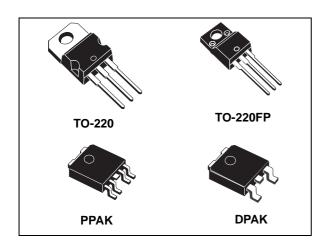


Very low drop voltage regulator with inhibit function

Datasheet - production data



Features

- Very low-dropout voltage (0.45 V)
- Very low quiescent current (typ. 50 μA in OFF mode, 500 μA 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 µF for stability
- Available in ± 1% (AB) or ± 2% (C) selection at 25 °C
- Supply voltage rejection: 80 db (typ.)
- Temperature range: from -40 to 125 °C

Description

The LFXX is a very low drop regulator available in TO-220, TO-220FP, DPAK and PPAK packages and in a wide range of output voltages. The low drop voltage (0.45 V) and low quiescent current make it particularly suitable for low-noise, lowpower applications and especially in batterypowered systems. In the 5 pin configuration (PPAK) a shutdown logic control function is available (pin 2, TTL compatible). This means that when the device is used as a local regulator, a part of the board can be put in standby, decreasing the total power consumption. In the three terminal configuration, the device has the same electrical performance, but it is fixed in ON state. It requires a capacitor of only 2.2 µF for stability, saving board space and costs. 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 °C to 125 °C, and the statistical tests PAT, SYL, SBL are performed.

Contents

Contents

1	Diag	ram	5
2	Pin o	configuration	6
3	Maxi	mum ratings	7
4	Elec	trical characteristics	8
5	Турі	cal performance characteristics	4
6	Pack	rage information	8
	6.1	TO-220 package information	9
	6.2	TO-220 packing information	.4
	6.3	DPAK package information 4	-5
	6.4	PPAK package information	.7
	6.5	DPAK and PPAK packing information	.9
7	Orde	ering information5	1
8	Revi	sion history	2



LFXX List of tables

List of tables

Table 1.	Absolute maximum ratings	. 7
Table 2.	Thermal data	
Table 3.	LF15AB electrical characteristics	. 8
Table 4.	LF18AB electrical characteristics	. 9
Table 5.	LF18C electrical characteristics	
Table 6.	LF18C (automotive grade) electrical characteristics	11
Table 7.	LF25AB electrical characteristics	12
Table 8.	LF25AB (automotive grade) electrical characteristics	13
Table 9.	LF25C electrical characteristics	
Table 10.	LF25C (automotive grade) electrical characteristics	15
Table 11.	LF33AB electrical characteristics	16
Table 12.	LF33C electrical characteristics	17
Table 13.	LF33C (automotive grade) electrical characteristics	
Table 14.	LF50AB electrical characteristics	
Table 15.	LF50AB (automotive grade) electrical characteristics	
Table 16.	LF50C electrical characteristics	
Table 17.	LF50C (automotive grade) electrical characteristics	
Table 18.	LF60AB electrical characteristics	
Table 19.	LF60C electrical characteristics	
Table 20.	LF80AB electrical characteristics	
Table 21.	LF80C electrical characteristics	
Table 22.	LF80C (automotive grade) electrical characteristics	
Table 23.	LF85AB electrical characteristics	
Table 24.	LF85C electrical characteristics	
Table 25.	LF85C (automotive grade) electrical characteristics	
Table 26.	LF90C electrical characteristics	
Table 27.	LF120AB electrical characteristics	
Table 28.	LF120C electrical characteristics	
Table 29.	TO-220 mechanical data	
Table 30.	TO-220FP mechanical data	
Table 31.	DPAK mechanical data	
Table 32.	PPAK mechanical data	
Table 33.	DPAK and PPAK tape and reel mechanical data	
Table 34.	Order code	
Table 35.	Document revision history	52



List of figures LFXX

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	. 34
Figure 5.	Dropout voltage vs. temperature	
Figure 6.	upply current vs. input voltage	. 34
Figure 7.	Supply current vs. input voltage (no load)	. 34
Figure 8.	Short-circuit current vs. input voltage	. 34
Figure 9.	Supply current vs. temperature	. 34
Figure 10.	Logic-controlled precision 3.3/5.0 V selectable output	. 35
Figure 11.	Sequential multi-output supply	35
Figure 12.	Multiple supply with ON/OFF toggle switch	. 36
Figure 13.	Basic inhibit functions	. 36
Figure 14.	Delayed turn-on	37
Figure 15.	Low voltage bulb blinker	. 37
Figure 16.	TO-220 (STD-ST dual gauge) package outline	. 39
Figure 17.	TO-220 (STD-ST single gauge) package outline	40
Figure 18.	TO-220FP package outline	
Figure 19.	TO-220 dual gauge tube outline (dimensions in mm)	
Figure 20.	TO-220 single gauge tube outline(dimensions in mm)	. 44
Figure 21.	DPAK package outline	45
Figure 22.	DPAK recommended footprint	46
Figure 23.	PPAK package outline	47
Figure 24.	DPAK and PPAK tape outline	49
Figure 25	DPAK and PPAK reel outline	50



Diagram **LFXX**

Diagram 1

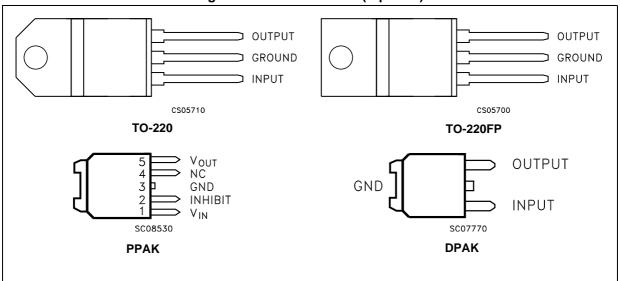
V_{out} —○ $\overset{\text{V}_{\text{in}}}{\bigcirc}$ CURRENT LIMIT INHIBIT CONTROL START REFERENCE 0-DRIVER INHIBIT VOLTAGE ERROR AMPLIFIER DUMP PROTECTION TERM. PROTEC. O-GND SC08350

