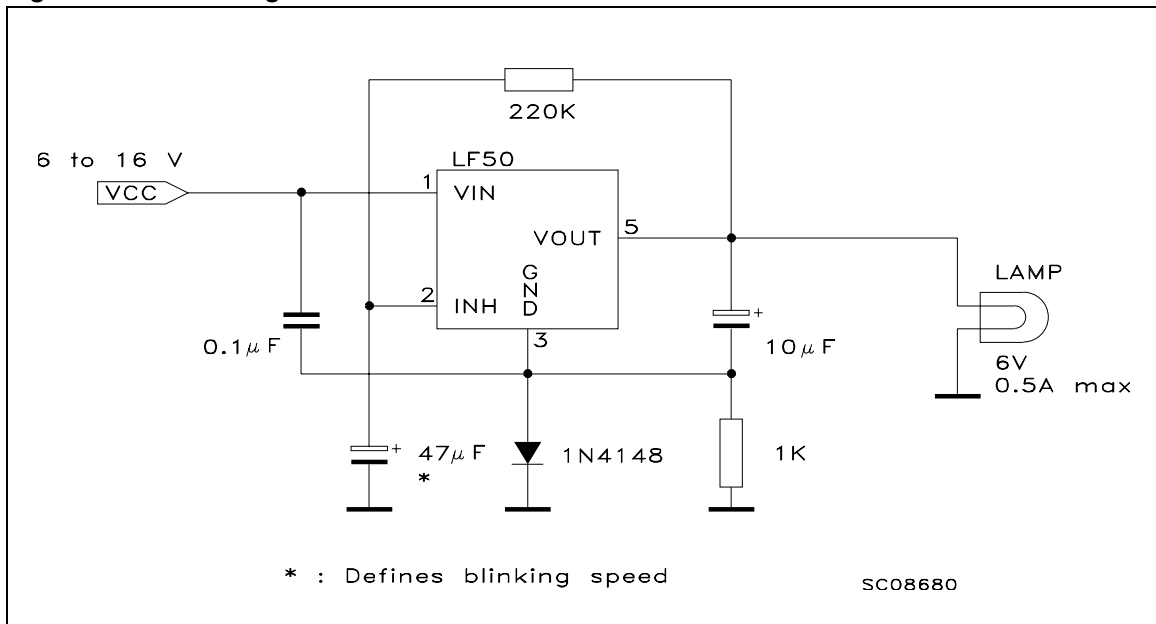


Figure 14. Low voltage bulb blinker

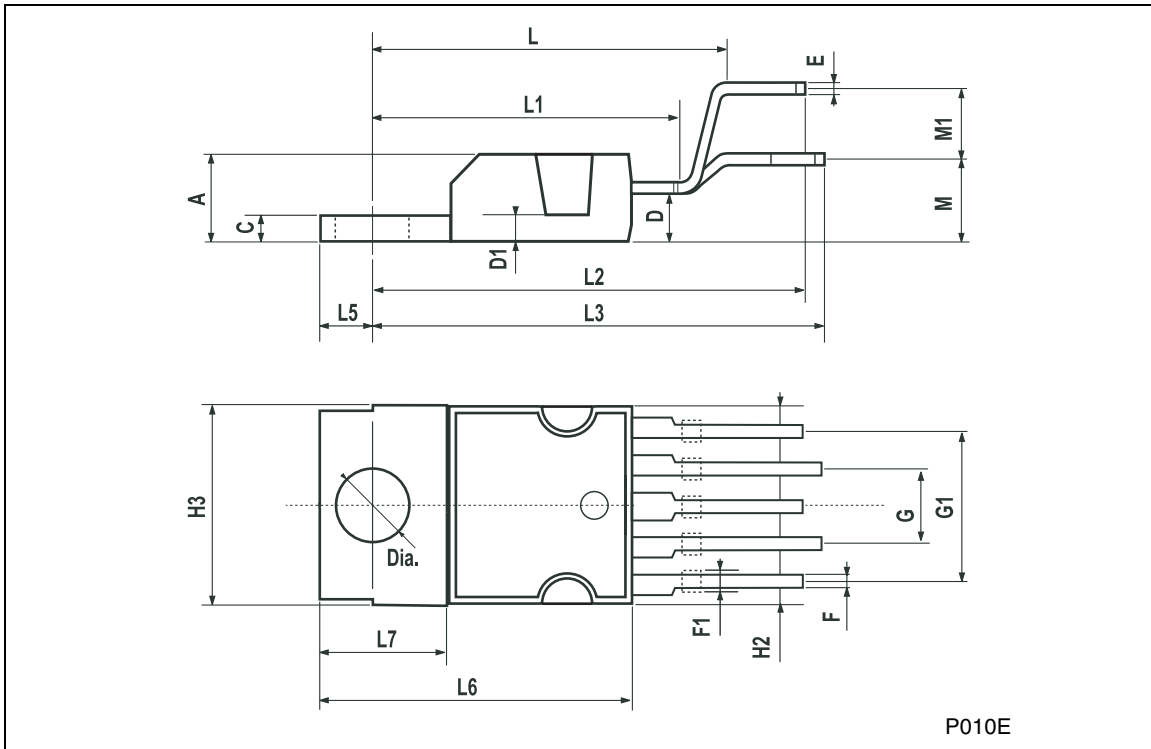


5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK[®] packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

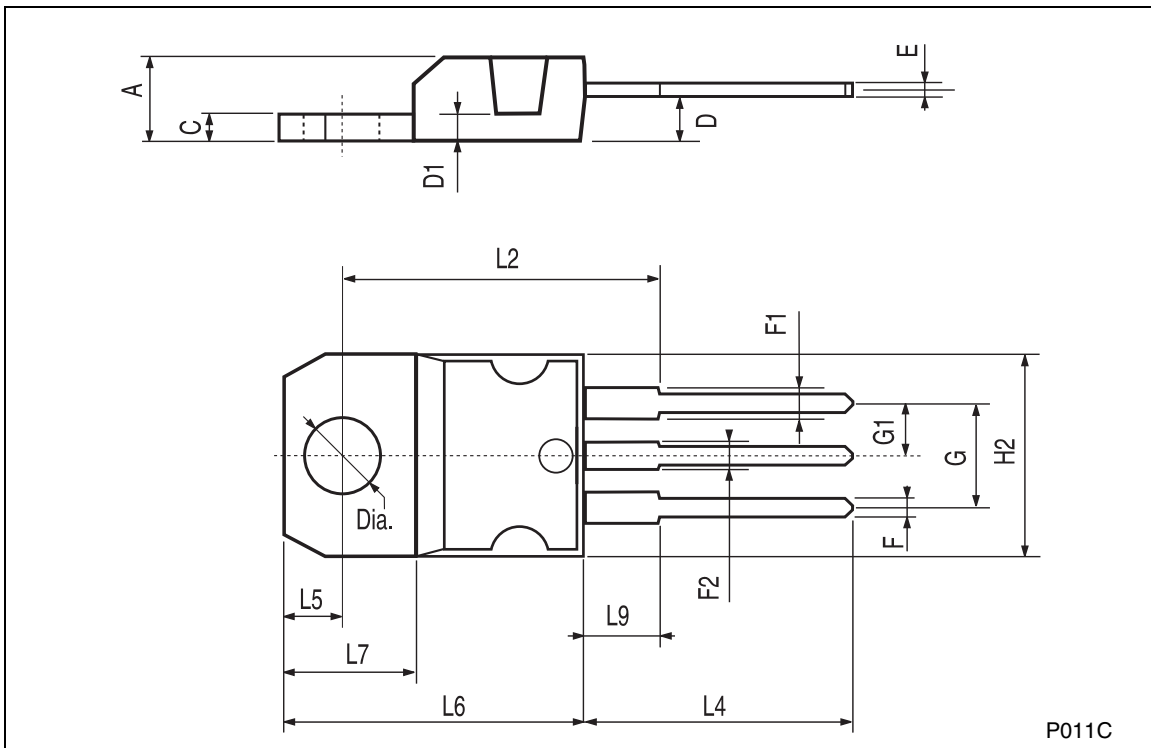
PENTAW ATT (VERTICAL) MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|-------|-------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 4.8 | | | 0.189 |
| C | | | 1.37 | | | 0.054 |
| D | 2.4 | | 2.8 | 0.094 | | 0.110 |
| D1 | 1.2 | | 1.35 | 0.047 | | 0.053 |
| E | 0.35 | | 0.55 | 0.014 | | 0.022 |
| F | 0.8 | | 1.05 | 0.031 | | 0.041 |
| F1 | 1 | | 1.4 | 0.039 | | 0.055 |
| G | 3.2 | 3.4 | 3.6 | 0.126 | 0.134 | 0.142 |
| G1 | 6.6 | 6.8 | 7 | 0.260 | 0.268 | 0.276 |
| H2 | | | 10.4 | | | 0.409 |
| H3 | 10.05 | | 10.4 | 0.396 | | 0.409 |
| L | | 17.85 | | | 0.703 | |
| L1 | | 15.75 | | | 0.620 | |
| L2 | | 21.4 | | | 0.843 | |
| L3 | | 22.5 | | | 0.886 | |
| L5 | 2.6 | | 3 | 0.102 | | 0.118 |
| L6 | 15.1 | | 15.8 | 0.594 | | 0.622 |
| L7 | 6 | | 6.6 | 0.236 | | 0.260 |
| M | | 4.5 | | | 0.177 | |
| M1 | | 4 | | | 0.157 | |
| Dia1 | 3.65 | | 3.85 | 0.144 | | 0.152 |



