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## Very low drop voltage regulators with inhibit

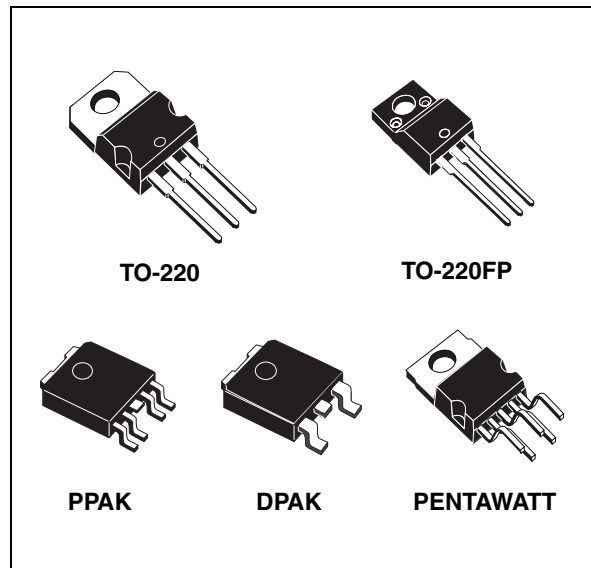
Datasheet – production data

### Features

- Very low dropout voltage (0.45 V)
- Very low quiescent current (typ. 50  $\mu$ A in OFF mode, 500  $\mu$ A in ON mode)
- Output current up to 500 mA
- Logic-controlled electronic shutdown
- Output voltages of 1.5; 1.8; 2.5; 3.3; 4.7; 5; 6; 8; 8.5; 9; 12 V
- Automotive Grade product: 1.8 V, 2.5 V, 3.3 V, 5.0 V, 8.0 V, 8.5 V  $V_{OUT}$  in DPAK and PPAK packages
- Internal current and thermal limit
- Only 2.2  $\mu$ F for stability
- Available in  $\pm 1\%$  (AB) or  $\pm 2\%$  (C) selection at 25  $^{\circ}$ C
- Supply voltage rejection: 80 db (typ.)
- Temperature range: -40 to 125  $^{\circ}$ C

### Description

The LFxxAB/LFxxC 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 (0.45 V) and the very low quiescent current make them particularly 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  $\mu$ F capacitor for stability allowing space and cost saving. The LFxx is available as Automotive Grade in DPAK and PPAK packages, for the options of output voltages whose commercial part numbers are shown in the order codes. These devices are qualified according to the specification AEC-Q100 of the Automotive market, in the temperature range - 40  $^{\circ}$ C to 125  $^{\circ}$ C, and the statistical tests PAT, SYL, SBL are performed.

**Table 1. Device summary**

| Part numbers |        |        |        |        |         |
|--------------|--------|--------|--------|--------|---------|
| LF15AB       | LF25C  | LF33AB | LF60C  | LF80AB | LF120C  |
| LF18C        | LF25AB | LF50C  | LF60AB | LF85C  | LF120AB |
| LF18AB       | LF33C  | LF50AB | LF80C  | LF90C  |         |

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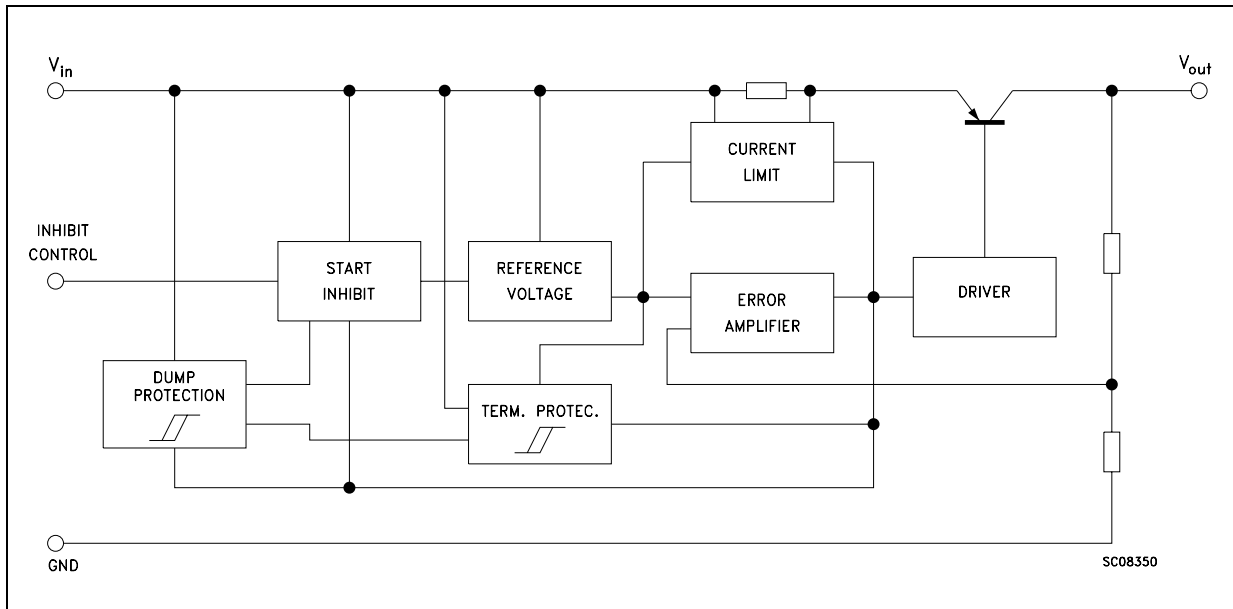
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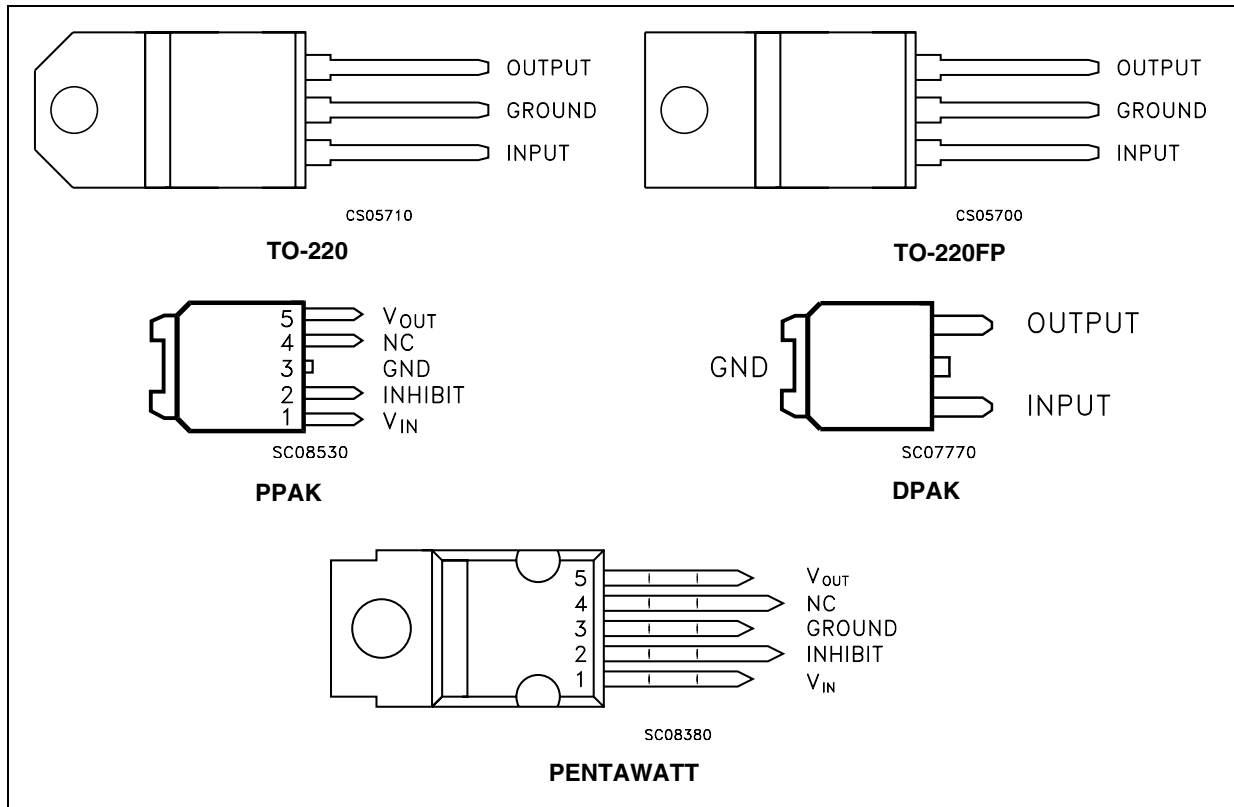
# 1 Diagram

Figure 1. Block diagram



## 2 Pin configuration

Figure 2. Pin connections (top view)



### 3 Maximum ratings

**Table 2. Absolute maximum ratings**

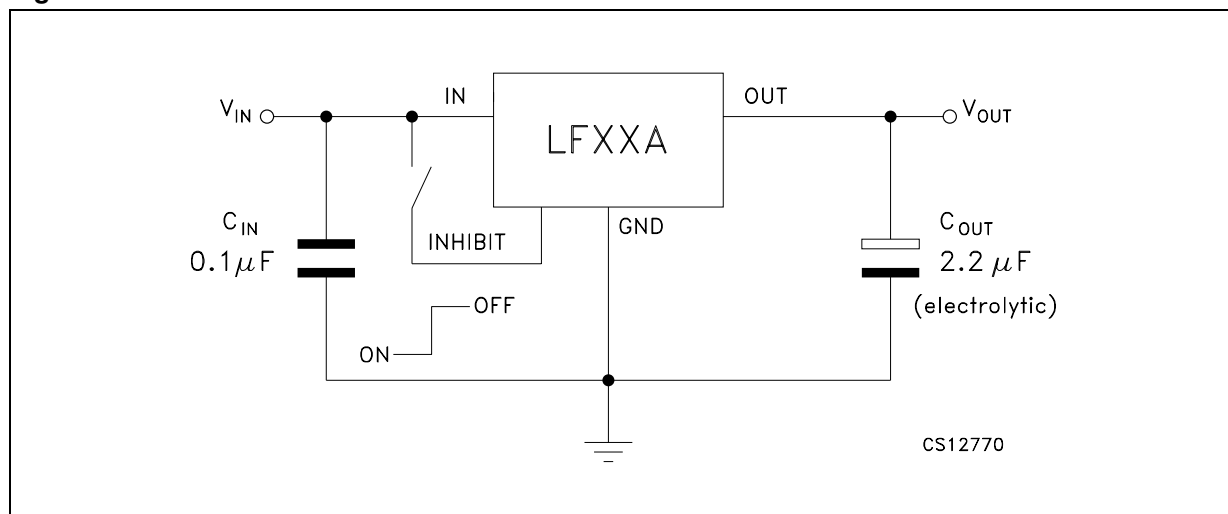
| Symbol    | Parameter                            | Value                     | Unit |
|-----------|--------------------------------------|---------------------------|------|
| $V_I$     | DC input voltage                     | -0.5 to 40 <sup>(1)</sup> | V    |
| $I_O$     | Output current                       | 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 3. Thermal data**

