

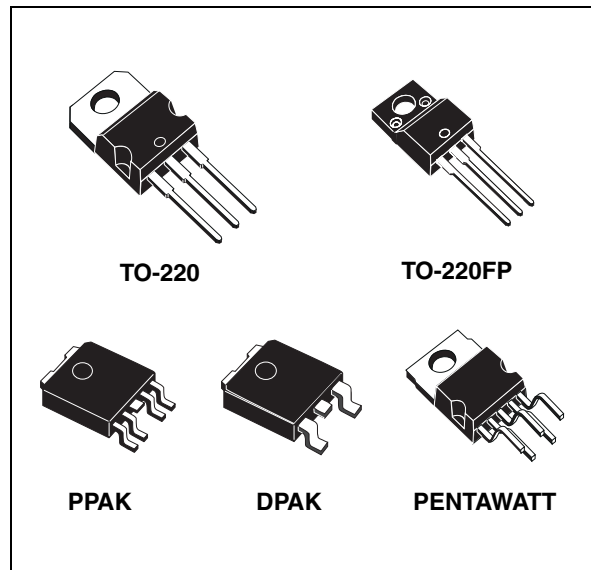
## Very low drop voltage regulators with inhibit

### 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	LF90C	LF120AB
LF18C	LF25AB	LF50C	LF60AB	LF85C	LF90AB	
LF18AB	LF33C	LF50AB	LF80C	LF85AB	LF120C	

---

## Contents

1	Diagram .....	5
2	Pin configuration .....	6
3	Maximum ratings .....	7
4	Electrical characteristics .....	8
5	Typical performance characteristics .....	35
6	Package mechanical data .....	39
7	Order codes .....	48
8	Revision history .....	49

## List of tables

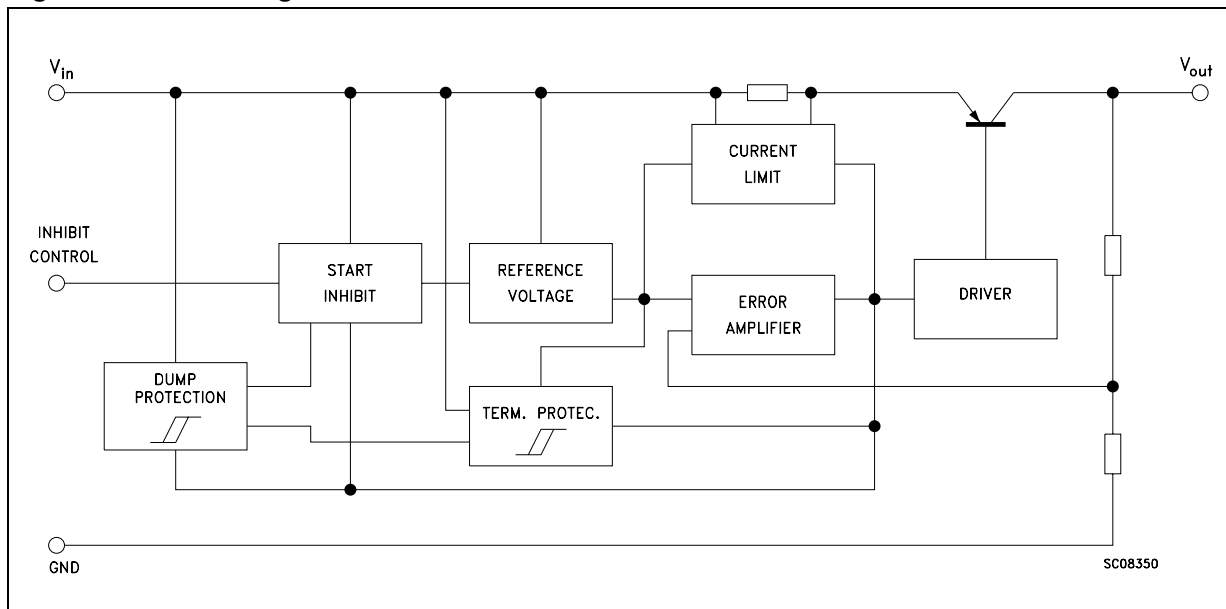
Table 1.	Device summary . . . . .	1
Table 2.	Absolute maximum ratings . . . . .	7
Table 3.	Thermal data . . . . .	7
Table 4.	Electrical characteristics for LF15AB . . . . .	8
Table 5.	Electrical characteristics for LF18AB . . . . .	9
Table 6.	Electrical characteristics for LF18C . . . . .	10
Table 7.	Electrical characteristics for LF18CDT-TRY (Automotive Grade). . . . .	11
Table 8.	Electrical characteristics for LF25AB . . . . .	12
Table 9.	Electrical characteristics for LF25ABDT-TRY (Automotive Grade). . . . .	13
Table 10.	Electrical characteristics for LF25C . . . . .	14
Table 11.	Electrical characteristics for LF25CDT-TRY (Automotive Grade). . . . .	15
Table 12.	Electrical characteristics for LF33AB . . . . .	16
Table 13.	Electrical characteristics for LF33C . . . . .	17
Table 14.	Electrical characteristics for LF33CDT-TRY and LF33CPT-TRY (Automotive Grade). . . . .	18
Table 15.	Electrical characteristics for LF50AB . . . . .	19
Table 16.	Electrical characteristics for LF50ABDT-TRY (Automotive Grade). . . . .	20
Table 17.	Electrical characteristics for LF50C . . . . .	21
Table 18.	Electrical characteristics for LF50CDT-TRY and LF50CPT-TRY (Automotive Grade). . . . .	22
Table 19.	Electrical characteristics for LF60AB . . . . .	23
Table 20.	Electrical characteristics for LF60C . . . . .	24
Table 21.	Electrical characteristics for LF80AB . . . . .	25
Table 22.	Electrical characteristics for LF80C . . . . .	26
Table 23.	Electrical characteristics for LF80CDT-TRY (Automotive Grade). . . . .	27
Table 24.	Electrical characteristics for LF85AB . . . . .	28
Table 25.	Electrical characteristics for LF85C . . . . .	29
Table 26.	Electrical characteristics for LF85CDT-TRY and LF85CPT-TRY (Automotive Grade). . . . .	30
Table 27.	Electrical characteristics for LF90AB . . . . .	31
Table 28.	Electrical characteristics for LF90C . . . . .	32
Table 29.	Electrical characteristics for LF120AB . . . . .	33
Table 30.	Electrical characteristics for LF120C . . . . .	34
Table 31.	TO-220 mechanical data . . . . .	39
Table 32.	Order codes . . . . .	48
Table 33.	Document revision history . . . . .	49

## List of figures

Figure 1.	Block diagram . . . . .	5
Figure 2.	Pin connections (top view) . . . . .	6
Figure 3.	Test circuit . . . . .	7
Figure 4.	Dropout voltage vs. output current . . . . .	35
Figure 5.	Dropout voltage vs. temperature . . . . .	35
Figure 6.	Supply current vs. input voltage . . . . .	35
Figure 7.	Supply current vs. input voltage . . . . .	35
Figure 8.	Short circuit current vs. input voltage . . . . .	35
Figure 9.	Supply current vs. temperature. . . . .	35
Figure 10.	Logic controlled precision 3.3 / 5.0 V selectable output . . . . .	36
Figure 11.	Sequential multi-output supply . . . . .	36
Figure 12.	Multiple supply with ON / OFF toggle switch . . . . .	37
Figure 13.	Basic inhibit functions . . . . .	37
Figure 14.	Delayed turn-on . . . . .	38
Figure 15.	Low voltage bulb blinker . . . . .	38
Figure 16.	Drawing dimension TO-220 (type STD-ST Dual Gauge) . . . . .	40
Figure 17.	Drawing dimension TO-220 (type STD-ST Single Gauge) . . . . .	41
Figure 18.	Drawing dimension tube for TO-220 Dual Gauge (mm.) . . . . .	42
Figure 19.	Drawing dimension tube for TO-220 Single Gauge (mm.) . . . . .	42