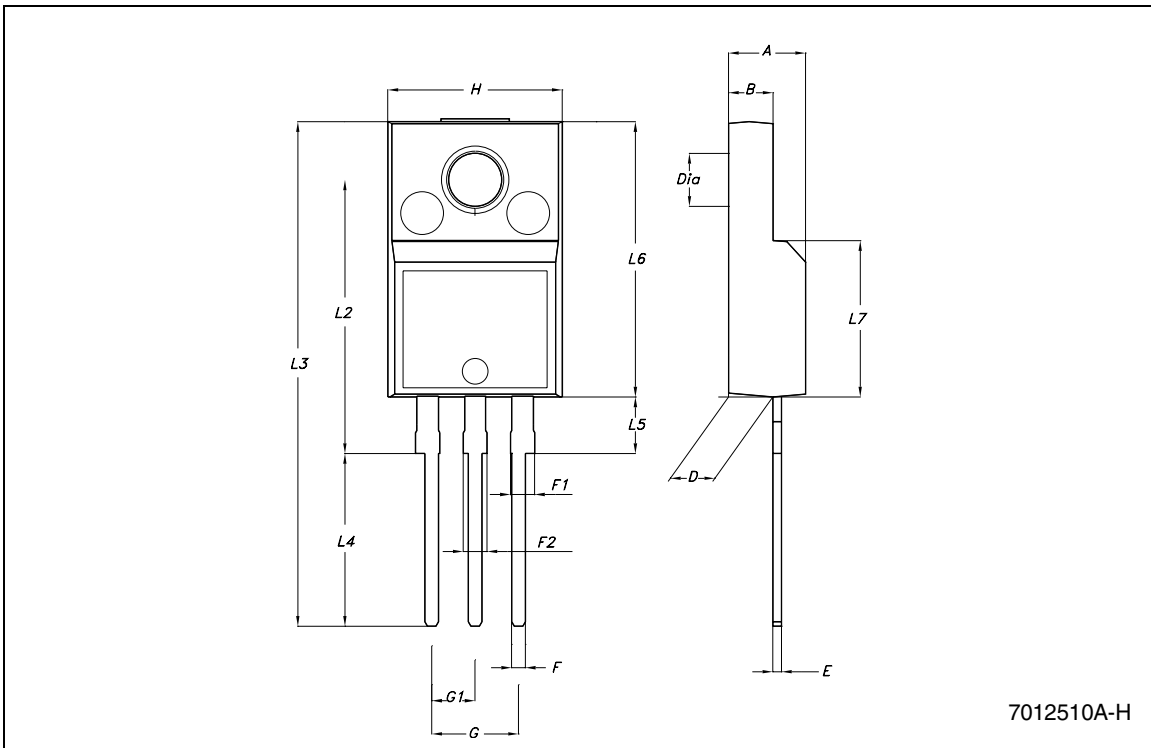
TO-220 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|-------|------|-------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| C | 1.23 | | 1.32 | 0.048 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| D1 | | 1.27 | | | 0.050 | |
| E | 0.49 | | 0.70 | 0.019 | | 0.027 |
| F | 0.61 | | 0.88 | 0.024 | | 0.034 |
| F1 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| F2 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| G | 4.95 | | 5.15 | 0.194 | | 0.203 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H2 | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 | | | 0.645 | |
| L4 | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| L9 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| DIA. | 3.75 | | 3.85 | 0.147 | | 0.151 |