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

**Figure 3. Test circuit**





## 4 Electrical characteristics

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 4. Electrical characteristics for LF15AB**

| 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             |               |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 3.5\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 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             |               |
| $\Delta V_O$ | Line regulation           | $V_I = 2.5\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 2    | 10    | mV            |               |
| $\Delta V_O$ | 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           | $\mu\text{A}$ |
| 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   |       | $\mu\text{V}$ |               |
| $V_d$        | Dropout voltage           | $I_O = 200\text{ mA}$  |                     | 1    |       | V             |               |
| $V_{IL}$     | Control input logic low   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  |                     |      | 0.8   | V             |               |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  | 2                   |      |       | V             |               |
| $I_I$        | Control input current     | $V_I = 6\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |       | $\mu\text{A}$ |               |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$            | 2                   | 10   |       | $\mu\text{F}$ |               |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 5. Electrical characteristics for LF18AB**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 3.3\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 1.764               |      | 1.836 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$  | 3                   |      | 16    | V             |
| $I_O$        | Output current limit      |  |                     | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 2.8\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 2    | 12    | mV            |
| $\Delta V_O$ | 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   | $\mu\text{A}$ |
| 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   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200\text{ mA}$  |                     | 0.7  |       | V             |
| $V_{IL}$     | Control input logic low   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  |                     |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  | 2                   |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$            | 2                   | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 6. Electrical characteristics for LF18C**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 3.5\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 1.728               |      | 1.872 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$  | 3                   |      | 16    | V             |
| $I_O$        | Output current limit      |  |                     | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 2.8\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 2    | 12    | mV            |
| $\Delta V_O$ | 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   | $\mu\text{A}$ |
| 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   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200\text{ mA}$  |                     | 0.7  |       | V             |
| $V_{IL}$     | Control input logic low   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  |                     |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  | 2                   |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$            | 2                   | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $125^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 7. Electrical characteristics for LF18CDT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions  | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|--|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 3.5 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 1.764                | 1.8  | 1.836 | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 3.5 \text{ V}$                                  | 1.713                |      | 1.887 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$   | 3                    |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$   |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 2.8$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                           |                      | 2    | 15    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 3.3 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                          |                      | 2    | 15    | mV            |
| $I_d$        | Quiescent current         | $V_I = 2.5$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                           | ON MODE              | 0.5  | 2     | mA            |
|              |                           | $V_I = 3.1$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                         |                      |      |       |               |
|              |                           | $V_I = 6 \text{ V}$  | OFF MODE             | 50   | 120   |               |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 3.5 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ |      | 82    | dB            |
|              |                           |  | $f = 1 \text{ kHz}$  |      | 77    |               |
|              |                           |  | $f = 10 \text{ kHz}$ |      | 60    |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $T_a = 25^\circ\text{C}$            |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$   |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$   |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |  |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |  | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$           |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$              | 2                    | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 8. Electrical characteristics for LF25AB**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 4.5\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 2.450               |      | 2.550 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$  |                     |      | 16    | V             |
| $I_O$        | Output current limit      |  |                     | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 3.5\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 2    | 12    | mV            |
| $\Delta V_O$ | 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   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5\text{ mA}$ , $V_I = 4.5 \pm 1\text{ V}$   | $f = 120\text{ Hz}$ | 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   |       | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  |                     |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  | 2                   |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$            | 2                   | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $125^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 9. Electrical characteristics for LF25ABDT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions  | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|--|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 4.5 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 2.475                | 2.5  | 2.525 | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 4.5 \text{ V}$                                  | 2.435                |      | 2.565 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$   |                      |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$   |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 3.5$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                           |                      | 2    | 15    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 3.8 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                          |                      | 2    | 15    | mV            |
| $I_d$        | Quiescent current         | $V_I = 3.5$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                           | ON MODE              | 0.5  | 2     | mA            |
|              |                           | $V_I = 3.8$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                         |                      |      |       |               |
|              |                           | $V_I = 6 \text{ V}$  | OFF MODE             | 50   | 120   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 4.5 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ | 82   |       | dB            |
|              |                           |  | $f = 1 \text{ kHz}$  | 77   |       |               |
|              |                           |  | $f = 10 \text{ kHz}$ | 65   |       |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $T_a = 25^\circ\text{C}$            |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$   |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$   |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |  |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |  | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$           |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$              | 2                    | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 10. Electrical characteristics for LF25C**

| 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             |
| $\Delta V_O$ | Line regulation           | $V_I = 3.5\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                              |                     | 2    | 12   | mV            |
| $\Delta V_O$ | 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  | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5\text{ mA}$ , $V_I = 4.5 \pm 1\text{ V}$                                     | $f = 120\text{ Hz}$ | 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$    | 2                   | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $125^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 11. Electrical characteristics for LF25CDT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions  | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|--|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 4.5 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 2.45                 | 2.5  | 2.55  | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 4.5 \text{ V}$                                  | 2.385                |      | 2.615 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$   |                      |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$   |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 3.5$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                           |                      | 2    | 15    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 3.8 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                          |                      | 2    | 15    | mV            |
| $I_d$        | Quiescent current         | $V_I = 3.5$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                           | ON MODE              | 0.5  | 2     | mA            |
|              |                           | $V_I = 3.8$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                         |                      |      |       |               |
|              |                           | $V_I = 6 \text{ V}$  | OFF MODE             | 50   | 120   |               |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 4.5 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ | 82   |       | dB            |
|              |                           |  | $f = 1 \text{ kHz}$  | 77   |       |               |
|              |                           |  | $f = 10 \text{ kHz}$ | 65   |       |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $T_a = 25^\circ\text{C}$            |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$   |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$   |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |  |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |  | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$           |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$              | 2                    | 10   |       | $\mu\text{F}$ |



Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 12. Electrical characteristics for LF33AB**

| 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             |
| $\Delta V_O$ | Line regulation           | $V_I = 4.3\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                              |                     | 3    | 16    | mV            |
| $\Delta V_O$ | 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   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5\text{ mA}$ , $V_I = 5.3 \pm 1\text{ V}$                                     | $f = 120\text{ Hz}$ | 80   |       | dB            |
|              |                           |  | $f = 1\text{ kHz}$  | 75   |       |               |
|              |                           |  | $f = 10\text{ kHz}$ | 65   |       |               |
| eN           | Output noise voltage      | $B = 10\text{ Hz to }100\text{ kHz}$   |                     | 50   |       | $\mu\text{V}$ |
| $V_d$        | 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   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$    | 2                   | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 13. Electrical characteristics for LF33C**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 5.3\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 3.168               |      | 3.432 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$  |                     |      | 16    | V             |
| $I_O$        | Output current limit      |  |                     | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 4.3\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 3    | 16    | mV            |
| $\Delta V_O$ | 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   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5\text{ mA}$ , $V_I = 5.3 \pm 1\text{ V}$   | $f = 120\text{ Hz}$ | 80   |       | dB            |
|              |                           |  | $f = 1\text{ kHz}$  | 75   |       |               |
|              |                           |  | $f = 10\text{ kHz}$ | 65   |       |               |
| eN           | Output noise voltage      | $B = 10\text{ Hz to }100\text{ kHz}$   |                     | 50   |       | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  |                     |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  | 2                   |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$            | 2                   | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $125^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 14. Electrical characteristics for LF33CDT-TRY and LF33CPT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions  | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|--|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 5.3 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 3.234                | 3.3  | 3.366 | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 5.3 \text{ V}$ ,                                | 3.153                |      | 3.447 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$   |                      |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$   |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 4.3$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                           |                      | 3    | 19    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 4.6 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                          |                      | 3    | 19    | mV            |
| $I_d$        | Quiescent current         | $V_I = 4.3$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                           | ON MODE              | 0.5  | 2     | mA            |
|              |                           | $V_I = 4.6$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                         |                      |      |       |               |
|              |                           | $V_I = 6 \text{ V}$  | OFF MODE             | 50   | 120   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 5.3 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ | 80   |       | dB            |
|              |                           |  | $f = 1 \text{ kHz}$  | 75   |       |               |
|              |                           |  | $f = 10 \text{ kHz}$ | 65   |       |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ KHz}$ , $T_a = 25^\circ\text{C}$            |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$   |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$   |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |  |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |  | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$           |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$              | 2                    | 10   |       | $\mu\text{F}$ |

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.

**Table 15. Electrical characteristics for LF50AB**

| 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             |
| $\Delta V_O$ | Line regulation           | $V_I = 6\ \text{to}\ 16\ \text{V}$ , $I_O = 5\ \text{mA}$                              |                      | 5    | 25   | mV            |
| $\Delta V_O$ | 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  | $\mu\text{A}$ |
| 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\ \text{to}\ 10\ \Omega$ , $I_O = 0\ \text{to}\ 500\ \text{mA}$       | 2                    | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $125^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 16. Electrical characteristics for LF50ABDT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions  | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|--|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 7 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 4.95                 | 5    | 5.05  | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 7 \text{ V}$                                  | 4.885                |      | 5.115 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$   |                      |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$   |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 6$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                           |                      | 5    | 28    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 6.3 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                        |                      | 5    | 28    | mV            |
| $I_d$        | Quiescent current         | $V_I = 6$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                           | ON MODE              | 0.5  | 2     | mA            |
|              |                           | $V_I = 6.3$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                       |                      |      |       |               |
|              |                           | $V_I = 6 \text{ V}$  | OFF MODE             | 50   | 120   |               |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 7 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ | 76   |       | dB            |
|              |                           |  | $f = 1 \text{ kHz}$  | 71   |       |               |
|              |                           |  | $f = 10 \text{ kHz}$ | 60   |       |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $T_a = 25^\circ\text{C}$          |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$   |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$   |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |  |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |  | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$         |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$            | 2                    | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 17. Electrical characteristics for LF50C**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 7\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 4.8                 |      | 5.2  |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$  |                     |      | 16   | V             |
| $I_O$        | Output current limit      |  |                     | 1    |      | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 6\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 5    | 25   | mV            |
| $\Delta V_O$ | 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  | $\mu\text{A}$ |
| 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  |                     |      | 0.8  | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$  | 2                   |      |      | V             |
| $I_I$        | Control input current     | $V_I = 6\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$          | 2                   | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $125^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 18. Electrical characteristics for LF50CDT-TRY and LF50CPT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions  | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|--|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 7 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 4.9                  | 5    | 5.1   | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 7 \text{ V}$                                  | 4.785                |      | 5.215 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$   |                      |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$   |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 6$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                           |                      | 5    | 28    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 6.3 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                        |                      | 5    | 28    | mV            |
| $I_d$        | Quiescent current         | $V_I = 6$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                           | ON MODE              | 0.5  | 2     | mA            |
|              |                           | $V_I = 6.3$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                       |                      |      | 12    |               |
|              |                           | $V_I = 6 \text{ V}$  | OFF MODE             | 50   | 120   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 7 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ | 76   |       | dB            |
|              |                           |  | $f = 1 \text{ kHz}$  | 71   |       |               |
|              |                           |  | $f = 10 \text{ kHz}$ | 60   |       |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $T_a = 25^\circ\text{C}$          |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$   |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$   |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |  |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |  | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 6 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$         |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$            | 2                    | 10   |       | $\mu\text{F}$ |

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.