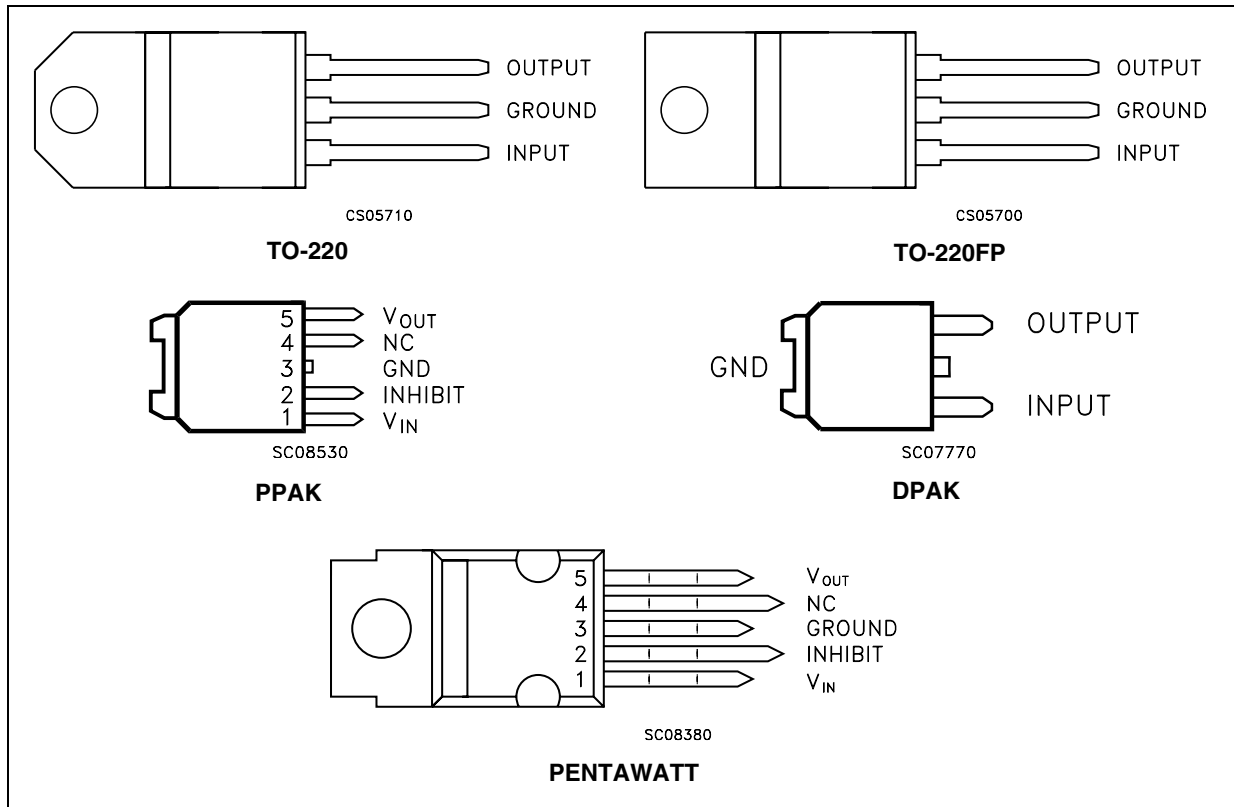
# 1 Diagram

Figure 1. Block diagram



## 2 Pin configuration

Figure 2. Pin connections (top view)



### 3 Maximum ratings

**Table 2. Absolute maximum ratings**

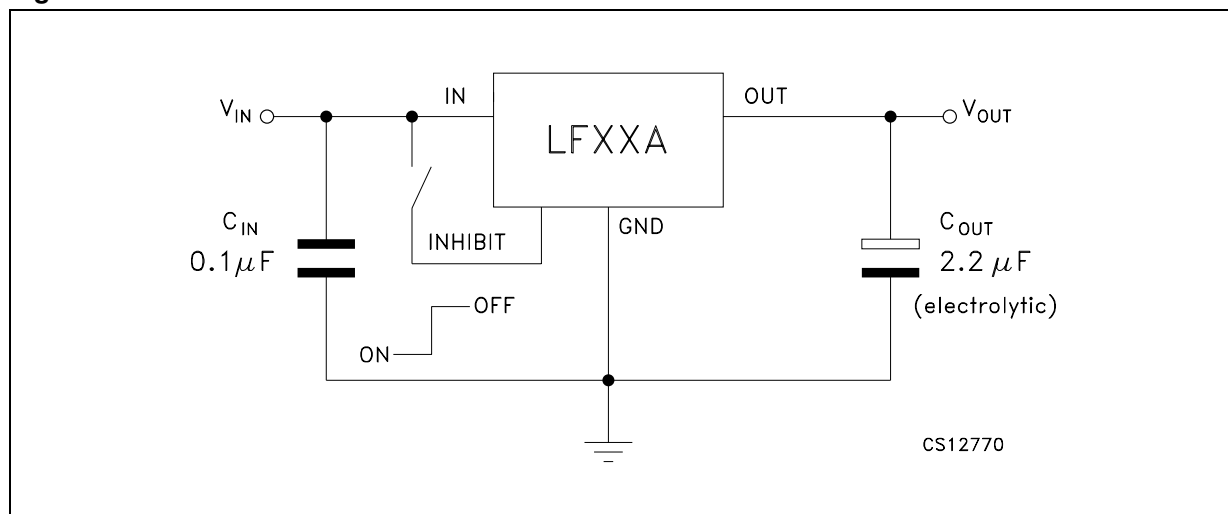
Symbol	Parameter	Value	Unit
$V_I$	DC input voltage	-0.5 to 40 <sup>(1)</sup>	V
$I_O$	Output current	Internally limited	
$P_{TOT}$	Power dissipation	Internally limited	
$T_{STG}$	Storage temperature range	-40 to 150	°C
$T_{OP}$	Operating junction temperature range	-40 to 125	°C

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	
		$I_O = 50\text{ mA}$ , $V_I = 3.5\text{ V}$ , $T_a = -25\text{ to }85^\circ\text{C}$	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	$T_a = -40\text{ to }125^\circ\text{C}$			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 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	$\mu\text{A}$
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}$ , $V_I = 3.5 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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
		$I_O = 50\text{ mA}$ , $V_I = 4.5\text{ V}$ , $T_a = -25\text{ to }85^\circ\text{C}$	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	$T_a = -40\text{ to }125^\circ\text{C}$			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 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	$I_O = 5 \text{ mA}$ , $V_I = 4.5 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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	$\mu\text{A}$
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}$ , $V_I = 4.5 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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	$I_O = 5 \text{ mA}$ , $V_I = 5.3 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  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
		$I_O = 50\text{ mA}$ , $V_I = 7\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$	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	$T_a = -40\text{ to }125\text{ }^\circ\text{C}$			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 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	$I_O = 5 \text{ mA}$ , $V_I = 7 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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 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
		$I_O = 50\ \text{mA}$ , $V_I = 7\ \text{V}$ , $T_a = -25\ \text{to}\ 85^\circ\text{C}$	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	$T_a = -40\ \text{to}\ 125^\circ\text{C}$			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 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	$I_O = 5 \text{ mA}$ , $V_I = 7 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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 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
		$I_O = 50\text{ mA}$ , $V_I = 8\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$	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	$T_a = -40\text{ to }125\text{ }^\circ\text{C}$			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 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
		$I_O = 50\text{ mA}$ , $V_I = 8\text{ V}$ , $T_a = -25\text{ to }85\text{ }^\circ\text{C}$	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	$T_a = -40\text{ to }125\text{ }^\circ\text{C}$			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,  $T_J = 25^\circ\text{C}$ ,  $C_I = 0.1\ \mu\text{F}$ ,  $C_O = 2.2\ \mu\text{F}$  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
		$I_O = 50\ \text{mA}$ , $V_I = 10\ \text{V}$ , $T_a = -25\ \text{to}\ 85^\circ\text{C}$	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	$T_a = -40\ \text{to}\ 125^\circ\text{C}$			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 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	$I_O = 5 \text{ mA}$ , $V_I = 10 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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	$I_O = 5 \text{ mA}$ , $V_I = 10.5 \pm 1 \text{ V}$ $T_a = 25^\circ\text{C}$	$f = 120 \text{ Hz}$	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
		$V_I = 10.3\text{ to }16\text{ V}$ , $I_O = 500\text{ mA}$			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
		$V_I = 10.3\text{ to }16\text{ V}$ , $I_O = 500\text{ mA}$			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,  $T_J = 25\text{ °C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  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
		$I_O = 50\text{ mA}$ , $V_I = 15\text{ V}$ , $T_a = -25\text{ to }85\text{ °C}$	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
		$V_I = 13.3\text{ to }16\text{ V}$ , $I_O = 500\text{ mA}$			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	$T_a = -40\text{ to }125\text{ °C}$			0.8	V
$V_{IH}$	Control input logic high	$T_a = -40\text{ to }125\text{ °C}$	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.