Figure 1. Block diagram

Pin configuration **LFXX**

Pin configuration 2

Figure 2. Pin connections (top view)



Note: TAB is electrically connected to GND on TO-220, PPAK and DPAK packages LFXX Maximum ratings

3 Maximum ratings

Table 1. Absolute maximum ratings

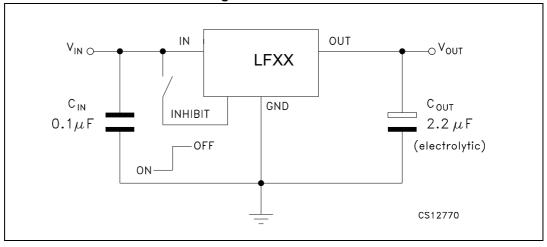
Symbol	Parameter	Value	Unit
V _I	DC input voltage	-0.5 to 40 ⁽¹⁾	V
Io	Output current	Internally limited	A
P _{TOT}	Power dissipation	Internally limited	W
T _{STG}	Storage temperature range	-40 to 150	°C
T _{OP}	Operating junction temperature range	-40 to 125	°C

^{1.} For $18 < V_{\parallel} < 40$ the regulator is in shutdown.

Table 2. Thermal data

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

Figure 3. Test circuit



4 Electrical characteristics

Table 3. LF15AB electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit
V.	Output voltage	$I_O = 50 \text{ mA}, V_I = 3.5 \text{ V}$		1.485	1.5	1.515	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 3.5 \text{ V}, T_a =$	-25 to 85 °C	1.470		1.530	V
VI	Operating input voltage	I _O = 500 mA		2.5		16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_{I} = 2.5 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			2	10	mV
ΔV_{O}	Load regulation	$V_I = 2.8 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$	1		2	10	mV
		$V_I = 2.5 \text{ to } 16 \text{ V}, I_O = 0 \text{ mA}$			0.5	1	
I _d	Quiescent current	V _I = 2.8 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 6 V	OFF mode		50	100	μA
			f = 120 Hz		82		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 3.5 \pm 1 \text{ V}$	f = 1 kHz		77		dB
			f = 10 kHz		65		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
V _d	Dropout voltage	I _O = 200 mA			1		V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I	Control input current	V _I = 6 V, V _C = 6 V			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω , $I_O = 0$ to	500 mA	2	10		μF

Table 4. LF18AB electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit	
V	Output valtage	$I_O = 50 \text{ mA}, V_I = 3.3 \text{ V}$		1.782	1.8	1.818	V	
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 3.3 \text{ V}, T_a =$	-25 to 85 °C	1.764		1.836	V	
VI	Operating input voltage	I _O = 500 mA		3		16	V	
Io	Output current limit				1		Α	
ΔV_{O}	Line regulation	$V_{I} = 2.8 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			2	12	mV	
ΔV_{O}	Load regulation	$V_1 = 3.3 \text{ V}, I_0 = 5 \text{ to } 500 \text{ mA}$	1		2	10	mV	
		$V_{I} = 2.5 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1		
I _d	Quiescent current	$V_I = 3.1 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode OFF mode	ON mode			12	mA
		V _I = 6 V			50	100	μA	
			f = 120 Hz		82			
SVR	Supply voltage rejection	$I_0 = 5 \text{ mA}, V_1 = 3.5 \pm 1 \text{ V}$	f = 1 kHz		77		dB	
			f = 10 kHz		60			
eN	Output noise voltage	B = 10 Hz to 100 kHz	1		50		μV	
V _d	Dropout voltage	I _O = 200 mA			0.7		V	
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V	
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V	
I _I	Control input current	$V_{I} = 6 \text{ V}, V_{C} = 6 \text{ V}$			10		μΑ	
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω , $I_0 = 0$ to	500 mA	2	10		μF	

Table 5. LF18C electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit
V.	Output voltage	$I_O = 50 \text{ mA}, V_I = 3.5 \text{ V}$		1.764	1.8	1.836	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 3.5 \text{ V}, T_a =$	-25 to 85 °C	1.728		1.872	V
VI	Operating input voltage	I _O = 500 mA		3		16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_I = 2.8 \text{ to } 16 \text{ V}, I_O = 5 \text{ mA}$			2	12	mV
ΔV_{O}	Load regulation	$V_I = 3.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$			2	10	mV
		$V_{I} = 2.5 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1	
I _d	Quiescent current	V _I = 3.1 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 6 V	OFF mode		50	100	μΑ
			f = 120 Hz		82		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 3.5 \pm 1 \text{ V}$	f = 1 kHz		77		dB
			f = 10 kHz		60		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
V _d	Dropout voltage	I _O = 200 mA			0.7		V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	V _I = 6 V, V _C = 6 V			10		μΑ
Co	Output bypass capacitance	ESR = 0.1 to 10 Ω , I_{O} = 0 to	500 mA	2	10		μF