**Table 19. Electrical characteristics for LF60AB**

| 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             |
| $\Delta V_O$ | Line regulation           | $V_I = 7\ \text{to}\ 16\ \text{V}$ , $I_O = 5\ \text{mA}$                              |                      | 6    | 30   | mV            |
| $\Delta V_O$ | 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  | $\mu\text{A}$ |
| 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\ \text{to}\ 10\ \Omega$ , $I_O = 0\ \text{to}\ 500\ \text{mA}$       | 2                    | 10   |      | $\mu\text{F}$ |



Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 20. Electrical characteristics for LF60C**

| 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             |
| $\Delta V_O$ | Line regulation           | $V_I = 7\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                              |                     | 6    | 30   | mV            |
| $\Delta V_O$ | 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  | $\mu\text{A}$ |
| 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$  | 2                   | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 21. Electrical characteristics for LF80AB**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 10\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 7.84                |      | 8.16 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$   |                     |      | 16   | V             |
| $I_O$        | Output current limit      |   |                     | 1    |      | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 9\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                       |                     | 8    | 40   | mV            |
| $\Delta V_O$ | 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           |
| SVR          | Supply voltage rejection  | $I_O = 5\text{ mA}$ , $V_I = 10 \pm 1\text{ V}$   | $f = 120\text{ Hz}$ |      | 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   |                     |      | 0.8  | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   | 2                   |      |      | V             |
| $I_I$        | Control input current     | $V_I = 9\text{ V}$ , $V_C = 6\text{ V}$   |                     | 10   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$           | 2                   | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 22. Electrical characteristics for LF80C**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 10\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 7.68                |      | 8.32 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$   |                     |      | 16   | V             |
| $I_O$        | Output current limit      |   |                     | 1    |      | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 9\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                       |                     | 8    | 40   | mV            |
| $\Delta V_O$ | 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  | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5\text{ mA}$ , $V_I = 10 \pm 1\text{ V}$   | $f = 120\text{ Hz}$ | 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   |                     |      | 0.8  | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   | 2                   |      |      | V             |
| $I_I$        | Control input current     | $V_I = 9\text{ V}$ , $V_C = 6\text{ V}$   |                     | 10   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$           | 2                   | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $125^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 23. Electrical characteristics for LF80CDT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions   | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|---|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 10 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 7.84                 | 8    | 8.16  | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 10 \text{ V}$                                  | 7.665                |      | 8.335 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$  |                      |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$  |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 9$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                            |                      | 8    | 44    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 9.3 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                         |                      | 8    | 44    | mV            |
| $I_d$        | Quiescent current         | $V_I = 9$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                            | ON MODE              | 0.7  | 2.5   | mA            |
|              |                           | $V_I = 9.3$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                        |                      |      |       |               |
|              |                           | $V_I = 9 \text{ V}$   | OFF MODE             | 70   | 160   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 10 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ | 72   |       | dB            |
|              |                           |   | $f = 1 \text{ kHz}$  | 67   |       |               |
|              |                           |   | $f = 10 \text{ kHz}$ | 57   |       |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $T_a = 25^\circ\text{C}$           |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$  |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$  |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |   |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |   | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 9 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$          |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$             | 2                    | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 24. Electrical characteristics for LF85AB**

| 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             |
| $\Delta V_O$ | Line regulation           | $V_I = 9.5\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                               |                     | 8    | 42    | mV            |
| $\Delta V_O$ | 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   | $\mu\text{A}$ |
| 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   |       | $\mu\text{V}$ |
| $V_d$        | 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   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$     | 2                   | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 25. Electrical characteristics for LF85C**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 10.5\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 8.16                |      | 8.84 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$   |                     |      | 16   | V             |
| $I_O$        | Output current limit      |   |                     | 1    |      | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 9.5\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                       |                     | 8    | 42   | mV            |
| $\Delta V_O$ | 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  | $\mu\text{A}$ |
| 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   |                     |      | 0.8  | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   | 2                   |      |      | V             |
| $I_I$        | Control input current     | $V_I = 9\text{ V}$ , $V_C = 6\text{ V}$   |                     | 10   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$             | 2                   | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_A = -40$  to  $25^\circ\text{C}$ ,  $C_I = 0.1 \mu\text{F}$ ,  $C_O = 2.2 \mu\text{F}$  unless otherwise specified.

**Table 26. Electrical characteristics for LF85CDT-TRY and LF85CPT-TRY (Automotive Grade)**

| Symbol       | Parameter                 | Test conditions   | Min.                 | Typ. | Max.  | Unit          |
|--------------|---------------------------|---|----------------------|------|-------|---------------|
| $V_O$        | Output voltage            | $I_O = 50 \text{ mA}$ , $V_I = 10.5 \text{ V}$ , $T_a = 25^\circ\text{C}$       | 8.33                 | 8.5  | 8.67  | V             |
|              |                           | $I_O = 50 \text{ mA}$ , $V_I = 10.5 \text{ V}$                                  | 8.145                |      | 8.855 |               |
| $V_I$        | Operating input voltage   | $I_O = 500 \text{ mA}$  |                      |      | 16    | V             |
| $I_O$        | Output current limit      | $T_a = 25^\circ\text{C}$  |                      | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 9.5$ to $16 \text{ V}$ , $I_O = 5 \text{ mA}$                            |                      | 8    | 44    | mV            |
| $\Delta V_O$ | Load regulation           | $V_I = 9.8 \text{ V}$ , $I_O = 5$ to $500 \text{ mA}$                           |                      | 8    | 44    | mV            |
| $I_d$        | Quiescent current         | $V_I = 9.5$ to $16 \text{ V}$ , $I_O = 0 \text{ mA}$                            | ON MODE              | 0.7  | 2.5   | mA            |
|              |                           | $V_I = 9.8$ to $16 \text{ V}$ , $I_O = 500 \text{ mA}$                          |                      |      | 12    |               |
|              |                           | $V_I = 9 \text{ V}$   | OFF MODE             | 70   | 160   | $\mu\text{A}$ |
| SVR          | Supply voltage rejection  | $I_O = 5 \text{ mA}$ , $V_I = 10.5 \pm 1 \text{ V}$<br>$T_a = 25^\circ\text{C}$ | $f = 120 \text{ Hz}$ | 72   |       | dB            |
|              |                           |   | $f = 1 \text{ kHz}$  | 67   |       |               |
|              |                           |   | $f = 10 \text{ kHz}$ | 57   |       |               |
| eN           | Output noise voltage      | $B = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $T_a = 25^\circ\text{C}$             |                      | 50   |       | $\mu\text{V}$ |
| $V_d$        | Dropout voltage           | $I_O = 200 \text{ mA}$  |                      | 0.2  | 1.3   | V             |
|              |                           | $I_O = 500 \text{ mA}$  |                      | 0.4  | 1.3   |               |
| $V_{IL}$     | Control input logic low   |   |                      |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  |   | 2                    |      |       | V             |
| $I_I$        | Control input current     | $V_I = 9 \text{ V}$ , $V_C = 6 \text{ V}$ , $T_a = 25^\circ\text{C}$            |                      | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1$ to $10 \Omega$ , $I_O = 0$ to $500 \text{ mA}$               | 2                    | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 27. Electrical characteristics for LF90AB**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 11\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 8.82                |      | 9.18 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$   |                     |      | 16   | V             |
| $I_O$        | Output current limit      |   |                     | 1    |      | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 10\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 9    | 45   | mV            |
| $\Delta V_O$ | 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            |
|              |                           | $V_I = 10.3\text{ to }16\text{ V}$ ,<br>$I_O = 500\text{ mA}$                               |                     |      | 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   |                     |      | 0.8  | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   | 2                   |      |      | V             |
| $I_I$        | Control input current     | $V_I = 10\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$           | 2                   | 10   |      | $\mu\text{F}$ |



Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 28. Electrical characteristics for LF90C**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 11\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 8.64                |      | 9.36 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$   |                     |      | 16   | V             |
| $I_O$        | Output current limit      |   |                     | 1    |      | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 10\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 9    | 45   | mV            |
| $\Delta V_O$ | 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            |
|              |                           | $V_I = 10.3\text{ to }16\text{ V}$ ,<br>$I_O = 500\text{ mA}$                               |                     |      | 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   |      | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   |                     |      | 0.8  | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   | 2                   |      |      | V             |
| $I_I$        | Control input current     | $V_I = 10\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |      | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$           | 2                   | 10   |      | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 29. Electrical characteristics for LF120AB**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 15\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 11.76               |      | 12.24 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$   |                     |      | 16    | V             |
| $I_O$        | Output current limit      |   |                     | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 13\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 12   | 60    | mV            |
| $\Delta V_O$ | 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            |
|              |                           | $V_I = 13.3\text{ to }16\text{ V}$ ,<br>$I_O = 500\text{ mA}$                               |                     |      | 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   |       | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   |                     |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   | 2                   |      |       | V             |
| $I_I$        | Control input current     | $V_I = 13\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$           | 2                   | 10   |       | $\mu\text{F}$ |

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

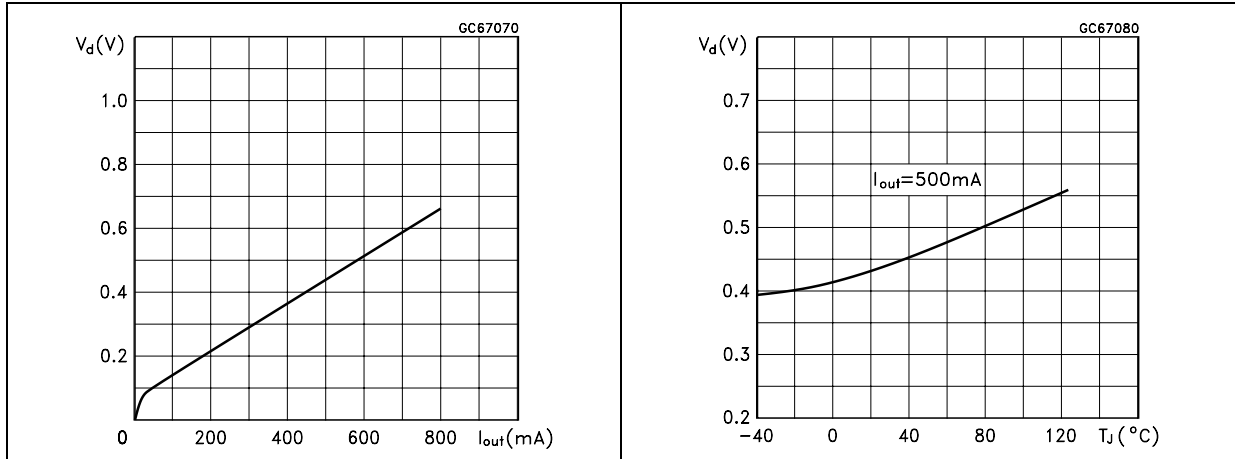
**Table 30. Electrical characteristics for LF120C**

| 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             |
|              |                           | $I_O = 50\text{ mA}$ , $V_I = 14\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$ | 11.52               |      | 12.48 |               |
| $V_I$        | Operating input voltage   | $I_O = 500\text{ mA}$   |                     |      | 16    | V             |
| $I_O$        | Output current limit      |   |                     | 1    |       | A             |
| $\Delta V_O$ | Line regulation           | $V_I = 13\text{ to }16\text{ V}$ , $I_O = 5\text{ mA}$                                      |                     | 12   | 60    | mV            |
| $\Delta V_O$ | 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            |
|              |                           | $V_I = 13.3\text{ to }16\text{ V}$ ,<br>$I_O = 500\text{ mA}$                               |                     |      | 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   |       | $\mu\text{V}$ |
| $V_d$        | 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   | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   |                     |      | 0.8   | V             |
| $V_{IH}$     | Control input logic high  | $T_a = -40\text{ to }125\text{ }^\circ\text{C}$   | 2                   |      |       | V             |
| $I_I$        | Control input current     | $V_I = 13\text{ V}$ , $V_C = 6\text{ V}$  |                     | 10   |       | $\mu\text{A}$ |
| $C_O$        | Output bypass capacitance | $\text{ESR} = 0.1\text{ to }10\text{ }\Omega$ , $I_O = 0\text{ to }500\text{ mA}$           | 2                   | 10   |       | $\mu\text{F}$ |