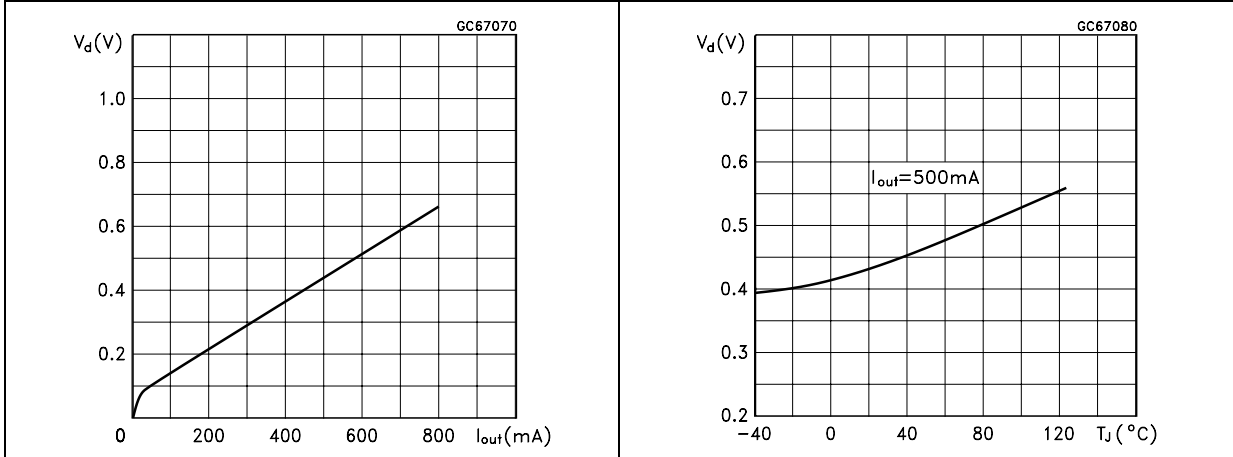
**Table 30. Electrical characteristics for LF120C**

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
		$V_I = 13.3\text{ to }16\text{ V}$ , $I_O = 500\text{ mA}$			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		$\mu\text{F}$

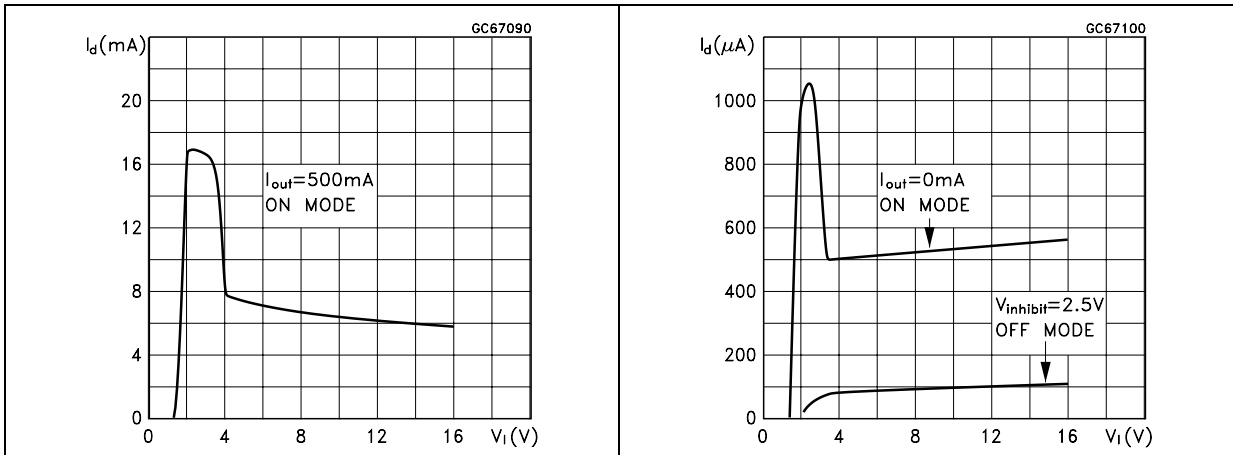
## 5 Typical performance characteristics