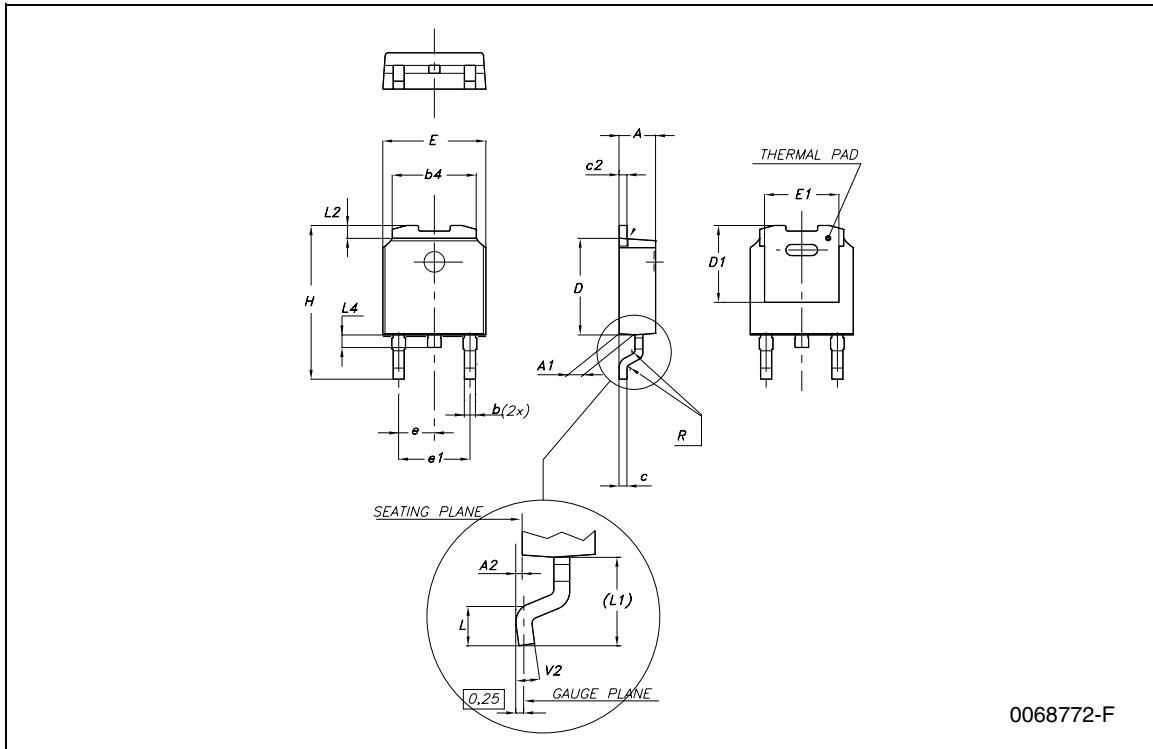
TO-220FP MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| B | 2.5 | | 2.7 | 0.098 | | 0.106 |
| D | 2.5 | | 2.75 | 0.098 | | 0.108 |
| E | 0.45 | | 0.70 | 0.017 | | 0.027 |
| F | 0.75 | | 1 | 0.030 | | 0.039 |
| F1 | 1.15 | | 1.50 | 0.045 | | 0.059 |
| F2 | 1.15 | | 1.50 | 0.045 | | 0.059 |
| G | 4.95 | | 5.2 | 0.194 | | 0.204 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16 | | | 0.630 | |
| L3 | 28.6 | | 30.6 | 1.126 | | 1.204 |
| L4 | 9.8 | | 10.6 | 0.385 | | 0.417 |
| L5 | 2.9 | | 3.6 | 0.114 | | 0.142 |
| L6 | 15.9 | | 16.4 | 0.626 | | 0.645 |
| L7 | 9 | | 9.3 | 0.354 | | 0.366 |
| DIA. | 3 | | 3.2 | 0.118 | | 0.126 |