Table 6. LF18C (automotive grade) electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit	
\ <u>/</u>	Output voltage	$I_O = 50 \text{ mA}, V_I = 3.5 \text{ V}, T_a =$: 25 °C	1.764	1.8	1.836	V	
Vo	Output voltage	I _O = 50 mA, V _I = 3.5 V		1.713		1.887		
VI	Operating input voltage	I _O = 500 mA		3		16	V	
Io	Output current limit	T _a = 25 °C			1		Α	
ΔV_{O}	Line regulation	$V_1 = 2.8 \text{ to } 16 \text{ V}, I_0 = 5 \text{ mA}$			2	15	mV	
ΔV_{O}	Load regulation	$V_1 = 3.3 \text{ V}, I_0 = 5 \text{ to } 500 \text{ mA}$	1		2	15	mV	
		$V_1 = 2.5 \text{ to } 16 \text{ V}, I_0 = 0 \text{ mA}$			0.5	2		
I _d	Quiescent current	V _I = 3.1 to 16 V, I _O = 500 mA	ON mode	ON mode			12	mA
		V _I = 6 V	OFF mode		50	120	μA	
			f = 120 Hz		82			
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 3.5 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		77	77	dB	
		a == =	f = 10 kHz		60			
eN	Output noise voltage	$B = 10 \text{ Hz to } 100 \text{ kHz}, T_a =$	25 °C		50		μV	
\/	Dropout voltage	I _O = 200 mA			0.2	1.3	V	
V _d	Diopout voltage	I _O = 500 mA		0.4	1.3	v		
V _{IL}	Control input logic low					0.8	V	
V _{IH}	Control input logic high			2			V	
I _I	Control input current	$V_1 = 6 \text{ V}, V_C = 6 \text{ V}, T_a = 25 \text{ G}$	°C		10		μA	
Co	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF	

Table 7. LF25AB electrical characteristics

Symbol	Parameter	Test condition	ns	Min.	Тур.	Max.	Unit
V.	Output voltage	$I_O = 50 \text{ mA}, V_I = 4.5 \text{ V}$		2.475	2.5	2.525	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 4.5 \text{ V}, T_a =$	-25 to 85 °C	2.450		2.550	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_I = 3.5 \text{ to } 16 \text{ V}, I_O = 5 \text{ mA}$			2	12	mV
ΔV_{O}	Load regulation	$V_I = 3.8 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$	1		2	12	mV
		$V_{I} = 3.5 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1	
I _d	Quiescent current	V _I = 3.8 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 6 V	OFF mode		50	100	μΑ
			f = 120 Hz		82		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 4.5 \pm 1 \text{ V}$	f = 1 kHz		77		dB
			f = 10 kHz		65		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V _d	I _O = 500 mA			0.4	0.7	V	
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	$V_{I} = 6 \text{ V}, V_{C} = 6 \text{ V}$			10		μΑ
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF

Table 8. LF25AB (automotive grade) electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit
\ <u>/</u>	Output voltage	$I_O = 50 \text{ mA}, V_I = 4.5 \text{ V}, T_a =$: 25 °C	2.475	2.5	2.525	V
Vo	Output voltage	I _O = 50 mA, V _I = 4.5 V		2.435		2.565	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit	T _a = 25 °C			1		Α
ΔV_{O}	Line regulation	$V_1 = 3.5 \text{ to } 16 \text{ V}, I_0 = 5 \text{ mA}$			2	15	mV
ΔV_{O}	Load regulation	$V_1 = 3.8 \text{ V}, I_0 = 5 \text{ to } 500 \text{ mA}$			2	15	mV
		$V_1 = 3.5 \text{ to } 16 \text{ V}, I_0 = 0 \text{ mA}$			0.5	2	
I _d	LUUIescent current	$V_{I} = 3.8 \text{ to } 16 \text{ V},$ $I_{O} = 500 \text{ mA}$	ON mode			12	mA
		V _I = 6 V	OFF mode		50	120	μA
			f = 120 Hz		82		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 4.5 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		77		dB
		a == =	f = 10 kHz		65		
eN	Output noise voltage	$B = 10 \text{ Hz to } 100 \text{ kHz}, T_a =$	25 °C		50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	1.3	V
V _d	Dropout voltage	I _O = 500 mA		0.4	1.3	V	
V _{IL}	Control input logic low					0.8	V
V _{IH}	Control input logic high			2			V
I _I	Control input current	$V_1 = 6 \text{ V}, V_C = 6 \text{ V}, T_a = 25 \text{ G}$	°C		10		μA
Co	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF

Table 9. LF25C electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit
V	Output voltage	$I_O = 50 \text{ mA}, V_I = 4.5 \text{ V}$		2.45	2.5	2.55	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 4.5 \text{ V}, T_a = -25 \text{ to } 85 \text{ °C}$ 2.4	2.4		2.6	V	
V _I	Operating input voltage	I _O = 500 mA				16	V
I _O	Output current limit				1		Α
ΔV _O	Line regulation	$V_{I} = 3.5 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			2	12	mV
ΔV_{O}	Load regulation	$V_I = 3.8 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$,		2	12	mV
		$V_{I} = 3.5 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1	
I _d	Quiescent current	V _I = 3.8 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 6 V	OFF mode		50	100	μA
			f = 120 Hz		82		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 4.5 \pm 1 \text{ V}$	f = 1 kHz		77		dB
			f = 10 kHz		65		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
V	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V_d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V_{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V_{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	$V_{I} = 6 \text{ V}, V_{C} = 6 \text{ V}$			10		μA
Co	Output bypass capacitance	ESR = 0.1 to 10 Ω , $I_O = 0$ to	500 mA	2	10		μF