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**

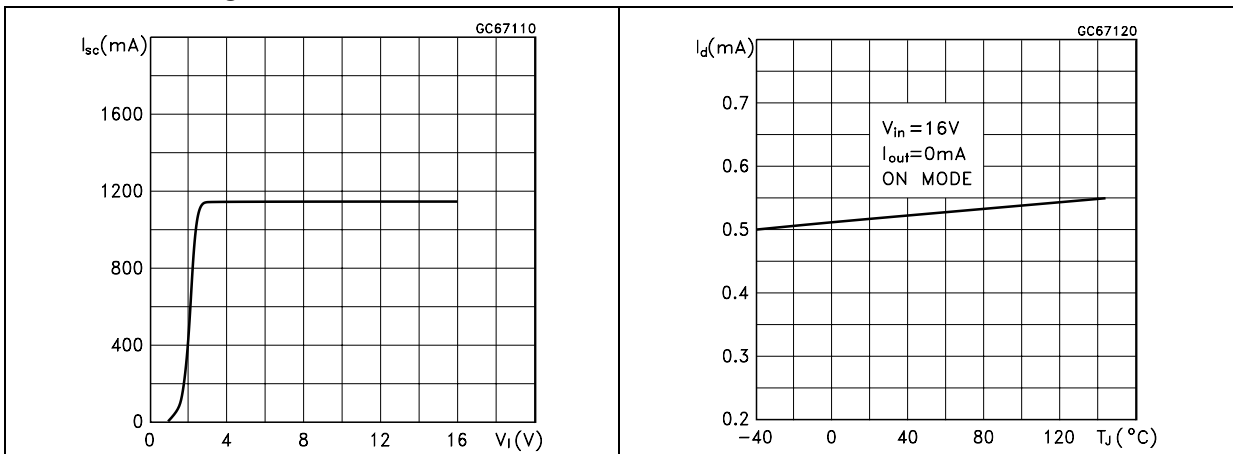


Figure 10. Logic controlled precision 3.3 / 5.0 V selectable output

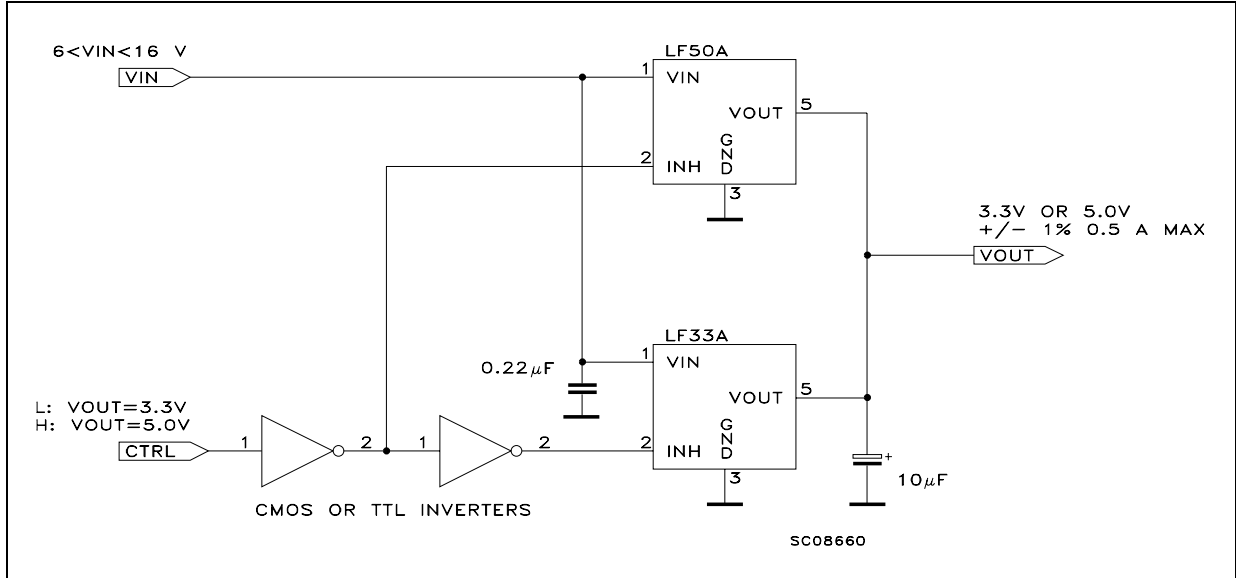


Figure 11. Sequential multi-output supply

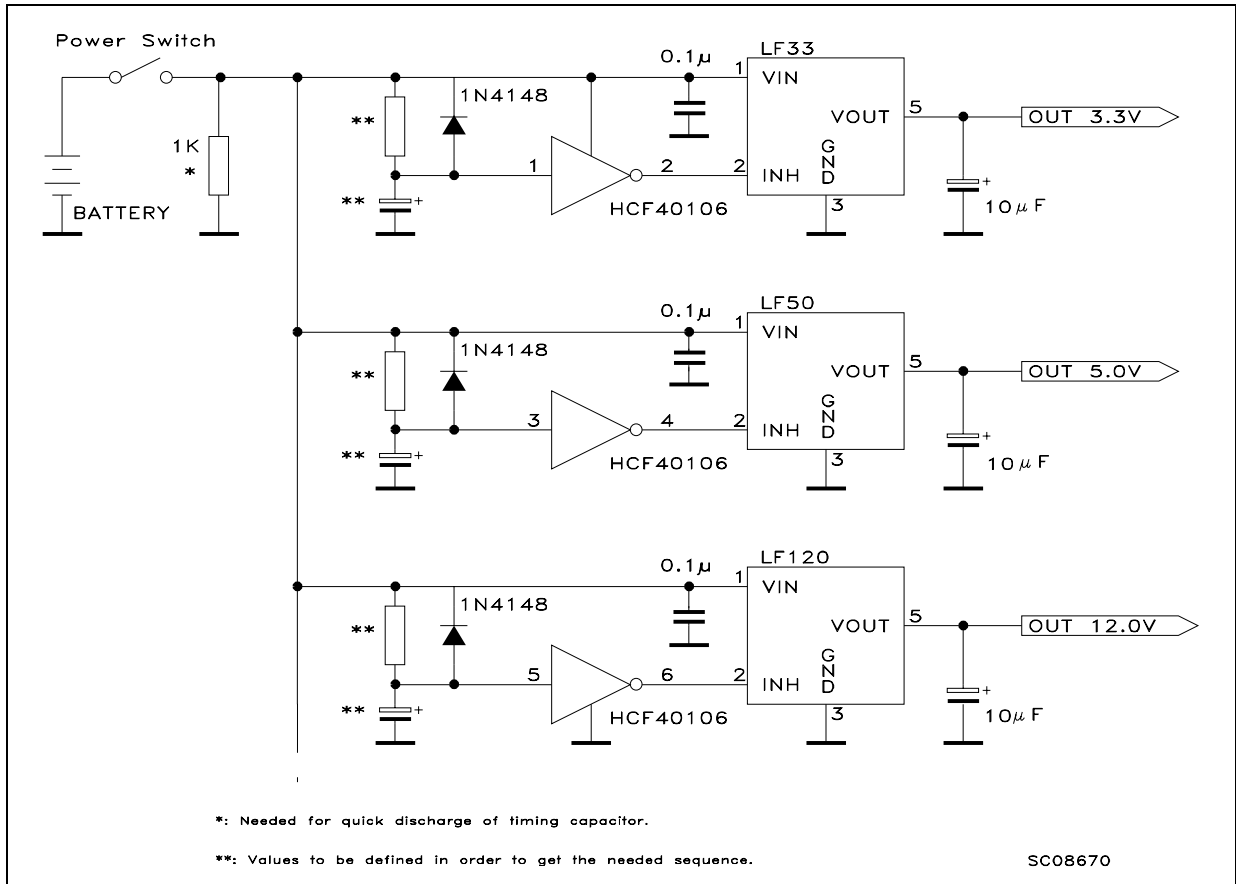


Figure 12. Multiple supply with ON / OFF toggle switch

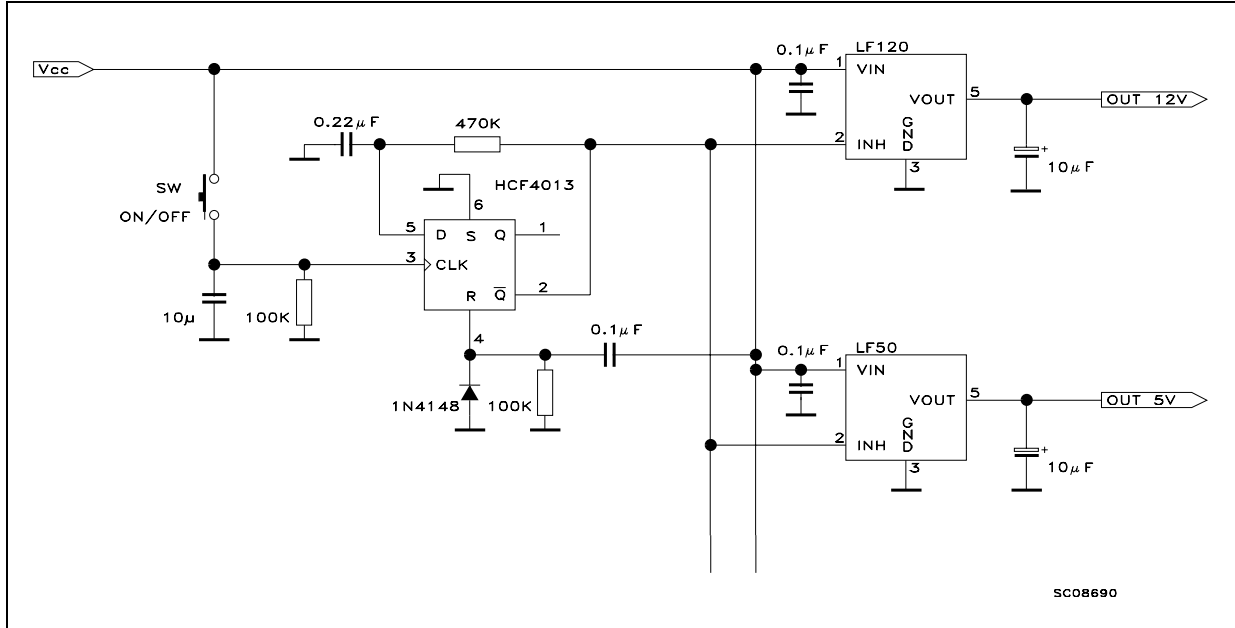


Figure 13. Basic inhibit functions