DPAK MECHANICAL DATA

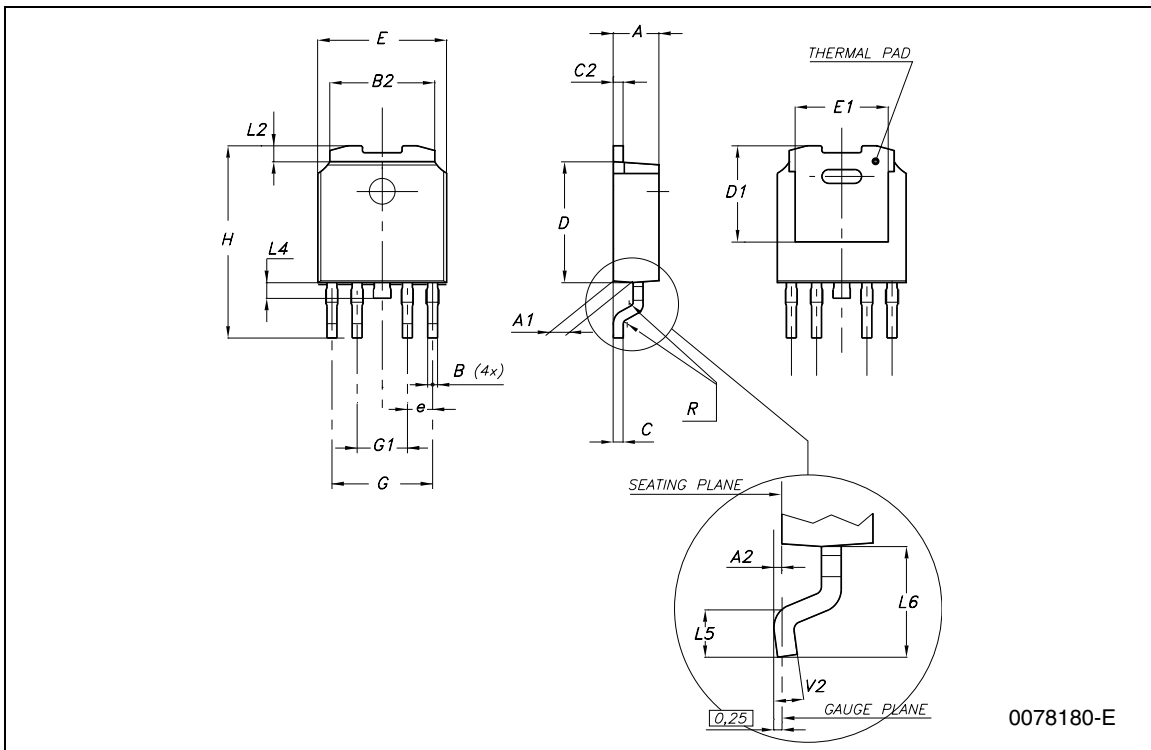
| DIM. | mm. | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.9 | 0.025 | | 0.035 |
| b4 | 5.2 | | 5.4 | 0.204 | | 0.212 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 0.48 | | 0.6 | 0.019 | | 0.023 |
| D | 6 | | 6.2 | 0.236 | | 0.244 |
| D1 | | 5.1 | | | 0.200 | |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| E1 | | 4.7 | | | 0.185 | |
| e | | 2.28 | | | 0.090 | |
| e1 | 4.4 | | 4.6 | 0.173 | | 0.181 |
| H | 9.35 | | 10.1 | 0.368 | | 0.397 |
| L | 1 | | | 0.039 | | |
| (L1) | | 2.8 | | | 0.110 | |
| L2 | | 0.8 | | | 0.031 | |
| L4 | 0.6 | | 1 | 0.023 | | 0.039 |
| R | | 0.2 | | | 0.008 | |
| V2 | 0° | | 8° | 0° | | 8° |