Table 10. LF25C (automotive grade) electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit	
V	Output voltage	$I_O = 50 \text{ mA}, V_I = 4.5 \text{ V}, T_a =$: 25 °C	2.45	2.5	2.55	V	
Vo	Output voltage	I _O = 50 mA, V _I = 4.5 V		2.385		2.615	V	
VI	Operating input voltage	I _O = 500 mA				16	V	
Io	Output current limit	T _a = 25 °C			1		Α	
ΔV_{O}	Line regulation	$V_I = 3.5 \text{ to } 16 \text{ V}, I_O = 5 \text{ mA}$			2	15	mV	
ΔV_{O}	Load regulation	$V_I = 3.8 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$,		2	15	mV	
		$V_I = 3.5 \text{ to } 16 \text{ V}, I_O = 0 \text{ mA}$			0.5	2		
I _d	Quiescent current	V _I = 3.8 to 16 V, I _O = 500 mA	ON mode	ON mode			12	mA
		V _I = 6 V OFF mode		50	120	μΑ		
			f = 120 Hz		82			
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 4.5 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		77		dB	
		'a	f = 10 kHz		65			
eN	Output noise voltage	$B = 10 \text{ Hz to } 100 \text{ kHz}, T_a =$	25 °C		50		μV	
\/	Dropout voltage	I _O = 200 mA			0.2	1.3	V	
V _d	Dropout voltage	I _O = 500 mA			0.4	1.3	V	
V _{IL}	Control input logic low					0.8	V	
V _{IH}	Control input logic high			2			V	
I _I	Control input current	$V_1 = 6 \text{ V}, V_C = 6 \text{ V}, T_a = 25 \text{ G}$	V _I = 6 V, V _C = 6 V, T _a = 25 °C		10		μA	
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF	

Table 11. LF33AB electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit
W	Output voltage	$I_O = 50 \text{ mA}, V_I = 5.3 \text{ V}$		3.267	3.3	3.333	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 5.3 \text{ V}, T_a =$	-25 to 85 °C	3.234		3.366	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_{I} = 4.3 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			3	16	mV
ΔV_{O}	Load regulation	$V_I = 4.6 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$,		3	16	mV
		$V_{I} = 4.3 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1	
I _d	Quiescent current	$V_1 = 4.6 \text{ to } 16 \text{ V},$ $I_0 = 500 \text{ mA}$	ON mode			12	mA
		V _I = 6 V OFF mode			50	100	μA
			f = 120 Hz		80		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 5.3 \pm 1 \text{ V}$	f = 1 kHz		75		dB
			f = 10 kHz		65		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
	Dranaut voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	$V_{I} = 6 \text{ V}, V_{C} = 6 \text{ V}$	V _I = 6 V, V _C = 6 V		10		μΑ
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω , I_{O} = 0 to	500 mA	2	10		μF

Table 12. LF33C electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit	
V	Output valtage	$I_O = 50 \text{ mA}, V_I = 5.3 \text{ V}$		3.234	3.3	3.366	V	
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 5.3 \text{ V}, T_a =$	-25 to 85 °C	3.168		3.432	V	
VI	Operating input voltage	I _O = 500 mA				16	V	
Io	Output current limit				1		Α	
ΔV_{O}	Line regulation	$V_{I} = 4.3 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			3	16	mV	
ΔV_{O}	Load regulation	$V_I = 4.6 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$,		3	16	mV	
		$V_{I} = 4.3 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1		
I _d	Quiescent current	V _I = 4.6 to 16 V, I _O = 500 mA	ON mode	ON mode			12	mA
		V _I = 6 V	OFF mode		50	100	μΑ	
			f = 120 Hz		80			
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 5.3 \pm 1 \text{ V}$	f = 1 kHz		75		dB	
			f = 10 kHz		65			
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV	
\/	Dropout voltage	I _O = 200 mA			0.2	0.35	V	
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V	
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V	
V _{IH}	Control input logic high	$T_a = -40 \text{ to } 125 ^{\circ}\text{C}$		2			V	
I _I	Control input current	$V_I = 6 \text{ V}, V_C = 6 \text{ V}$			10		μA	
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF	

Table 13. LF33C (automotive grade) electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 5.3 \text{ V}, T_a =$: 25 °C	3.234	3.3	3.366	V
٧٥	Output voltage	$I_O = 50 \text{ mA}, V_I = 5.3 \text{ V},$		3.153		3.447	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit	T _a = 25 °C			1		Α
ΔV_{O}	Line regulation	$V_1 = 4.3 \text{ to } 16 \text{ V}, I_0 = 5 \text{ mA}$			3	19	mV
ΔV_{O}	Load regulation	$V_1 = 4.6 \text{ V}, I_0 = 5 \text{ to } 500 \text{ mA}$	1		3	19	mV
		$V_1 = 4.3 \text{ to } 16 \text{ V}, I_0 = 0 \text{ mA}$			0.5	2	
I _d	Quiescent current	V _I = 4.6 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 6 V	OFF mode		50	120	μA
			f = 120 Hz		80		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 5.3 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		75		dB
		·a =	f = 10 kHz		65		
eN	Output noise voltage	$B = 10 \text{ Hz to } 100 \text{ kHz}, T_a =$	25 °C		50		μV
V	Dropout voltage	I _O = 200 mA			0.2	1.3	V
V _d	Diopout voltage	I _O = 500 mA			0.4	1.3	V
V _{IL}	Control input logic low					0.8	V
V _{IH}	Control input logic high			2			V
I	Control input current	V _I = 6 V, V _C = 6 V, T _a = 25 °C			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF

Table 14. LF50AB electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
V	Output voltage	$I_O = 50 \text{ mA}, V_I = 7 \text{ V}$		4.95	5	5.05	V
Vo	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 7 \text{ V}, T_a = 0$	-25 to 85 °C	4.9		5.1	V
V _I	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			5	25	mV
ΔV_{O}	Load regulation	$V_I = 6.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m/s}$	4		5	25	mV
		$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1	
I _d	Quiescent current	$V_I = 6.3 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode			12	mA
		V _I = 6 V	OFF mode		50	100	μA
			f = 120 Hz		76		
SVR	Supply voltage rejection	$I_0 = 5 \text{ mA}, V_1 = 7 \pm 1 \text{ V}$	f = 1 kHz		71		dB
			f = 10 kHz		60		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dranaut voltage	I _O = 200 mA			0.2	0.35	V
V_d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	V _I = 6 V, V _C = 6 V			10		μΑ
Co	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ t	o 500 mA	2	10		μF

Table 15. LF50AB (automotive grade) electrical characteristics

Symbol	Parameter	Test condition	ns	Min.	Тур.	Max.	Unit
V.	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 7 \text{ V}, T_a = 20 \text{ mA}$	25 °C	4.95	5	5.05	V
Vo	Output voltage	I _O = 50 mA, V _I = 7 V		4.885		5.115	V
VI	Operating input voltage	I _O = 500 mA	O = 500 mA			16	V
Io	Output current limit	T _a = 25 °C			1		Α
ΔV_{O}	Line regulation	$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			5	28	mV
ΔV_{O}	Load regulation	$V_I = 6.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m/s}$	4		5	28	mV
		$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	2	
I _d	Quiescent current	$V_I = 6.3 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode			12	mA
		V _I = 6 V OFF mode			50	120	μA
			f = 120 Hz		76		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 7 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		71		dB
		1a - 25	f = 10 kHz		60		
eN	Output noise voltage	$B = 10 \text{ Hz to } 100 \text{ kHz}, T_a =$	= 25 °C		50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	1.3	V
V _d	Diopout voltage	I _O = 500 mA			0.4	1.3	V
V _{IL}	Control input logic low					0.8	V
V _{IH}	Control input logic high			2			V
I	Control input current	$V_1 = 6 \text{ V}, V_C = 6 \text{ V}, T_a = 25 \text{ °C}$			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ t	o 500 mA	2	10		μF

Table 16. LF50C electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
W	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 7 \text{ V}$		4.9	5	5.1	V
Vo	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 7 \text{ V}, T_a = -100 \text{ M}$	·25 to 85 °C	4.8		5.2	V
VI	Operating input voltage	I _O = 500 mA	O = 500 mA			16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			5	25	mV
ΔV_{O}	Load regulation	$V_I = 6.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m/s}$	4		5	25	mV
		$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	1	
I _d	Quiescent current	$V_I = 6.3 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode			12	mA
		V _I = 6 V	OFF mode		50	100	μΑ
			f = 120 Hz		76		
SVR	Supply voltage rejection	$I_0 = 5 \text{ mA}, V_1 = 7 \pm 1 \text{ V}$	f = 1 kHz		71		dB
			f = 10 kHz		60		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	T _a = -40 to 125 °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 V, V _C = 6 V			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω , $I_0 = 0$ to	o 500 mA	2	10		μF

Table 17. LF50C (automotive grade) electrical characteristics

Symbol	Parameter	Test condition	ns	Min.	Тур.	Max.	Unit
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 7 \text{ V}, T_a = 2$	25 °C	4.9	5	5.1	V
٧٥	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 7 \text{ V}$		4.785		5.215	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit	T _a = 25 °C			1		Α
ΔV_{O}	Line regulation	$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			5	28	mV
ΔV_{O}	Load regulation	$V_I = 6.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m/s}$	4		5	28	mV
		$V_{I} = 6 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.5	2	
I _d	Quiescent current	$V_I = 6.3 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode			12	mA
		V _I = 6 V	OFF mode		50	120	μA
			f = 120 Hz		76		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 7 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		71		dB
		1a - 20 0	f = 10 kHz		60		
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_a =	= 25 °C		50		μV
\/	Drangut voltage	I _O = 200 mA			0.2	1.3	V
V _d	Dropout voltage	I _O = 500 mA			0.4	1.3	V
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 V, V _C = 6 V, T _a = 25 °C			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ to	o 500 mA	2	10		μF

Table 18. LF60AB electrical characteristics

Symbol	Parameter	Test condition	ns	Min.	Тур.	Max.	Unit
V	Output voltage	I _O = 50 mA, V _I = 8 V		5.94	6	6.06	V
Vo	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 8 \text{ V}, T_a = 0$	-25 to 85 °C	5.88		6.12	V
VI	Operating input voltage	I _O = 500 mA	O = 500 mA			16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_{I} = 7 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			6	30	mV
ΔV_{O}	Load regulation	$V_I = 7.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m/s}$	4		6	30	mV
		$V_{I} = 7 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	V _I = 7.3 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 9 V	OFF mode		70	140	μA
			f = 120 Hz		75		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 8 \pm 1 \text{ V}$	f = 1 kHz		70		dB
			f = 10 kHz		60		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
V	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C	T _a = -40 to 125 °C				V
I _I	Control input current	V _I = 9 V, V _C = 6 V			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ t	o 500 mA	2	10		μF