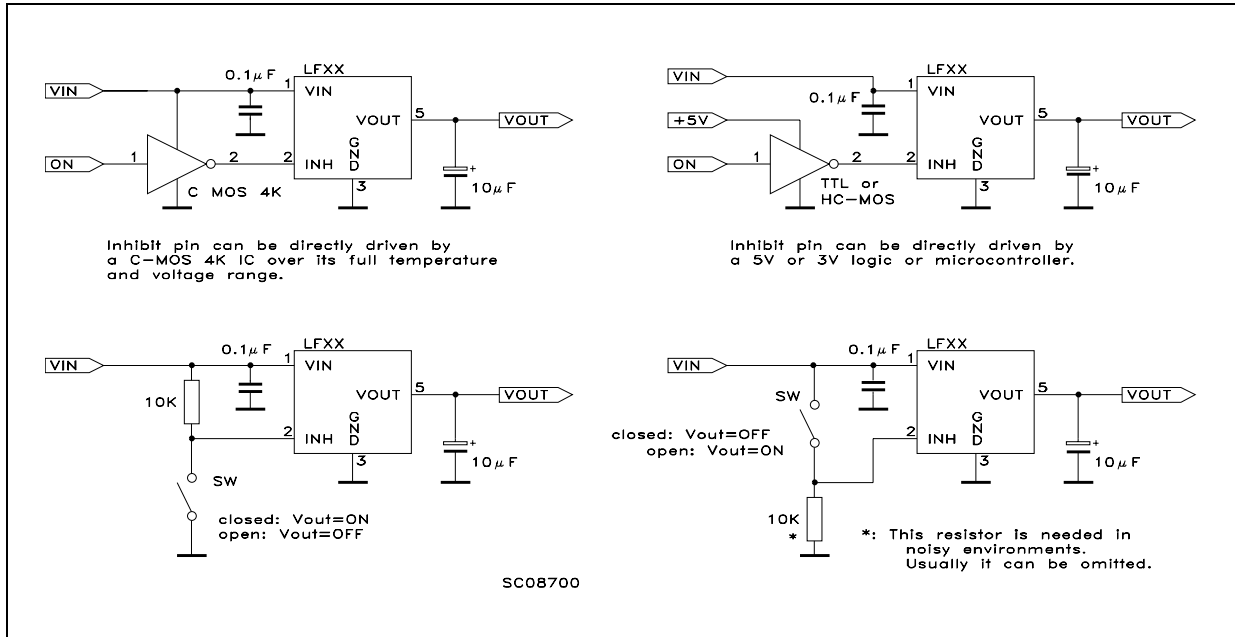


Figure 14. Delayed turn-on

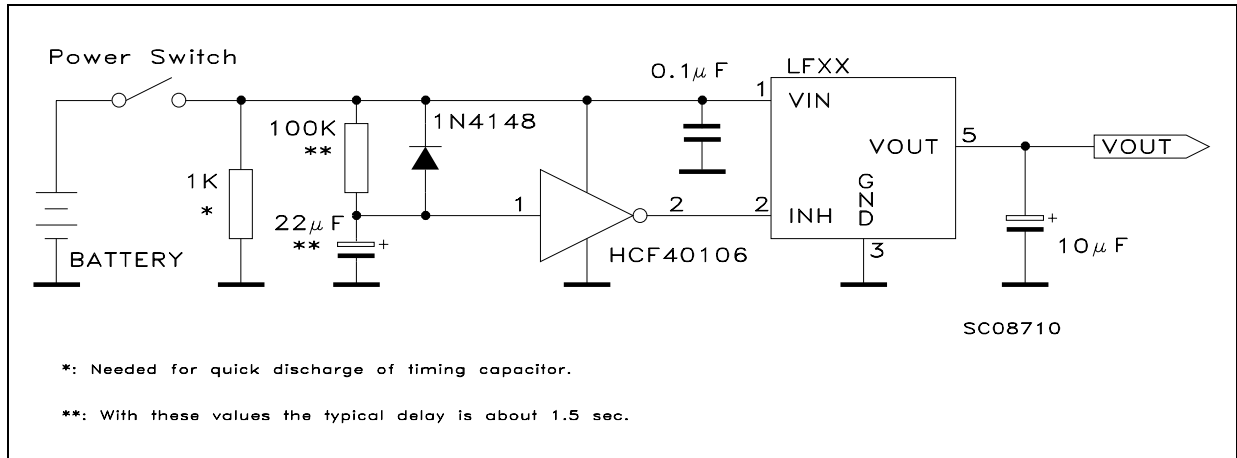
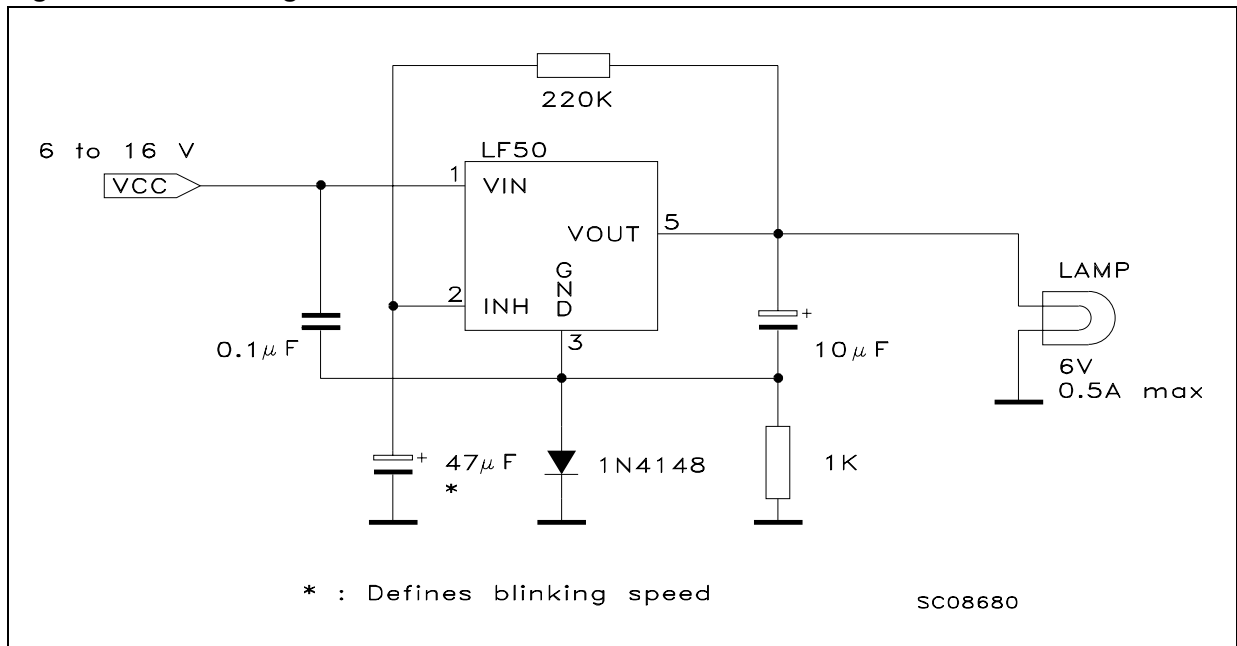


Figure 15. Low voltage bulb blinker



## 6 Package mechanical data

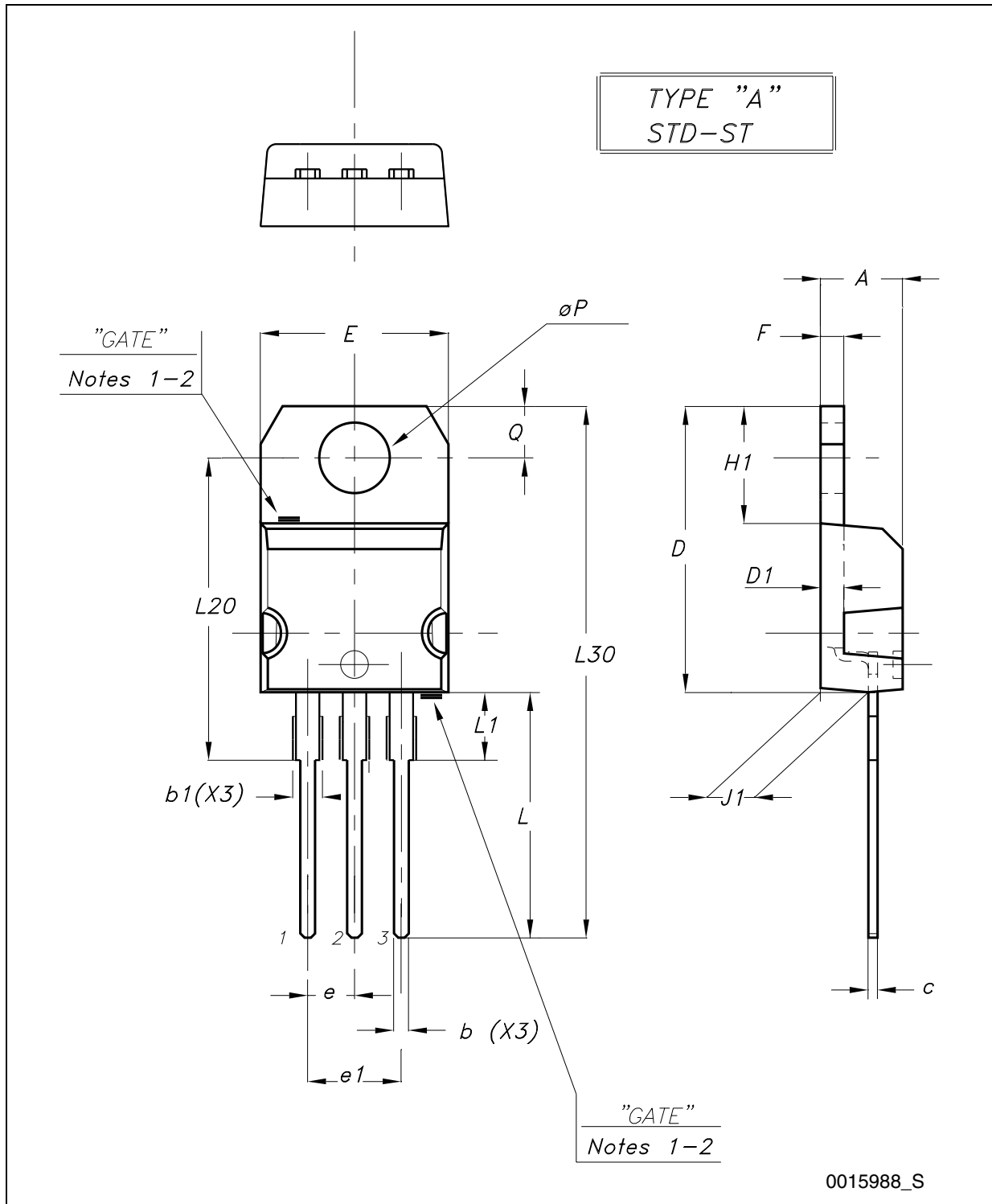
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**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)



0015988\_S

- 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)