0068772-F

PPAK MECHANICAL DATA

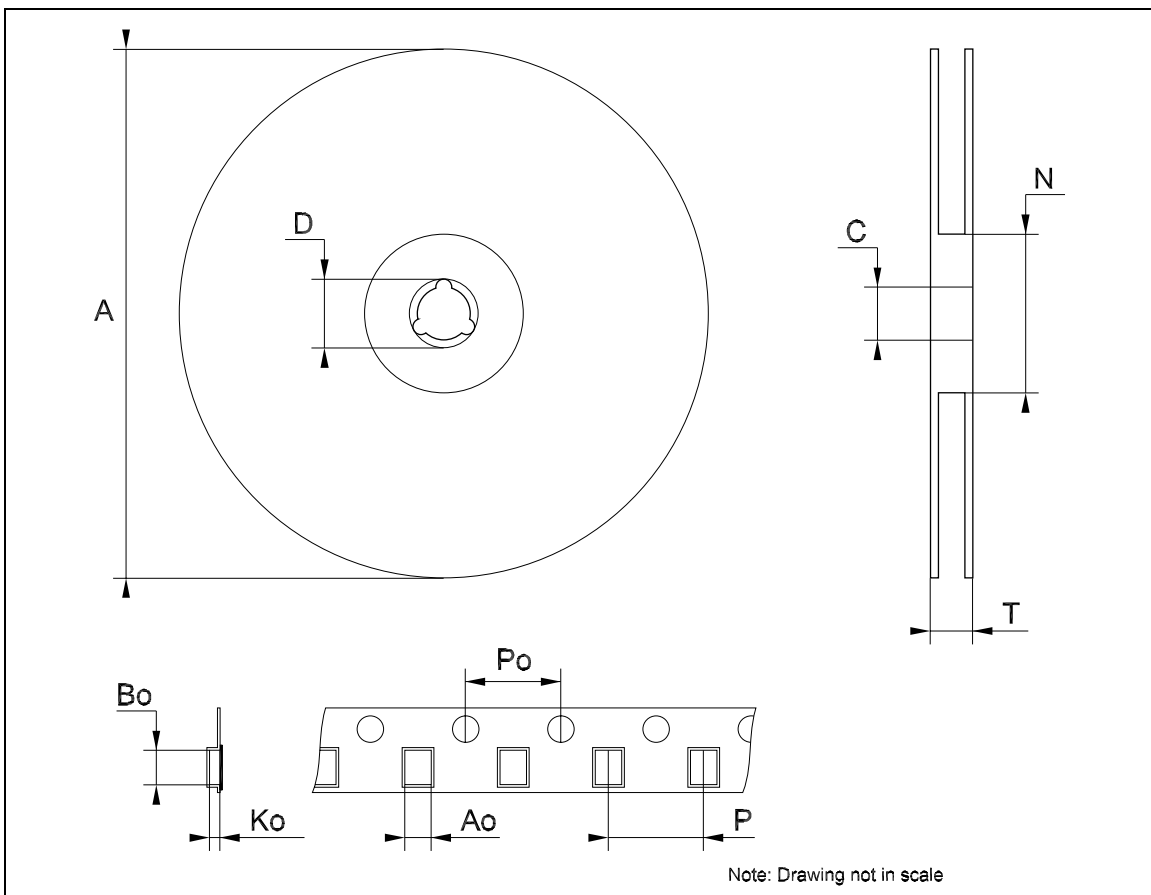
| DIM. | mm. | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.4 | | 0.6 | 0.015 | | 0.023 |
| B2 | 5.2 | | 5.4 | 0.204 | | 0.212 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 0.48 | | 0.6 | 0.019 | | 0.023 |
| D | 6 | | 6.2 | 0.236 | | 0.244 |
| D1 | | 5.1 | | | 0.201 | |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| E1 | | 4.7 | | | 0.185 | |
| e | | 1.27 | | | 0.050 | |
| G | 4.9 | | 5.25 | 0.193 | | 0.206 |
| G1 | 2.38 | | 2.7 | 0.093 | | 0.106 |
| H | 9.35 | | 10.1 | 0.368 | | 0.397 |
| L2 | | 0.8 | 1 | | 0.031 | 0.039 |
| L4 | 0.6 | | 1 | 0.023 | | 0.039 |
| L5 | 1 | | | 0.039 | | |
| L6 | | 2.8 | | | 0.110 | |