Table 19. LF60C electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
V	Output voltage	$I_O = 50 \text{ mA}, V_I = 8 \text{ V}$		5.88	6	6.12	V
Vo	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 8 \text{ V}, T_a = 0$	-25 to 85 °C	5.76		6.24	V
VI	Operating input voltage	I _O = 500 mA	O = 500 mA			16	V
I _O	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_1 = 7 \text{ to } 16 \text{ V}, I_0 = 5 \text{ mA}$			6	30	mV
ΔV_{O}	Load regulation	$V_1 = 7.3 \text{ V}, I_0 = 5 \text{ to } 500 \text{ m/s}$	4		6	30	mV
		$V_{I} = 7 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	$V_1 = 7.3 \text{ to } 16 \text{ V},$ $I_0 = 500 \text{ mA}$	ON mode			12	mA
		V _I = 9 V OFF mode			70	140	μA
			f = 120 Hz		75		
SVR	Supply voltage rejection	$I_0 = 5 \text{ mA}, V_1 = 8 \pm 1 \text{ V}$	f = 1 kHz		70		dB
			f = 10 kHz		60		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C	T _a = -40 to 125 °C				V
I _I	Control input current	$V_{I} = 9 \text{ V}, V_{C} = 6 \text{ V}$			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ t	o 500 mA	2	10		μF

Table 20. LF80AB electrical characteristics

Symbol	Parameter	Test condition	าร	Min.	Тур.	Max.	Unit
\/	Output voltage	$I_O = 50 \text{ mA}, V_I = 10 \text{ V}$		7.92	8	8.08	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 10 \text{ V}, T_a = 10 \text{ V}$	-25 to 85 °C	7.84		8.16	V
VI	Operating input voltage	O = 500 mA				16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_1 = 9 \text{ to } 16 \text{ V}, I_0 = 5 \text{ mA}$			8	40	mV
ΔV_{O}	Load regulation	$V_1 = 9.3 \text{ V}, I_0 = 5 \text{ to } 500 \text{ m/s}$	4		8	40	mV
		$V_1 = 9 \text{ to } 16 \text{ V}, I_0 = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	$V_I = 9.3 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode	node		12	mA
		V _I = 9 V	= 9 V OFF mode		70	140	μA
			f = 120 Hz		72		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 10 \pm 1 \text{ V}$	f = 1 kHz		67		dB
			f = 10 kHz		57		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	$T_a = -40 \text{ to } 125 ^{\circ}\text{C}$				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I ₁	Control input current	$V_{I} = 9 \text{ V}, V_{C} = 6 \text{ V}$			10		μA
Co	Output bypass capacitance	ESR = 0.1 to 10 Ω , $I_0 = 0$ to	o 500 mA	2	10		μF

Table 21. LF80C electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
V.	Output voltage	I _O = 50 mA, V _I = 10 V		7.84	8	8.16	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 10 \text{ V}, T_a = 10 \text{ V}$	-25 to 85 °C	7.68		8.32	V
VI	Operating input voltage	I _O = 500 mA				16	V
I _O	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_{I} = 9 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			8	40	mV
ΔV_{O}	Load regulation	$V_I = 9.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m/s}$	4		8	40	mV
		$V_{I} = 9 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	$V_I = 9.3 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode			12	mA
		V _I = 9 V OFF mode			70	140	μA
			f = 120 Hz		72		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 10 \pm 1 \text{ V}$	f = 1 kHz		67		dB
			f = 10 kHz		57		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	T _a = -40 to 125 °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 V, V _C = 6 V	$V_{I} = 9 \text{ V}, V_{C} = 6 \text{ V}$		10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 t	o 500 mA	2	10		μF

Table 22. LF80C (automotive grade) electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
V.	Output voltage	$I_O = 50 \text{ mA}, V_I = 10 \text{ V}, T_a =$: 25 °C	7.84	8	8.16	V
Vo	Output voltage	I _O = 50 mA, V _I = 10 V	_O = 50 mA, V _I = 10 V			8.335	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit	T _a = 25 °C			1		Α
ΔV_{O}	Line regulation	$V_{I} = 9 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			8	44	mV
ΔV_{O}	Load regulation	$V_I = 9.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m/s}$	4		8	44	mV
		$V_{I} = 9 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	2.5	
I _d	Quiescent current	$V_I = 9.3 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode			12	mA
		V _I = 9 V	OFF mode		70	160	μΑ
			f = 120 Hz		72		μA
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 10 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		67		
		1a - 25 0	f = 10 kHz		57		
eN	Output noise voltage	$B = 10 \text{ Hz to } 100 \text{ kHz}, T_a =$	= 25 °C		50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	1.3	V
V _d	Diopout voltage	I _O = 500 mA			0.4	1.3	V
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 V, V _C = 6 V, T _a = 25 °C			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ to	o 500 mA	2	10		μF

Table 23. LF85AB electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
V	Output voltage	$I_O = 50 \text{ mA}, V_I = 10.5 \text{ V}$		8.415	8.5	8.585	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 10.5 \text{ V}, T_a$	= -25 to 85 °C	8.33		8.67	
VI	Operating input voltage	I _O = 500 mA				16	V
I _O	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_I = 9.5 \text{ to } 16 \text{ V}, I_O = 5 \text{ mA}$			8	42	mV
ΔV_{O}	Load regulation	$V_I = 9.8 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$			8	42	mV
		$V_{I} = 9.5 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	V _I = 9.8 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 9 V	OFF mode		70	140	μΑ
			f = 120 Hz		72		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 10.5 \pm 1 \text{ V}$	f = 1 kHz		67		dB
			f = 10 kHz		57		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
V	Dropout voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	8.585 V 8.67 16 V 42 mV 42 mV 1.5 12 140	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
lį	Control input current	V _I = 9 V, V _C = 6 V			10		μΑ
Co	Output bypass capacitance	ESR = 0.1 to 10 Ω , $I_O = 0$ to	500 mA	2	10		μF