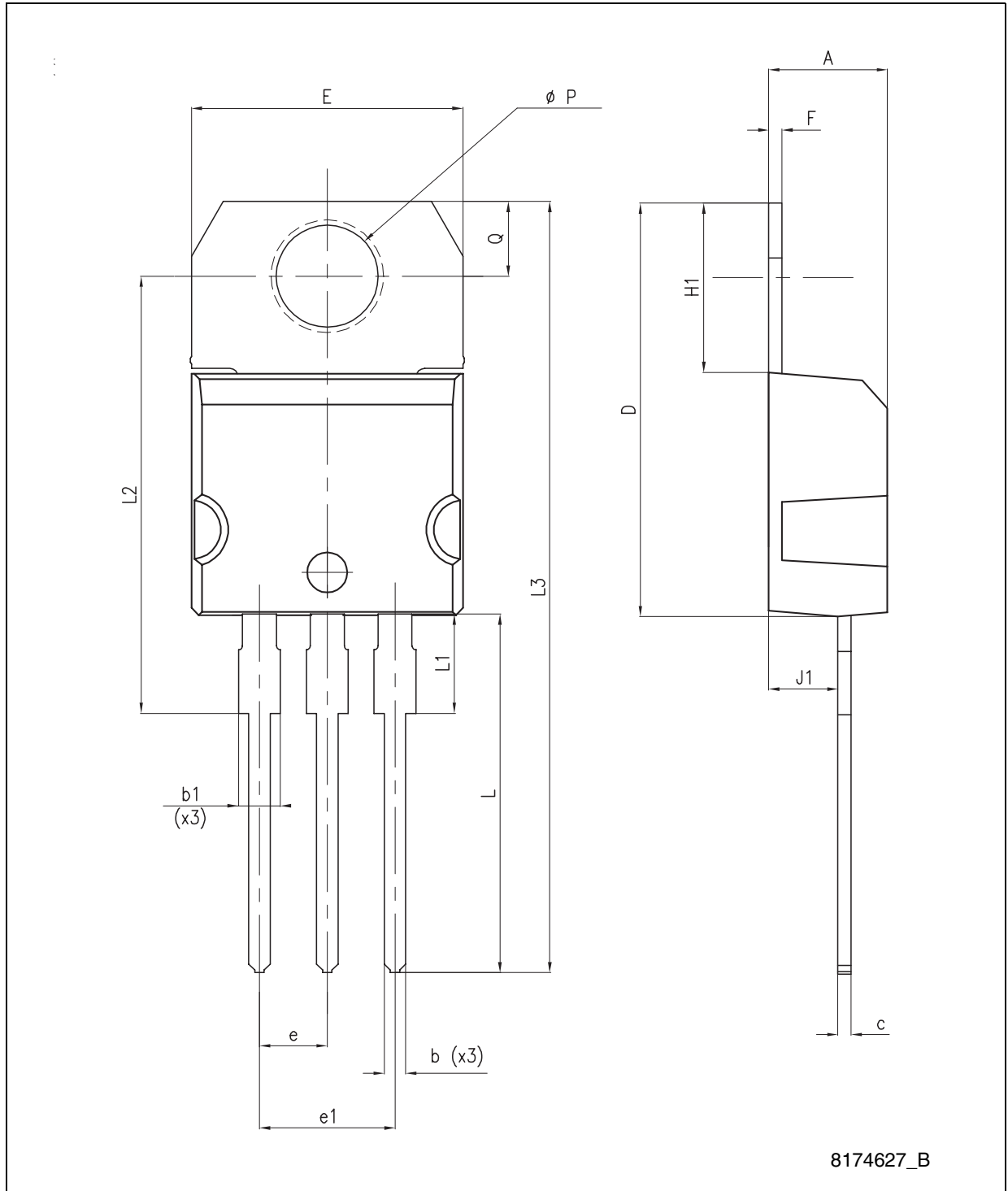


Figure 18. Drawing dimension tube for TO-220 Dual Gauge (mm.)

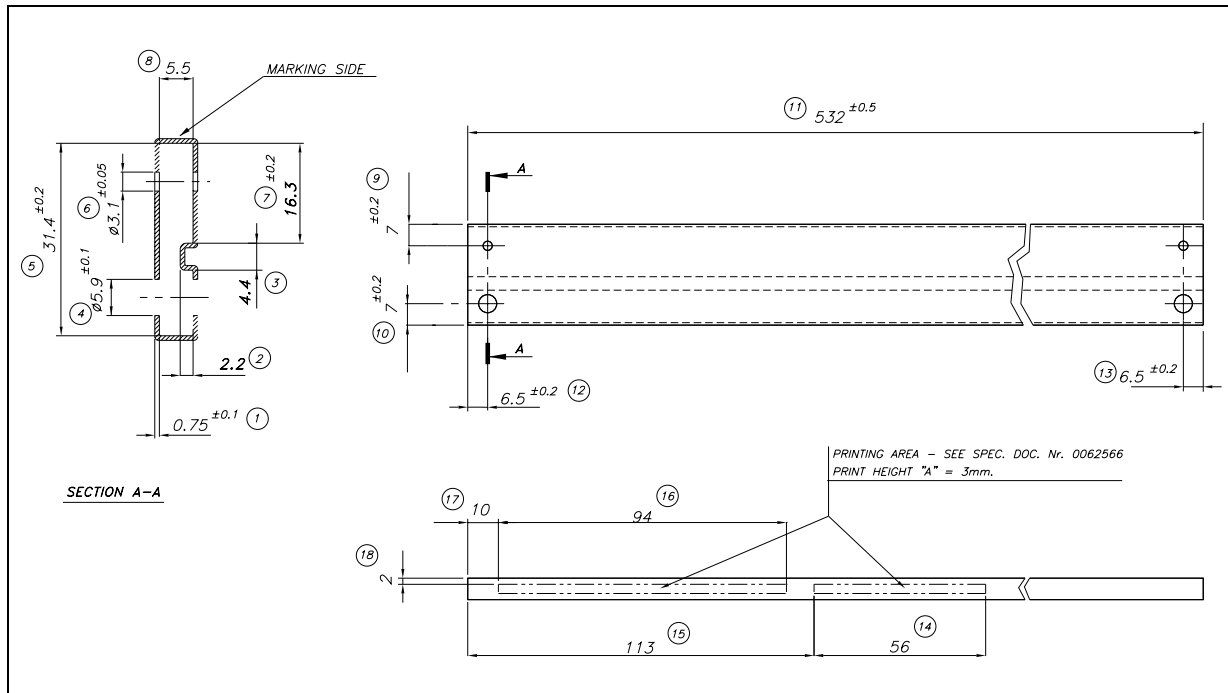
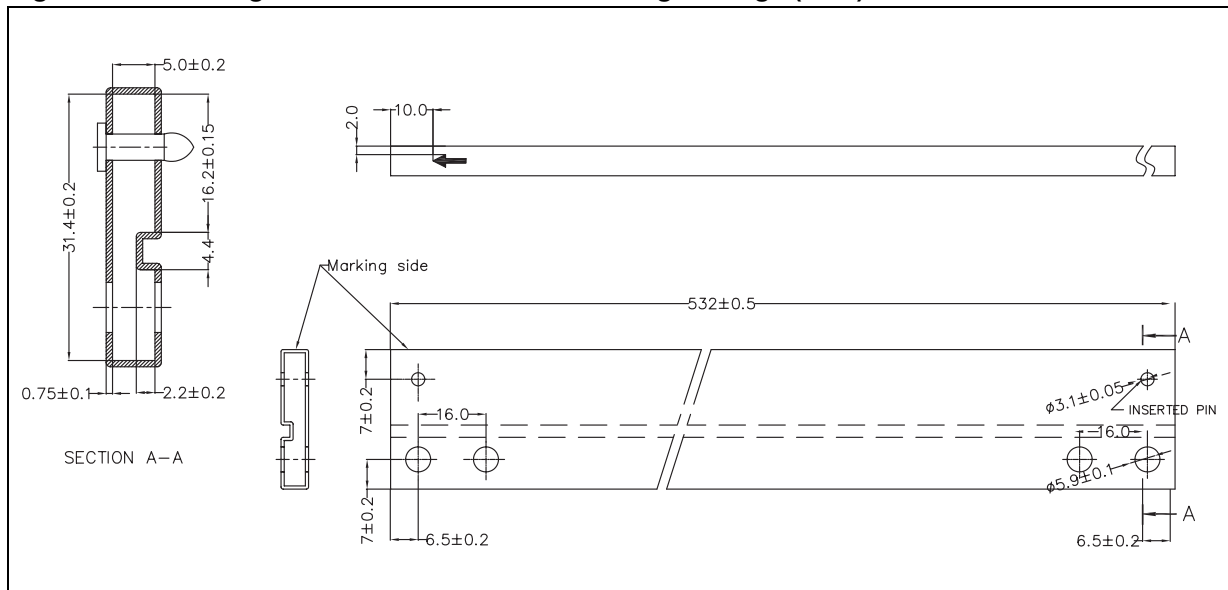
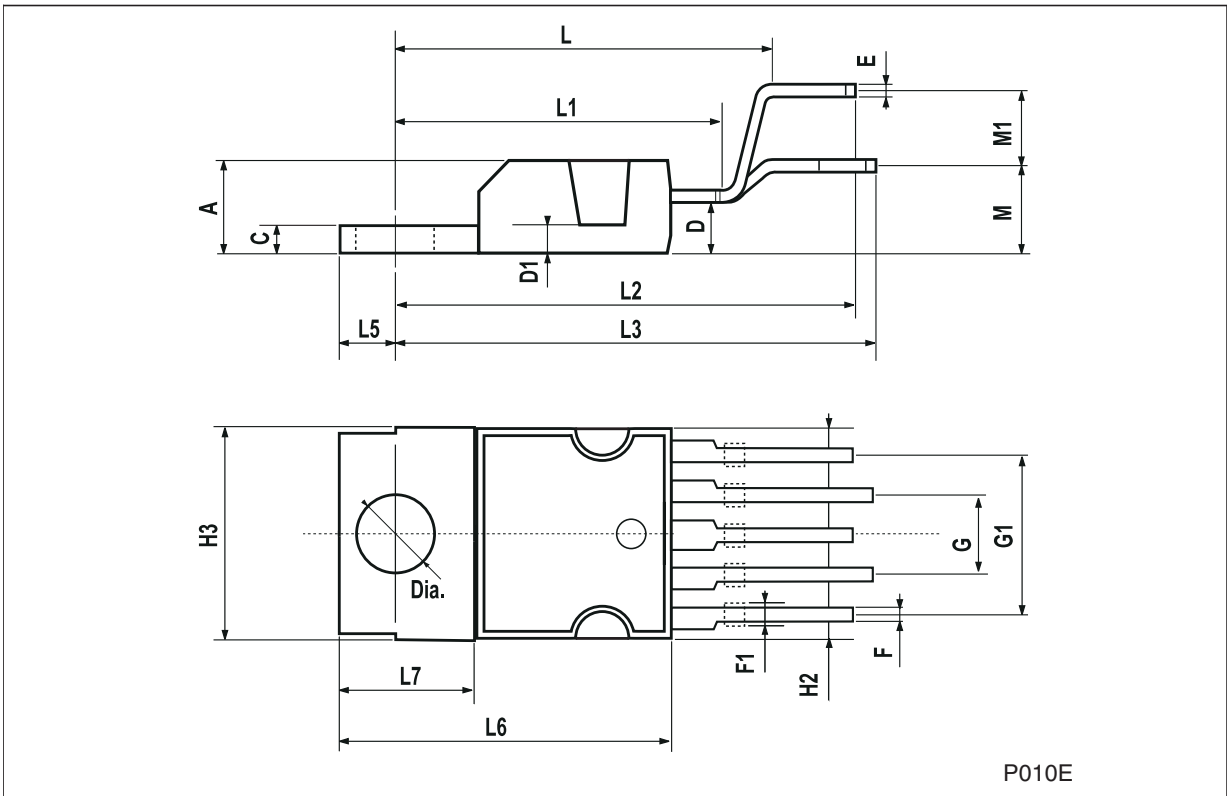