0078180-E

Tape & Reel DPAK-PPAK MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|-------|-------|-------|-------|-------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 330 | | | 12.992 |
| C | 12.8 | 13.0 | 13.2 | 0.504 | 0.512 | 0.519 |
| D | 20.2 | | | 0.795 | | |
| N | 60 | | | 2.362 | | |
| T | | | 22.4 | | | 0.882 |
| Ao | 6.80 | 6.90 | 7.00 | 0.268 | 0.272 | 0.276 |
| Bo | 10.40 | 10.50 | 10.60 | 0.409 | 0.413 | 0.417 |
| Ko | 2.55 | 2.65 | 2.75 | 0.100 | 0.104 | 0.105 |
| Po | 3.9 | 4.0 | 4.1 | 0.153 | 0.157 | 0.161 |
| P | 7.9 | 8.0 | 8.1 | 0.311 | 0.315 | 0.319 |



6 Order code

Table 31. Order code

| Part numbers | | | | | | |
|------------------------|------------------------|-------------------------|----------------------------|--------------------------|----------------------------|----------------|
| Packages | | | | | | Output voltage |
| TO-220 | TO-220FP | DPAK | DPAK (T&R) | PPAK | PPAK (T&R) | |
| LF15CV ⁽¹⁾ | LF15CP ⁽¹⁾ | LF15CDT | LF15CDT-TR | LF15CPT ⁽¹⁾ | LF15CPT-TR ⁽¹⁾ | 1.5 V |
| LF15ABV ⁽¹⁾ | LF15ABP ⁽¹⁾ | LF15ABDT | LF15ABDT-TR | LF15ABPT ⁽¹⁾ | LF15ABPT-TR | 1.5 V |
| LF18CV | LF18CP ⁽¹⁾ | LF18CDT | LF18CDT-TR | LF18CPT | LF18CPT-TR | 1.8 V |
| LF18ABV | LF18ABP ⁽¹⁾ | LF18ABDT | LF18ABDT-TR | LF18ABPT | LF18ABPT-TR | 1.8 V |
| LF25CV | LF25CP ⁽¹⁾ | LF25CDT | LF25CDT-TR | LF25CPT | LF25CPT-TR | 2.5 V |
| LF25ABV | LF25ABP ⁽¹⁾ | LF25ABDT | LF25ABDT-TR | LF25ABPT ⁽¹⁾ | LF25ABPT-TR | 2.5 V |
| LF27CV ⁽¹⁾ | LF27CP ⁽¹⁾ | LF27CDT | LF27CDT-TR | LF27CPT | LF27CPT-TR ⁽¹⁾ | 2.7 V |
| LF27ABV ⁽¹⁾ | LF27ABP ⁽¹⁾ | LF27ABDT | LF27ABDT-TR | LF27ABPT ⁽¹⁾ | LF27ABPT-TR ⁽¹⁾ | 2.7 V |
| LF30CV | LF30CP ⁽¹⁾ | LF30CDT | LF30CDT-TR | LF30CPT | LF30CPT-TR ⁽¹⁾ | 3 V |
| LF30ABV ⁽¹⁾ | LF30ABP ⁽¹⁾ | LF30ABDT | LF30ABDT-TR | LF30ABPT | LF30ABPT-TR ⁽¹⁾ | 3 V |
| LF33CV | LF33CP | LF33CDT | LF33CDT-TR | LF33CPT | LF33CPT-TR | 3.3 V |