Table 24. LF85C electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit
V	Output voltage	$I_O = 50 \text{ mA}, V_I = 10.5 \text{ V}$		8.33	8.5	8.67	\/
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 10.5 \text{ V}, T_a$	= -25 to 85 °C	8.16		8.84	\ \ \
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_I = 9.5 \text{ to } 16 \text{ V}, I_O = 5 \text{ mA}$			8	42	mV
ΔV_{O}	Load regulation	$V_I = 9.8 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$			8	42	mV
		$V_I = 9.5 \text{ to } 16 \text{ V}, I_O = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	$V_I = 9.8 \text{ to } 16 \text{ V},$ $I_O = 500 \text{ mA}$	ON mode			12	mA
		V _I = 9 V	OFF mode		70	140	μΑ
			f = 120 Hz		72		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 10.5 \pm 1 \text{ V}$	f = 1 kHz		67		dB
			f = 10 kHz		57		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	0.35	.,
V _d	Dropout voltage	I _O = 500 mA			0.4	8.67 8.84 16 V 42 mV 42 mV 1.5 mA 12 140 μA dB 0.35 V 0.7 V 0.8 V μΑ	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 = 9 V, V _C = 6 V			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF

Table 25. LF85C (automotive grade) electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
V.	Output voltage	$I_O = 50 \text{ mA}, V_I = 10.5 \text{ V}, T_a$	= 25 °C	8.33	8.5	8.67	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 10.5 \text{ V}$		8.145		8.855	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit	T _a = 25 °C			1		Α
ΔV_{O}	Line regulation	$V_{I} = 9.5 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			8	44	mV
ΔV_{O}	Load regulation	$V_I = 9.8 \text{ V}, I_O = 5 \text{ to } 500 \text{ mA}$	1		8	44	mV
		$V_{I} = 9.5 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	2.5	
I _d	Quiescent current	V _I = 9.8 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 9 V	OFF mode		70	160	μΑ
			f = 120 Hz		72		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 10.5 \pm 1 \text{ V}$ $T_a = 25 \text{ °C}$	f = 1 kHz		67		dB
		'a	f = 10 kHz		57		
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_a =$	25 °C		50		μV
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Dropout voltage	I _O = 200 mA			0.2	1.3	\/
V _d	Dropout voltage	I _O = 500 mA			0.4	44 mV 44 mV 2.5 mA 12 hA 160 μA dB	V
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 V, V _C = 6 V, T _a = 25 °C			10		μΑ
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_0 = 0 to	500 mA	2	10		μF

Table 26. LF90C electrical characteristics

Symbol	Parameter	Test condition	ıs	Min.	Тур.	Max.	Unit
V	0 1 1 1	$I_{O} = 50 \text{ mA}, V_{I} = 11 \text{ V}$		8.82	9	9.18	\/
Vo	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 11 \text{ V}, T_a =$	-25 to 85 °C	8.64		9.36	V
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_I = 10 \text{ to } 16 \text{ V}, I_O = 5 \text{ mA}$			9	45	mV
ΔV_{O}	Load regulation	$V_I = 10.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m}$	A		9	45	mV
		$V_{I} = 10 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	$V_1 = 10.3 \text{ to } 16V,$ $I_0 = 500 \text{ mA}$	ON mode			12	mA
		V _I = 10 V	OFF mode		70	140	μΑ
			f = 120 Hz		71		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 11 \pm 1 \text{ V}$	f = 1 kHz		66		dB
			f = 10 kHz		56		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dropout voltage	I _O = 200 mA			0.2	0.35	\/
V _d	Dropout voltage	I _O = 500 mA			0.4	9.18 9.36 V 9.36 V A 45 MV 1.5 12 140 µA dB 0.35 0.7 0.8 V µA	V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	V _I = 10 V, V _C = 6 V			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ to	500 mA	2	10		μF

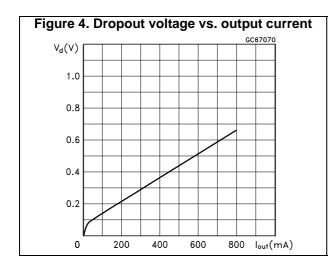
Table 27. LF120AB electrical characteristics

Symbol	Parameter	Test condition	ns	Min.	Тур.	Max.	Unit
W	Output voltage	$I_O = 50 \text{ mA}, V_I = 15 \text{ V}$		11.88	12	12.12	V
Vo	Output voltage	$I_O = 50 \text{ mA}, V_I = 15 \text{ V}, T_a =$	-25 to 85 °C	11.76		12.24	v
VI	Operating input voltage	I _O = 500 mA	I _O = 500 mA			16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_{I} = 13 \text{ to } 16 \text{ V}, I_{O} = 5 \text{ mA}$			12	60	mV
ΔV_{O}	Load regulation	$V_I = 13.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m}$	Α		12	60	mV
		$V_{I} = 13 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	V _I = 13.3 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 13 V	OFF mode		70	140	μA
			f = 120 Hz		69		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 14 \pm 1 \text{ V}$	f = 1 kHz		64		dB
			f = 10 kHz		54		
eN	Output noise voltage	B = 10 Hz to 100 kHz	-		50		μV
	Drangut voltage	I _O = 200 mA			0.2	0.35	V
V _d	Dropout voltage	I _O = 500 mA			0.4	0.7	V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	V _I = 13 V, V _C = 6 V			10		μΑ
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω , I_{O} = 0 to	500 mA	2	10		μF