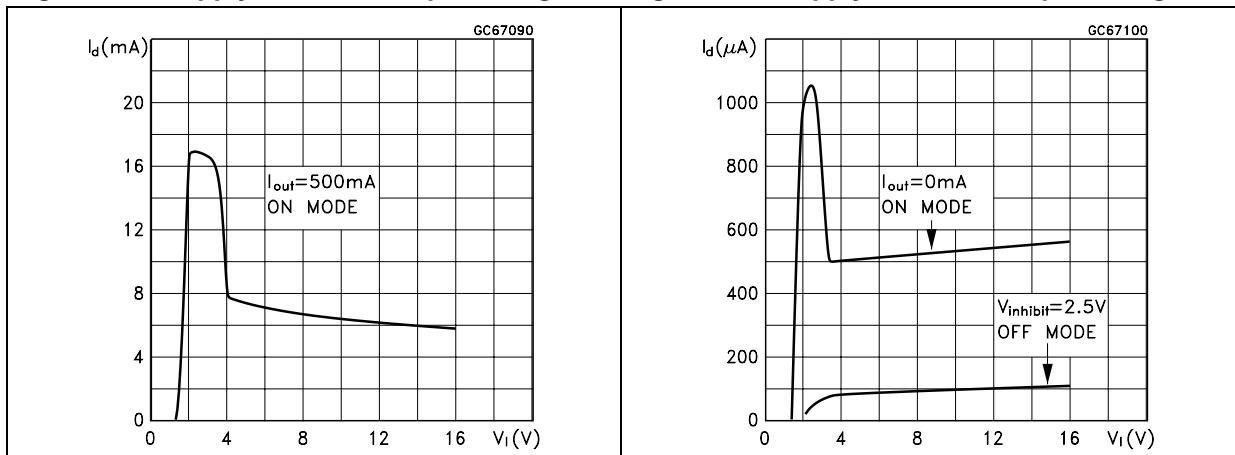
## 5 Typical performance characteristics