Figure 19. Drawing dimension tube for TO-220 Single Gauge (mm.)



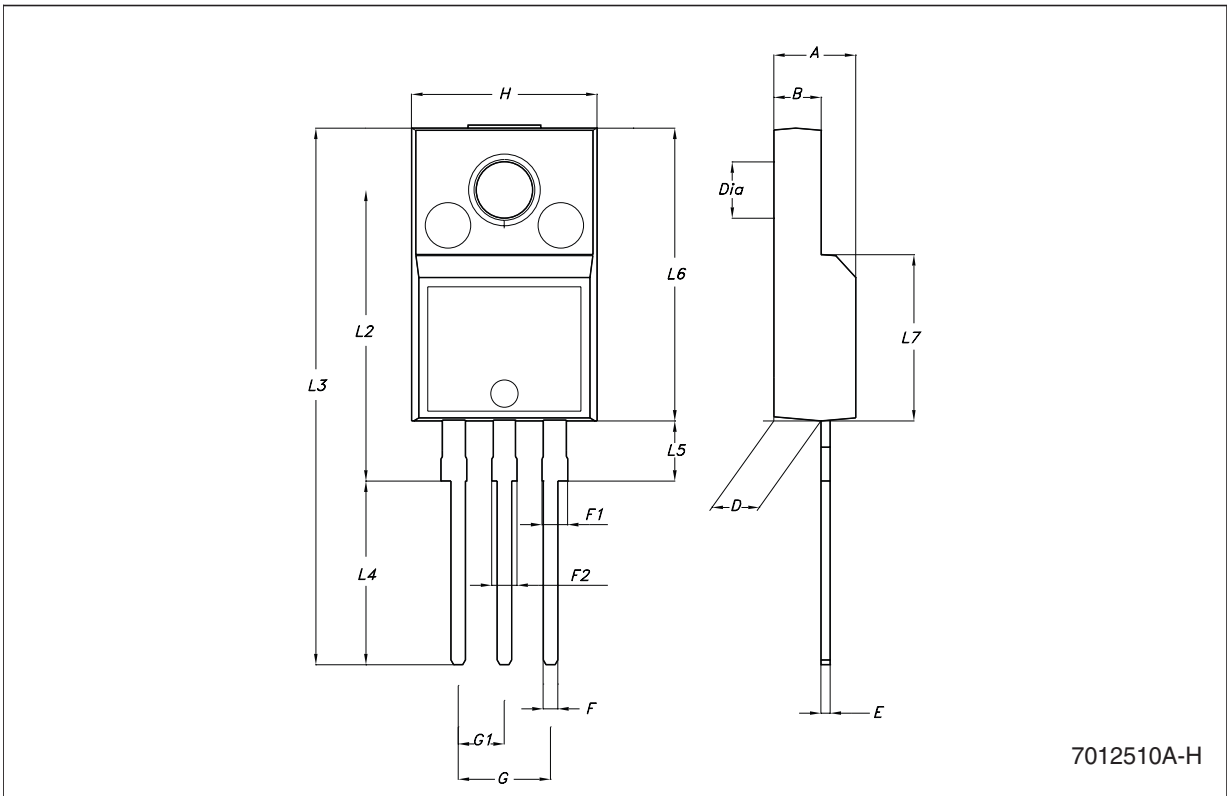
**PENTAWATT (Vertical) mechanical data**