| LF33ABV | LF33ABP | LF33ABDT | LF33ABDT-TR | LF33ABPT | LF33ABPT-TR | 3.3 V |
| LF35CV ⁽¹⁾ | LF35CP ⁽¹⁾ | LF35CDT | LF35CDT-TR ⁽¹⁾ | LF35CPT ⁽¹⁾ | LF35CPT-TR ⁽¹⁾ | 3.5 V |
| LF35ABV ⁽¹⁾ | LF35ABP ⁽¹⁾ | LF35ABDT | LF35ABDT-TR | LF35ABPT ⁽¹⁾ | LF35ABPT-TR ⁽¹⁾ | 3.5 V |
| LF40CV ⁽¹⁾ | LF40CP ⁽¹⁾ | LF40CDT | LF40CDT-TR | LF40CPT | LF40CPT-TR ⁽¹⁾ | 4 V |
| LF40ABV ⁽¹⁾ | LF40ABP ⁽¹⁾ | LF40ABDT ⁽¹⁾ | LF40ABDT-TR ⁽¹⁾ | LF40ABPT ⁽¹⁾ | LF40ABPT-TR ⁽¹⁾ | 4 V |
| LF50CV | LF50CP | LF50CDT | LF50CDT-TR | LF50CPT | LF50CPT-TR | 5 V |
| LF50ABV | LF50ABP | LF50ABDT | LF50ABDT-TR | LF50ABPT | LF50ABPT-TR | 5 V |
| LF60CV | LF60CP ⁽¹⁾ | LF60CDT | LF60CDT-TR | LF60CPT | LF60CPT-TR ⁽¹⁾ | 6 V |
| LF60ABV | LF60ABP ⁽¹⁾ | LF60ABDT | LF60ABDT-TR | LF60ABPT ⁽¹⁾ | LF60ABPT-TR ⁽¹⁾ | 6 V |
| LF80CV | LF80CP ⁽¹⁾ | LF80CDT | LF80CDT-TR | LF80CPT | LF80CPT-TR | 8 V |
| LF80ABV | LF80ABP ⁽¹⁾ | LF80ABDT | LF80ABDT-TR | LF80ABPT | LF80ABPT-TR | 8 V |
| LF85CV | LF85CP | LF85CDT | LF85CDT-TR | LF85CPT | LF85CPT-TR | 8.5 V |
| LF85ABV | LF85ABP ⁽¹⁾ | LF85ABDT | LF85ABDT-TR | LF85ABPT ⁽¹⁾ | LF85ABPT-TR | 8.5 V |
| LF90CV | LF90CP ⁽¹⁾ | LF90CDT | LF90CDT-TR | LF90CPT | LF90CPT-TR | 9 V |
| LF90ABV | LF90ABP ⁽¹⁾ | LF90ABDT ⁽¹⁾ | LF90ABDT-TR | LF90ABPT | LF90ABPT-TR | 9 V |
| LF120CV | LF120CP ⁽¹⁾ | LF120CDT | LF120CDT-TR | LF120CPT | LF120CPT-TR | 12 V |
| LF120ABV | LF120ABP | LF120ABDT | LF120ABDT-TR | LF120ABPT ⁽¹⁾ | LF120ABPT-TR | 12 V |

1. Available on request

7 Revision history

Table 32. Revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 21-Jun-2004 | 14 | Document updating. |
| 24-May-2006 | 15 | Order Codes has been updated and new template. |

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS, WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2006 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com