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

**Figure 4. Dropout voltage vs. output current**   **Figure 5. Dropout voltage vs. temperature**



**Figure 6. Supply current vs. input voltage**   **Figure 7. Supply current vs. input voltage**



**Figure 8. Short circuit current vs. input voltage**   **Figure 9. Supply current vs. temperature**

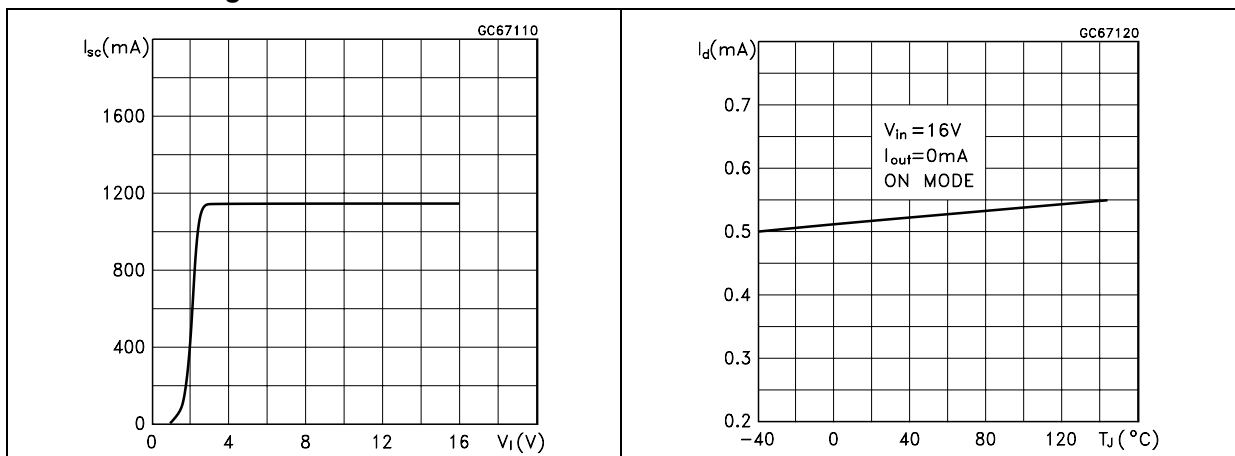


Figure 10. Logic controlled precision 3.3 / 5.0 V selectable output

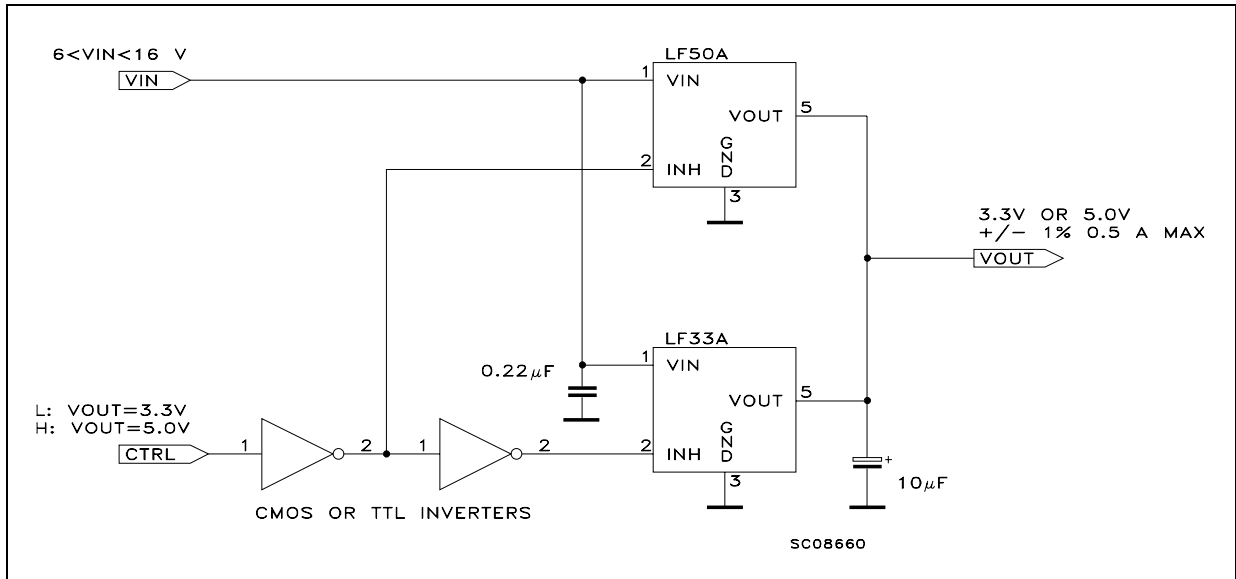


Figure 11. Sequential multi-output supply

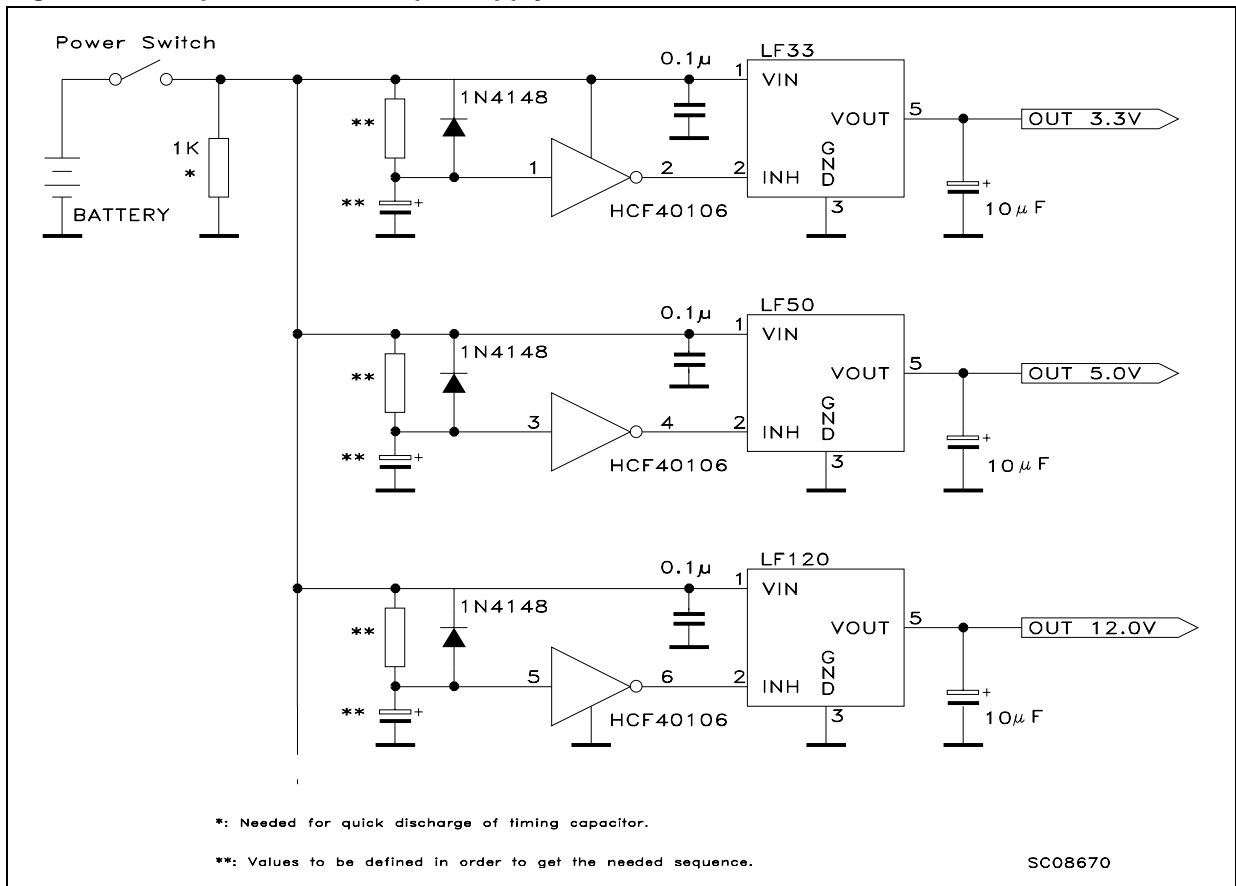


Figure 12. Multiple supply with ON / OFF toggle switch

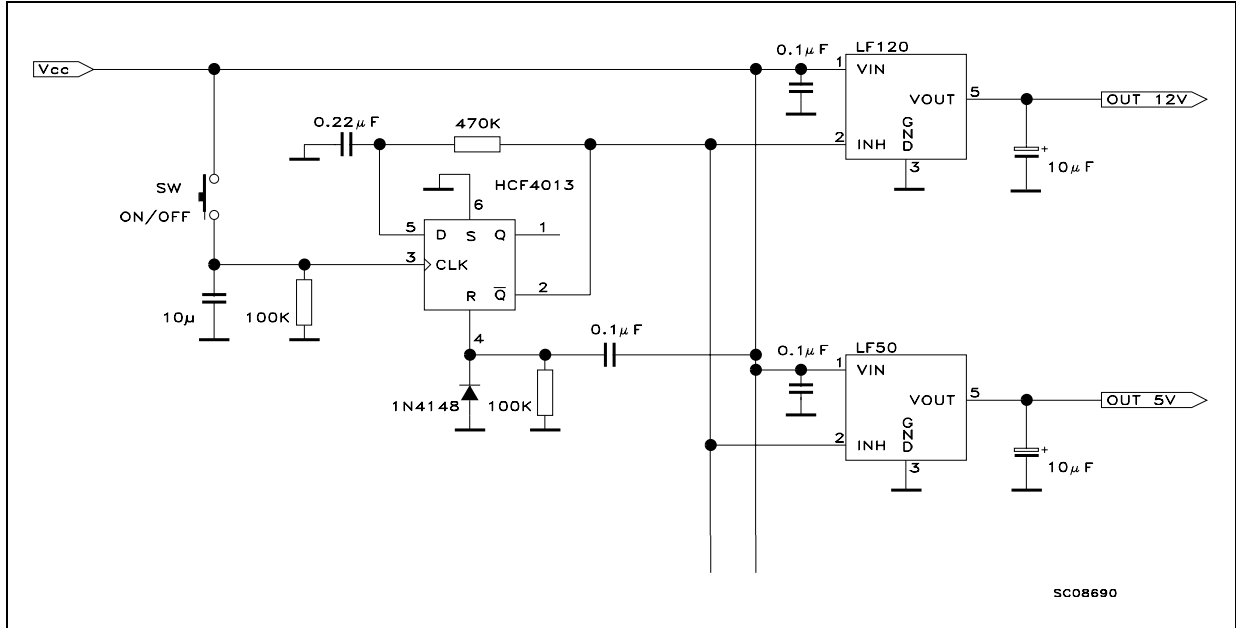


Figure 13. Basic inhibit functions

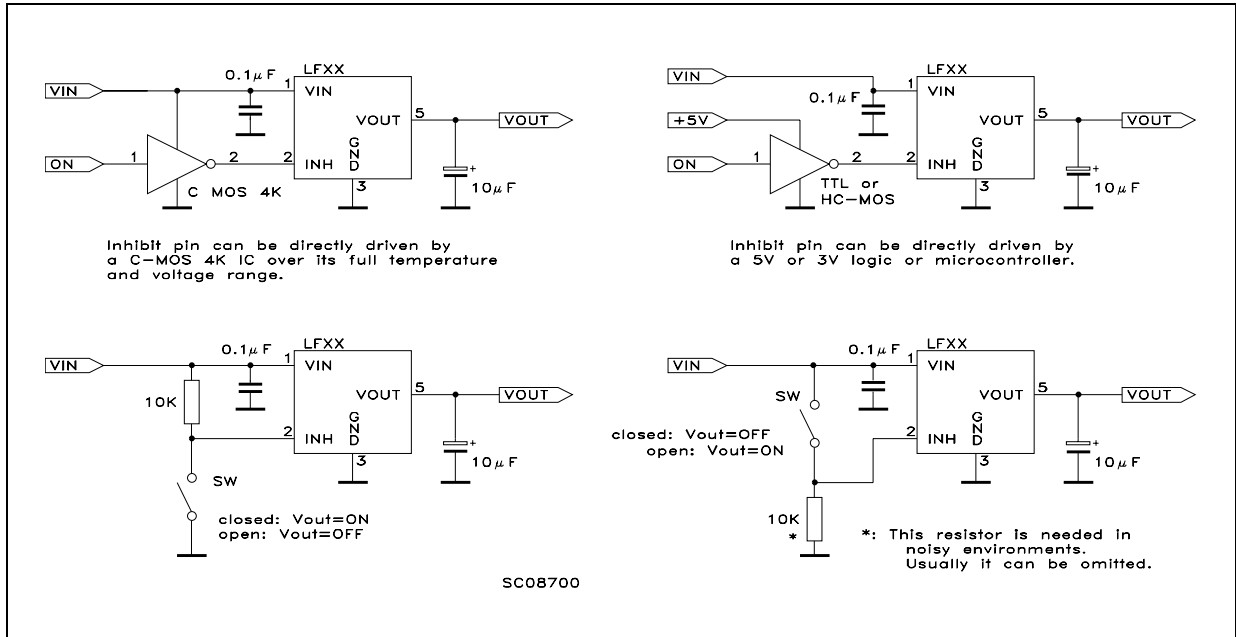


Figure 14. Delayed turn-on

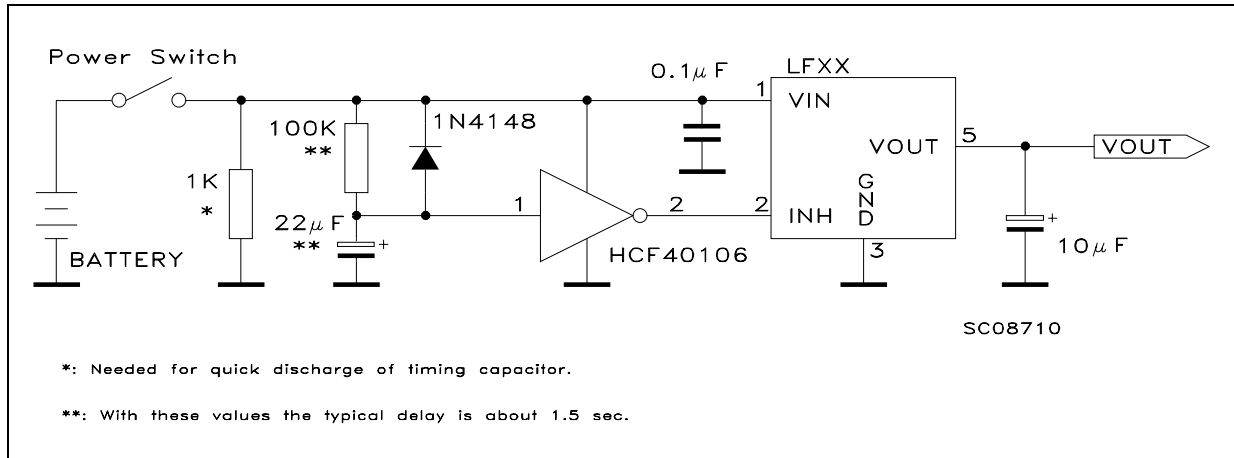
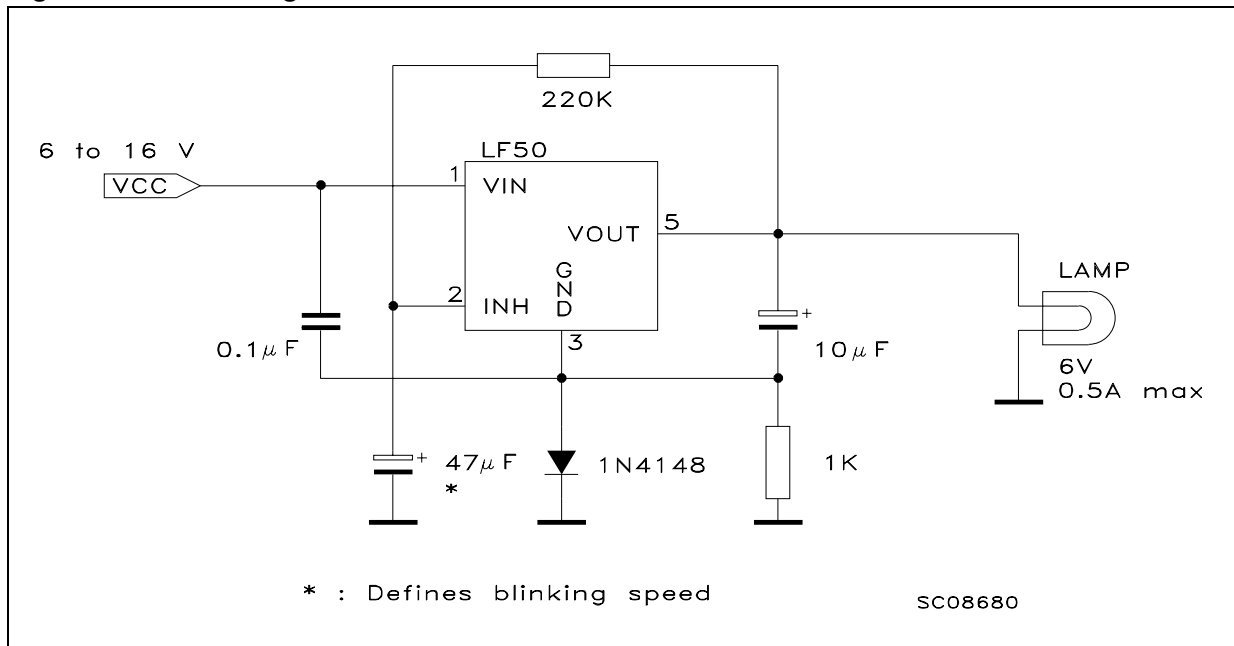