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



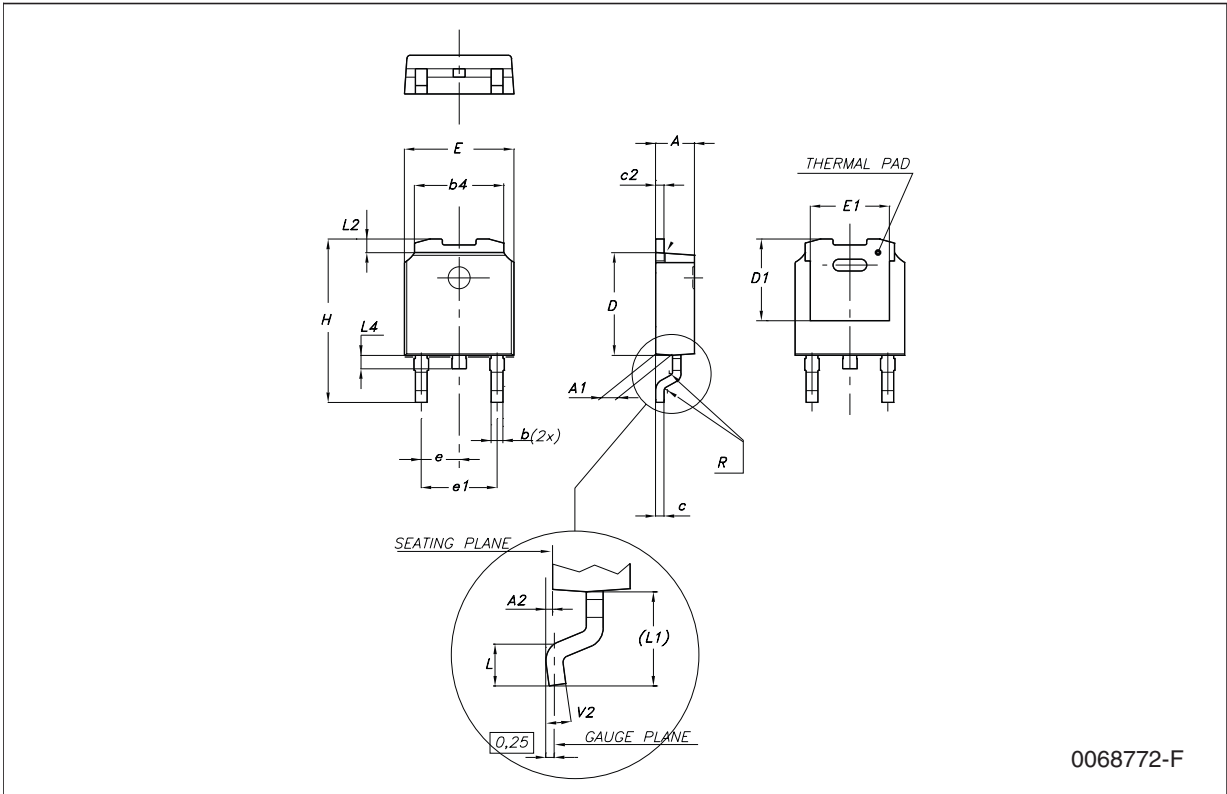
**TO-220FP mechanical data**

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**

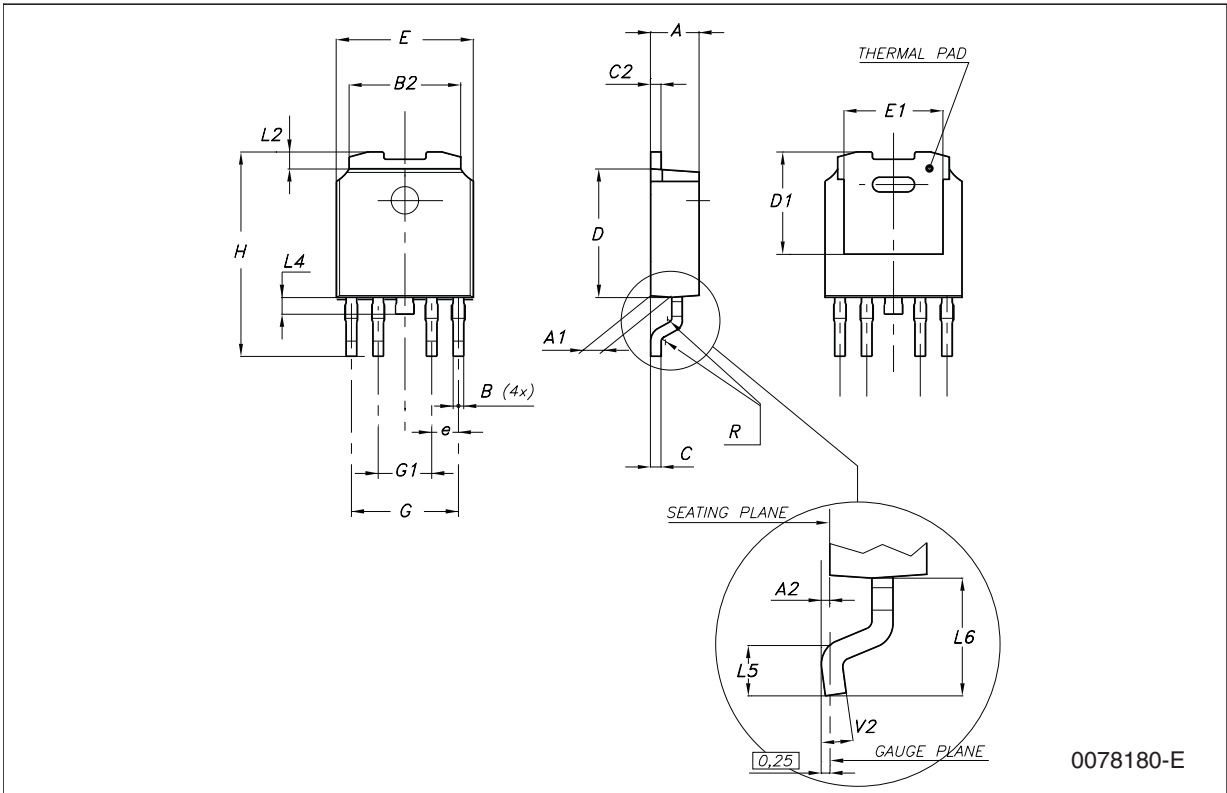
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
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	

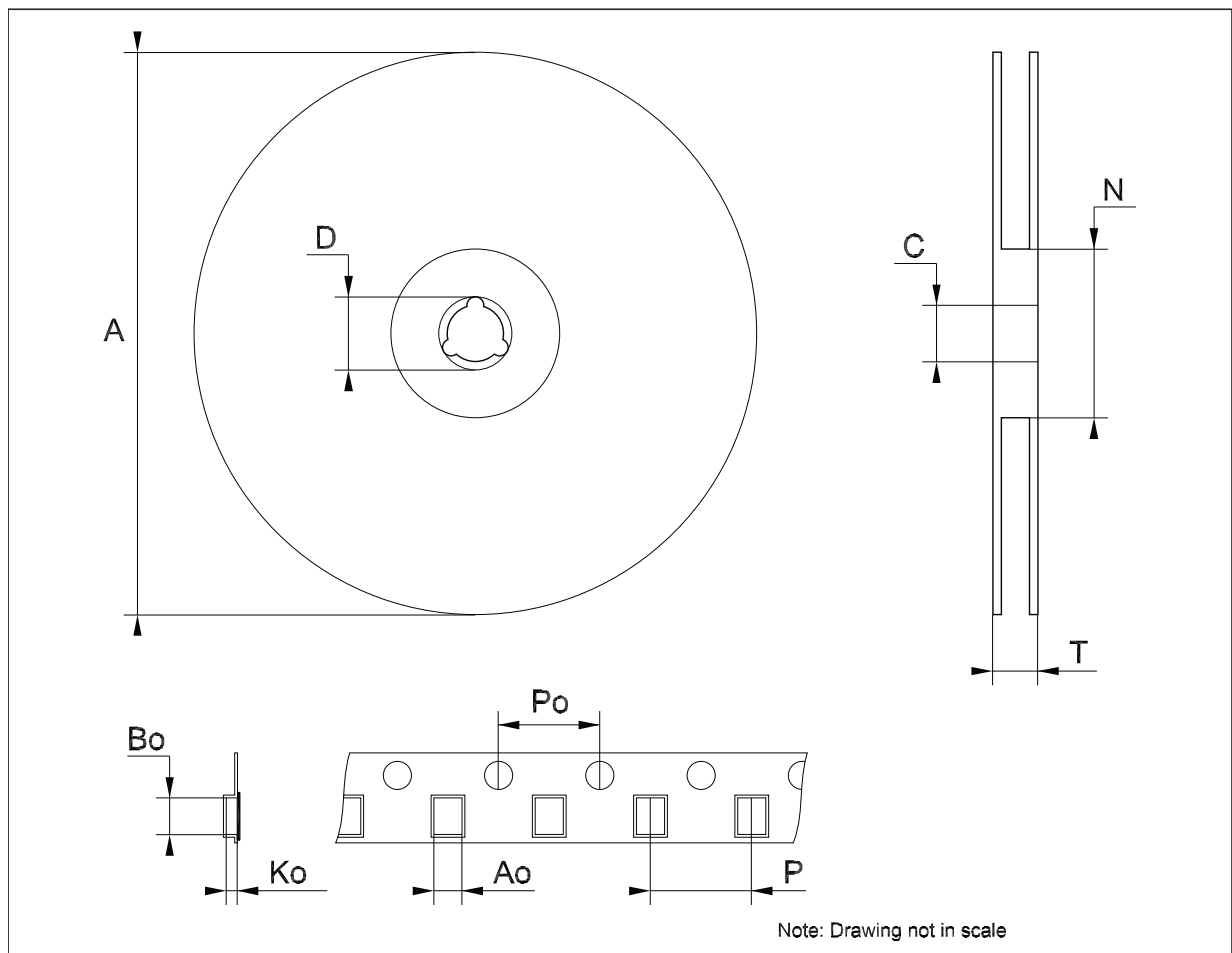


0078180-E



**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
		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
			LF85ABPT <sup>(1)</sup>	LF85ABPT-TR	8.5 V
LF90CV	LF90CP <sup>(1)</sup>	LF90CDT-TR		LF90CPT-TR	9 V
	LF90ABP <sup>(1)</sup>				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> .

**Please Read Carefully:**

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

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

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

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

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

**UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

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

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

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

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

© 2012 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

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

[www.st.com](http://www.st.com)