Figure 15. Low voltage bulb blinker



## 6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

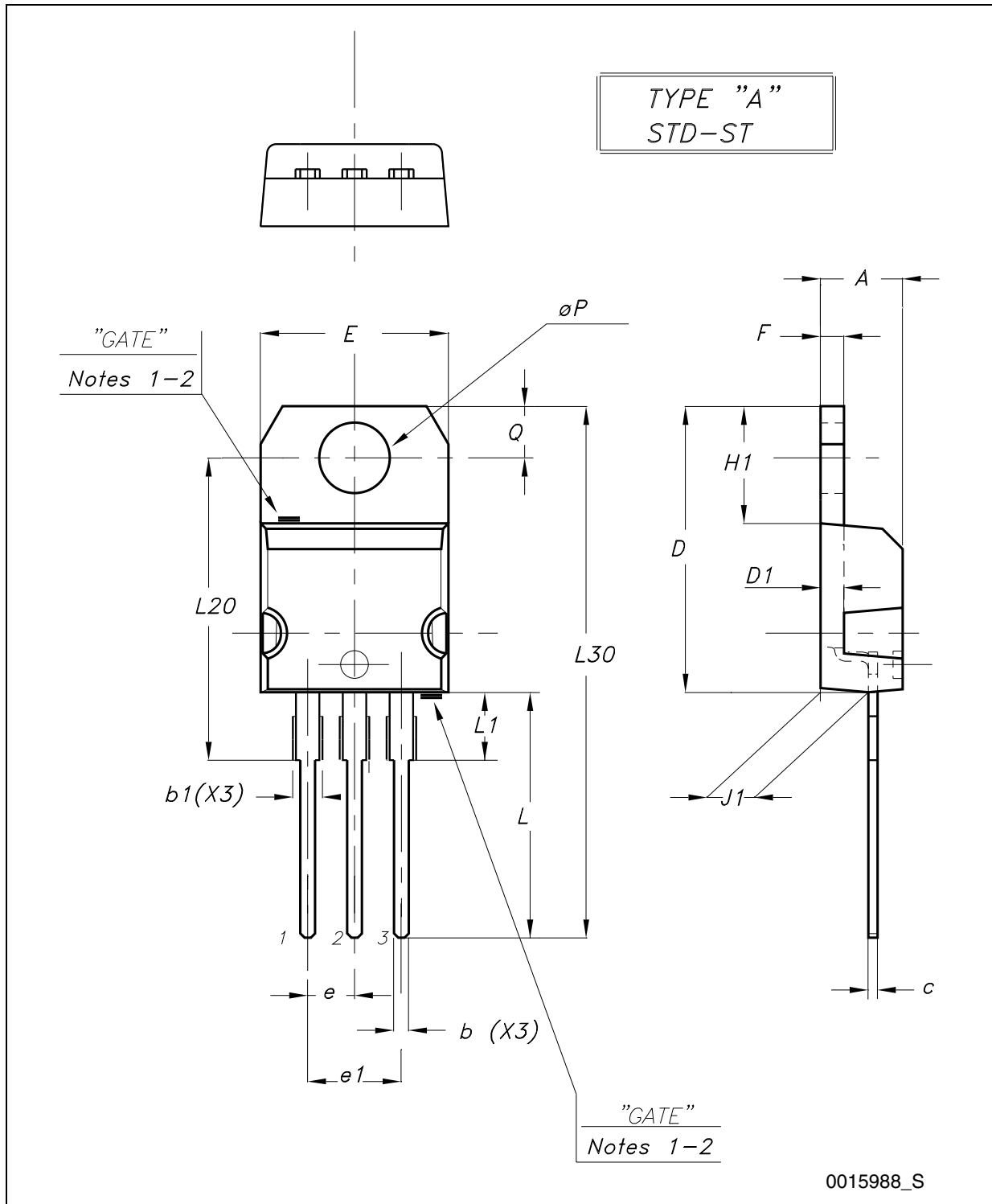
**Table 31. TO-220 mechanical data**

| Dim. | Type STD - ST Dual Gauge |       |       | Type STD - ST Single Gauge |       |       |
|------|--------------------------|-------|-------|----------------------------|-------|-------|
|      | mm.                      |       |       | mm.                        |       |       |
|      | Min.                     | Typ.  | Max.  | Min.                       | Typ.  | Max.  |
| A    | 4.40                     |       | 4.60  | 4.40                       |       | 4.60  |
| b    | 0.61                     |       | 0.88  | 0.61                       |       | 0.88  |
| b1   | 1.14                     |       | 1.70  | 1.14                       |       | 1.70  |
| c    | 0.48                     |       | 0.70  | 0.48                       |       | 0.70  |
| D    | 15.25                    |       | 15.75 | 15.25                      |       | 15.75 |
| D1   |                          | 1.27  |       |                            |       |       |
| E    | 10.00                    |       | 10.40 | 10.00                      |       | 10.40 |
| e    | 2.40                     |       | 2.70  | 2.40                       |       | 2.70  |
| e1   | 4.95                     |       | 5.15  | 4.95                       |       | 5.15  |
| F    | 1.23                     |       | 1.32  | 0.51                       |       | 0.60  |
| H1   | 6.20                     |       | 6.60  | 6.20                       |       | 6.60  |
| J1   | 2.40                     |       | 2.72  | 2.40                       |       | 2.72  |
| L    | 13.00                    |       | 14.00 | 13.00                      |       | 14.00 |
| L1   | 3.50                     |       | 3.93  | 3.50                       |       | 3.93  |
| L20  |                          | 16.40 |       |                            | 16.40 |       |
| L30  |                          | 28.90 |       |                            | 28.90 |       |
| ØP   | 3.75                     |       | 3.85  | 3.75                       |       | 3.85  |
| Q    | 2.65                     |       | 2.95  | 2.65                       |       | 2.95  |

*In spite of some difference in tolerances, the packages are compatible.*



Figure 16. Drawing dimension TO-220 (type STD-ST Dual Gauge)



- Note: 1 Maximum resin gate protrusion: 0.5 mm.  
 2 Resin gate position is accepted in each of the two positions shown on the drawing, or their symmetrical.

Figure 17. Drawing dimension TO-220 (type STD-ST Single Gauge)

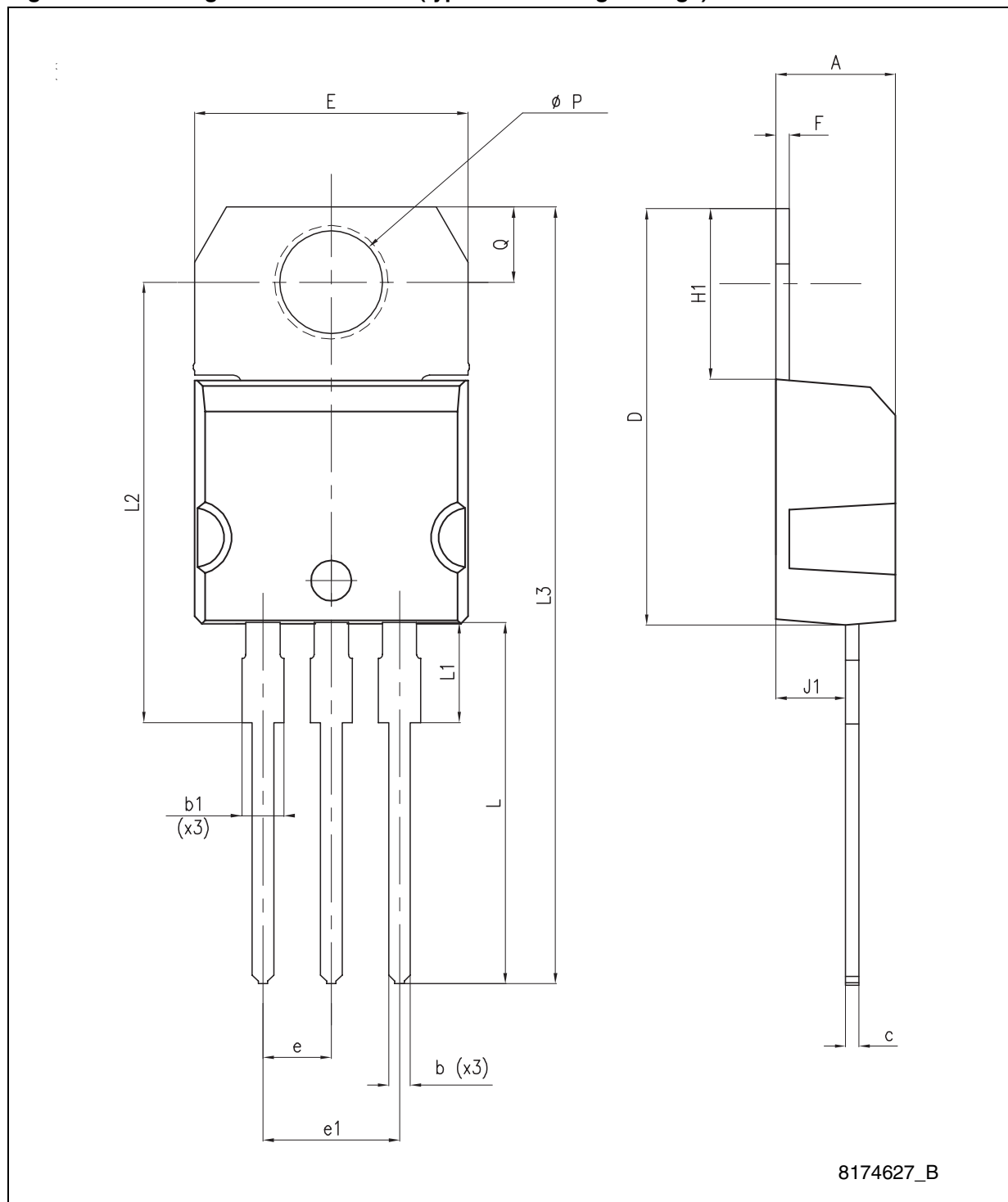


Figure 18. Drawing dimension tube for TO-220 Dual Gauge (mm.)

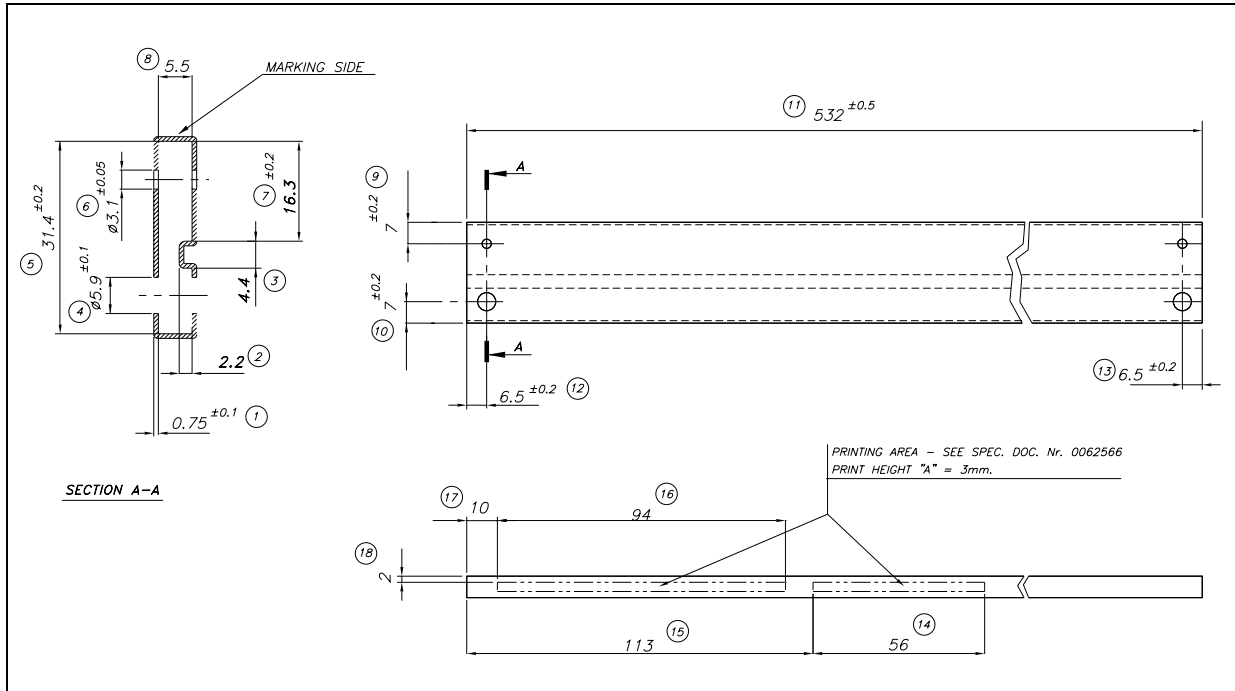
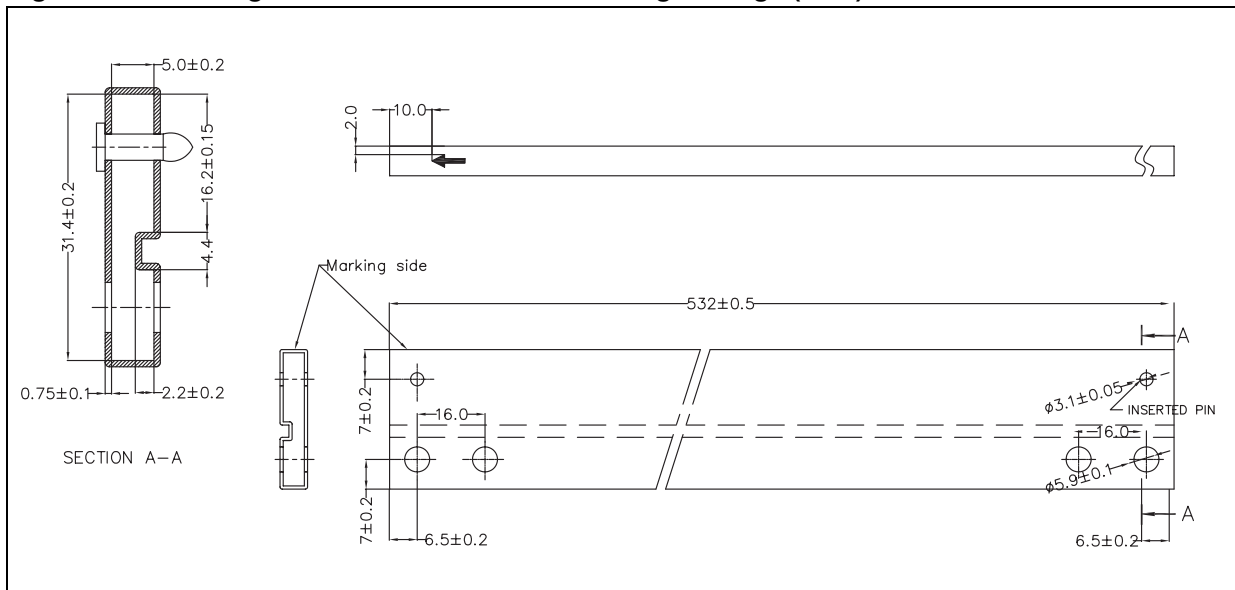
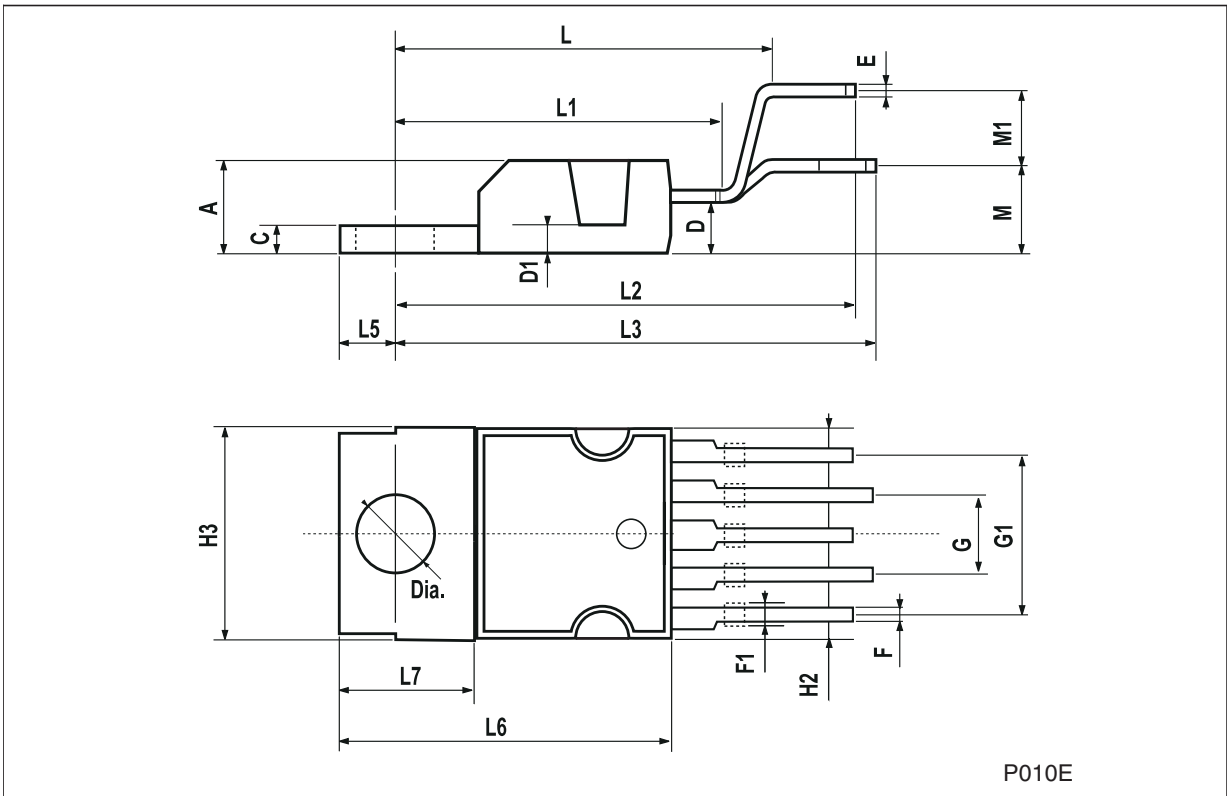


Figure 19. Drawing dimension tube for TO-220 Single Gauge (mm.)



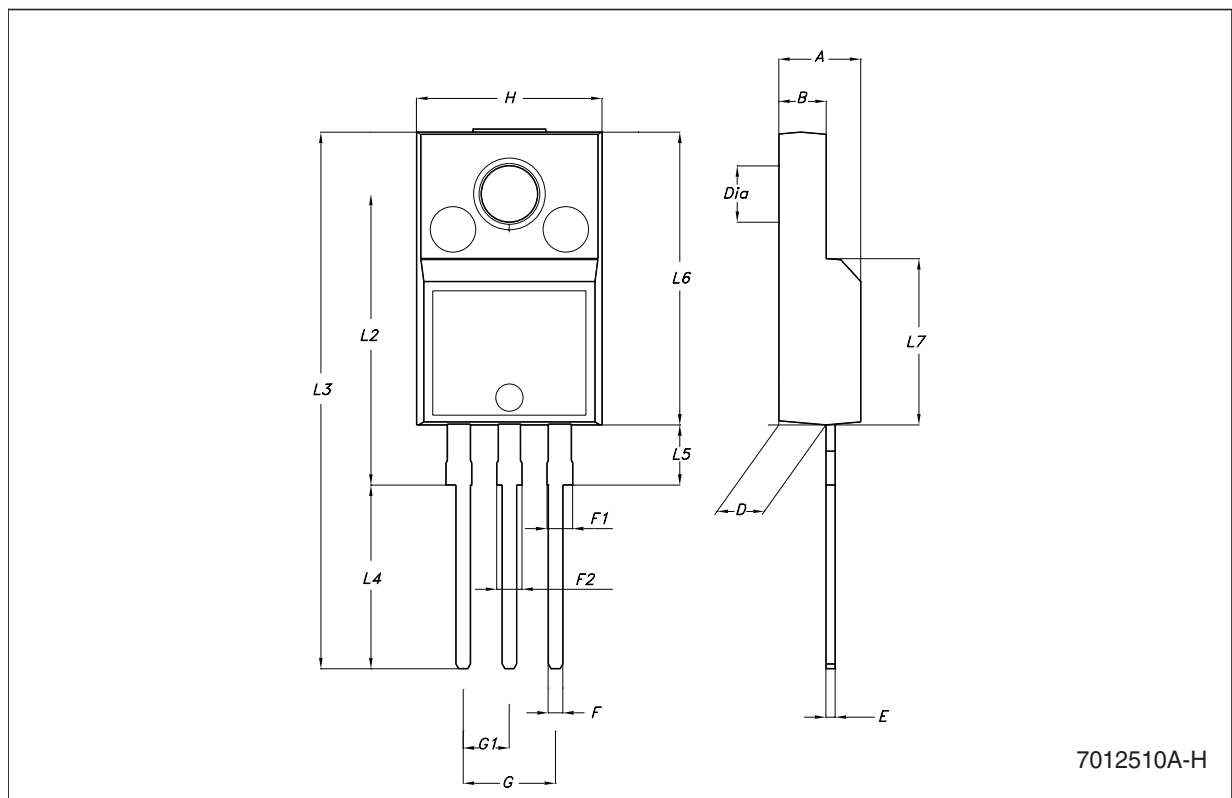
**PENTAWATT (Vertical) mechanical data**

| 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 |



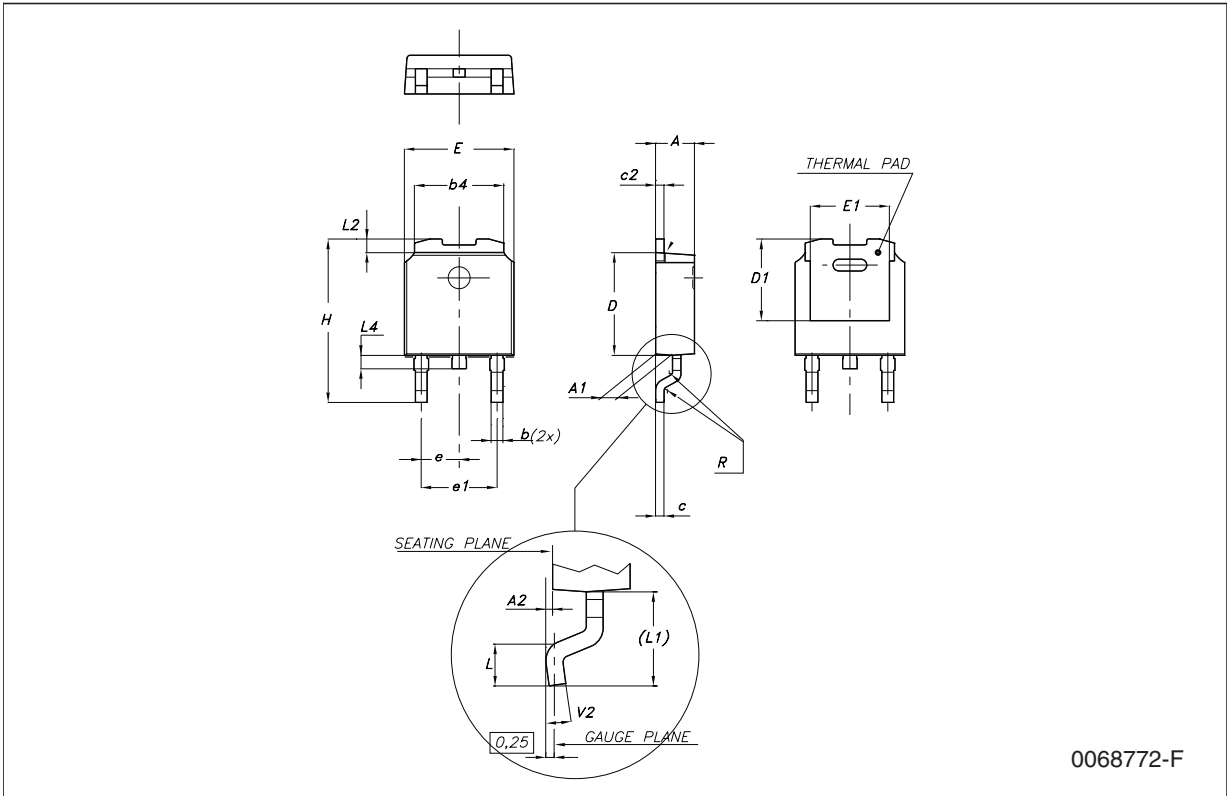
**TO-220FP mechanical data**

| 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**

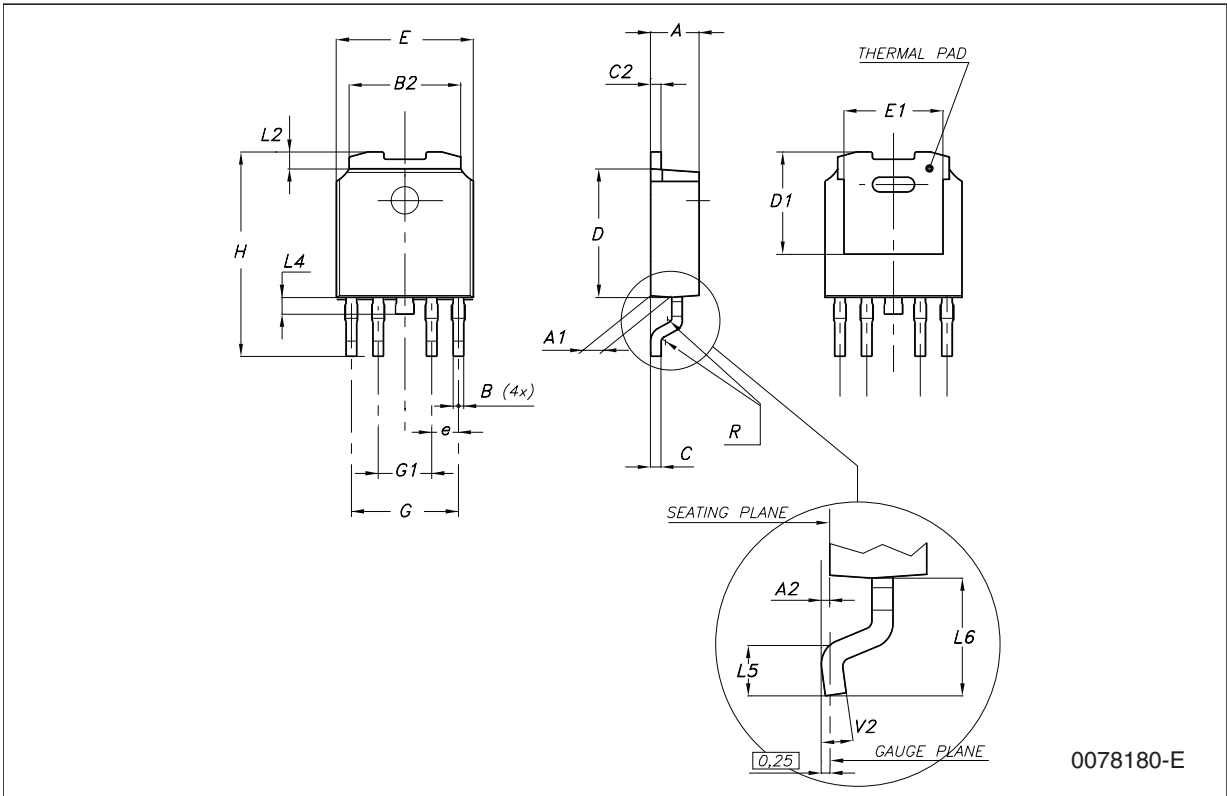
| Dim. | mm.  |      |      | inch. |       |       |
|------|------|------|------|-------|-------|-------|
|      | Min. | Typ. | Max. | Min.  | Typ.  | Max.  |
| A    | 2.2  |      | 2.4  | 0.086 |       | 0.094 |
| A1   | 0.9  |      | 1.1  | 0.035 |       | 0.043 |
| A2   | 0.03 |      | 0.23 | 0.001 |       | 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**

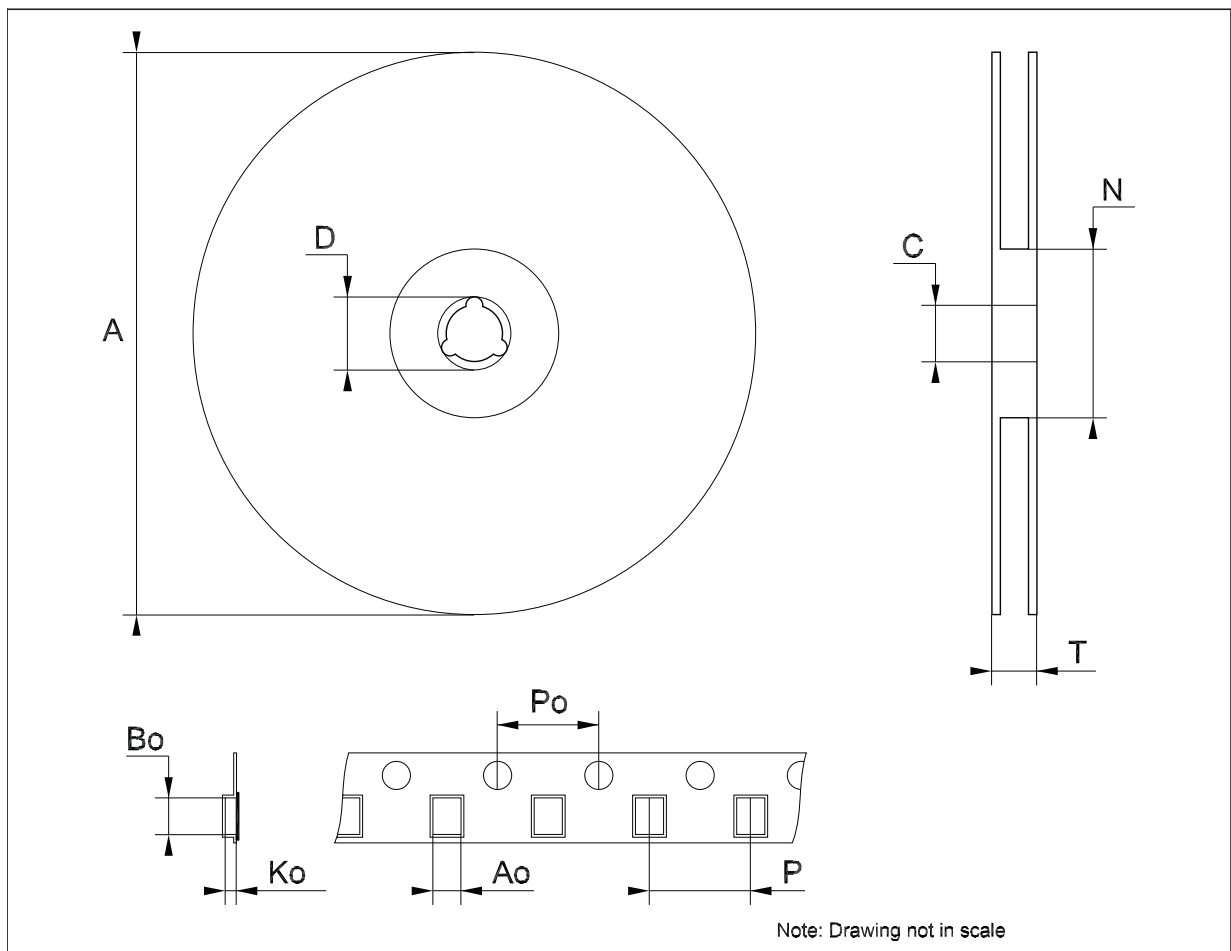
| Dim. | mm.  |      |      | inch. |       |       |
|------|------|------|------|-------|-------|-------|
|      | Min. | Typ. | Max. | Min.  | Typ.  | Max.  |
| A    | 2.2  |      | 2.4  | 0.086 |       | 0.094 |
| A1   | 0.9  |      | 1.1  | 0.035 |       | 0.043 |
| A2   | 0.03 |      | 0.23 | 0.001 |       | 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  |





## 7 Order codes

**Table 32. Order codes**

| Packages                  |                        |                             |                          |                            | Output voltages |
|---------------------------|------------------------|-----------------------------|--------------------------|----------------------------|-----------------|
| TO-220                    | TO-220FP               | DPAK (tape and reel)        | PPAK                     | PPAK (tape and reel)       |                 |
| LF15ABV <sup>(1)</sup>    | LF15ABP <sup>(1)</sup> | LF15ABDT-TR                 | LF15ABPT <sup>(1)</sup>  |                            | 1.5 V           |
|                           | LF18CP <sup>(1)</sup>  | LF18CDT-TR                  |                          | LF18CPT-TR                 | 1.8 V           |
|                           |                        | LF18CDT-TRY <sup>(2)</sup>  |                          |                            | 1.8 V           |
|                           | LF18ABP <sup>(1)</sup> | LF18ABDT-TR                 |                          | LF18ABPT-TR                | 1.8 V           |
|                           | LF25CP <sup>(1)</sup>  | LF25CDT-TR                  |                          | LF25CPT-TR                 | 2.5 V           |
|                           |                        | LF25CDT-TRY <sup>(2)</sup>  |                          |                            | 2.5 V           |
|                           | LF25ABP <sup>(1)</sup> | LF25ABDT-TR                 | LF25ABPT <sup>(1)</sup>  |                            | 2.5 V           |
|                           |                        | LF25ABDT-TRY <sup>(2)</sup> |                          |                            | 2.5 V           |
| LF33CV                    |                        | LF33CDT-TR                  |                          | LF33CPT-TR                 | 3.3 V           |
| LF33CV-DG <sup>(3)</sup>  |                        | LF33CDT-TRY <sup>(2)</sup>  |                          | LF33CPT-TRY <sup>(2)</sup> | 3.3 V           |
| LF33ABV                   |                        | LF33ABDT-TR                 |                          |                            | 3.3 V           |
| LF33ABV-DG <sup>(3)</sup> |                        |                             |                          |                            | 3.3 V           |
| LF50CV                    |                        | LF50CDT-TR                  |                          | LF50CPT-TR                 | 5 V             |
|                           |                        | LF50CDT-TRY <sup>(2)</sup>  |                          | LF50CPT-TRY <sup>(2)</sup> | 5 V             |
| LF50ABV                   | LF50ABP                | LF50ABDT-TR                 |                          | LF50ABPT-TR                | 5 V             |
| LF50ABV-DG <sup>(3)</sup> |                        |                             |                          |                            | 5 V             |
|                           |                        | LF50ABDT-TRY <sup>(2)</sup> |                          |                            | 5 V             |
| LF60CV                    | LF60CP <sup>(1)</sup>  | LF60CDT-TR                  |                          | LF60CPT-TR <sup>(1)</sup>  | 6 V             |
| LF60ABV                   | LF60ABP <sup>(1)</sup> | LF60ABDT-TR                 | LF60ABPT <sup>(1)</sup>  | LF60ABPT-TR <sup>(1)</sup> | 6 V             |
| LF80CV                    | LF80CP <sup>(1)</sup>  | LF80CDT-TR                  |                          |                            | 8 V             |
|                           |                        | LF80CDT-TRY <sup>(2)</sup>  |                          |                            | 8 V             |
| LF80ABV                   | LF80ABP <sup>(1)</sup> | LF80ABDT-TR                 |                          |                            | 8 V             |
|                           |                        | LF85CDT-TR                  |                          | LF85CPT-TR                 | 8.5 V           |
|                           |                        | LF85CDT-TRY <sup>(2)</sup>  |                          | LF85CPT-TRY <sup>(2)</sup> | 8.5 V           |
| LF90CV                    | LF90CP <sup>(1)</sup>  |                             |                          | LF90CPT-TR                 | 9 V             |
|                           | LF120CP <sup>(1)</sup> | LF120CDT-TR                 |                          |                            | 12 V            |
| LF120ABV                  |                        | LF120ABDT-TR                | LF120ABPT <sup>(1)</sup> |                            | 12 V            |

1. Available on request.

2. Automotive Grade products.

3. TO-220 Dual Gauge frame.

## 8 Revision history

**Table 33. Document revision history**

| Date        | Revision | Changes   |
|-------------|----------|---|
| 21-Jun-2004 | 14       | Document updating.  |
| 24-May-2006 | 15       | Order codes updated.  |
| 02-Apr-2007 | 16       | Order codes updated.  |
| 14-May-2007 | 17       | Order codes updated.  |
| 26-Jul-2007 | 18       | Add <a href="#">Table 1</a> in cover page.  |
| 26-Nov-2007 | 19       | Modified: <a href="#">Table 32</a> .  |
| 16-Jan-2008 | 20       | Added new order codes for Automotive grade products see <a href="#">Table 32 on page 48</a> .   |
| 12-Feb-2008 | 21       | Modified: <a href="#">Table 32 on page 48</a> .   |
| 10-Jul-2008 | 22       | Modified: <a href="#">Table 32 on page 48</a> .   |
| 05-May-2010 | 23       | Added: <a href="#">Table 31 on page 39</a> , <a href="#">Figure 16 on page 40</a> , <a href="#">Figure 17 on page 41</a> , <a href="#">Figure 18</a> and <a href="#">Figure 19 on page 42</a> . |
| 16-Nov-2010 | 24       | Modified: $R_{thJC}$ value for TO-220 <a href="#">Table 3 on page 7</a> .   |
| 10-Feb-2012 | 25       | Added: order code LF33CV-DG and LF33ABV-DG <a href="#">Table 32 on page 48</a> .  |
| 09-Mar-2012 | 26       | Added: order code LF50ABV-DG <a href="#">Table 32 on page 48</a> .  |

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