Table 28. LF120C electrical characteristics

Symbol	Parameter	Test condition	Test conditions		Тур.	Max.	Unit
V	Output valtage	$I_O = 50 \text{ mA}, V_I = 14 \text{ V}$		11.76	12	12.24	\/
Vo	Output voltage	$I_0 = 50 \text{ mA}, V_1 = 14 \text{ V}, T_a =$	$I_O = 50 \text{ mA}, V_I = 14 \text{ V}, T_a = -25 \text{ to } 85 ^{\circ}\text{C}$			12.48	\ \ \ \ \
VI	Operating input voltage	I _O = 500 mA				16	V
Io	Output current limit				1		Α
ΔV_{O}	Line regulation	$V_I = 13 \text{ to } 16 \text{ V}, I_O = 5 \text{ mA}$			12	60	mV
ΔV_{O}	Load regulation	$V_I = 13.3 \text{ V}, I_O = 5 \text{ to } 500 \text{ m}$	A		12	60	mV
		$V_{I} = 13 \text{ to } 16 \text{ V}, I_{O} = 0 \text{ mA}$			0.7	1.5	
I _d	Quiescent current	V _I = 13.3 to 16 V, I _O = 500 mA	ON mode			12	mA
		V _I = 13 V	OFF mode		70	140	μA
			f = 120 Hz		69		
SVR	Supply voltage rejection	$I_O = 5 \text{ mA}, V_I = 14 \pm 1 \text{ V}$	f = 1 kHz		64		dB
			f = 10 kHz		54		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		μV
\/	Dropout voltage	I _O = 200 mA		0.2		0.35	.,
V _d	Dropout voltage	I _O = 500 mA			0.4	12.48 16 V 60 m' 60 1.5 12 140 µ 0.35 0.7 0.8 V µ µ µ µ µ µ µ µ µ µ µ µ	V
V _{IL}	Control input logic low	T _a = -40 to 125 °C				0.8	V
V _{IH}	Control input logic high	T _a = -40 to 125 °C		2			V
I _I	Control input current	V _I = 13 V, V _C = 6 V			10		μA
C _O	Output bypass capacitance	ESR = 0.1 to 10 Ω, $I_0 = 0$ to	500 mA	2	10		μF

5 Typical performance characteristics



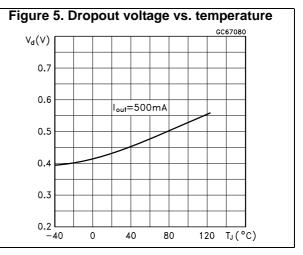


Figure 6. upply current vs. input voltage

ld(mA)

20

16

loui=500mA

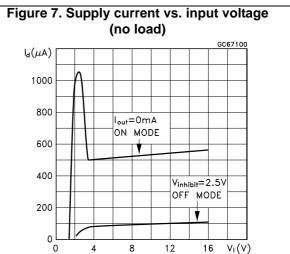
ON MODE

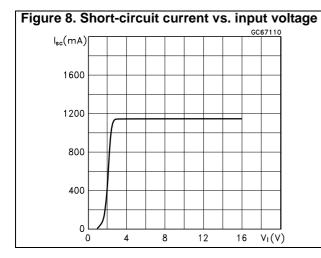
12

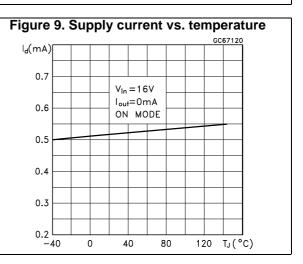
8

4

0
0
4
8
12
16
V_I(V)







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

34/53 DocID2574 Rev 28



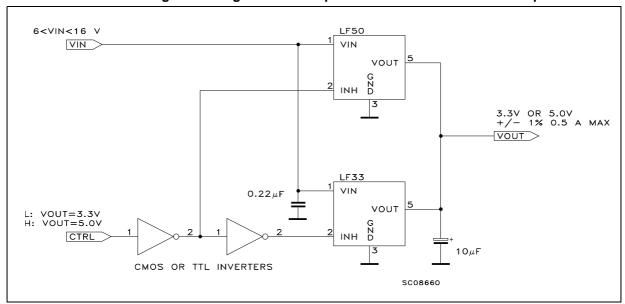
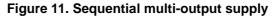
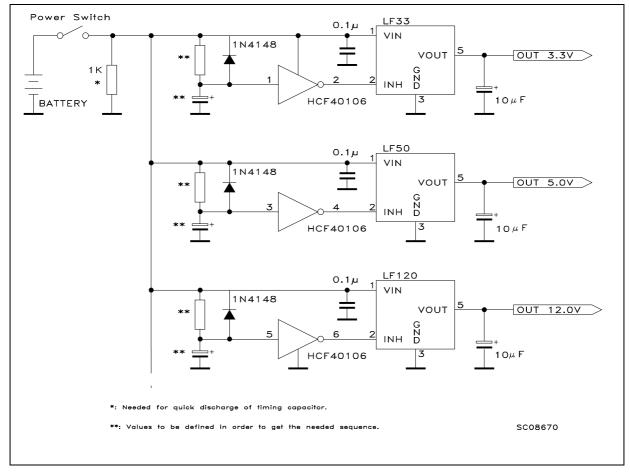


Figure 10. Logic-controlled precision 3.3/5.0 V selectable output





0.1μF LF120 Vcc VOUT _UT_12V> 0.22 µF 470K OZD INH HCF4013 SW ON/OFF D Q S $\overline{\mathsf{Q}}$ LF50 ╫ VOUT -DUT 5V > UZD 10μF

Figure 12. Multiple supply with ON/OFF toggle switch

Figure 13. Basic inhibit functions

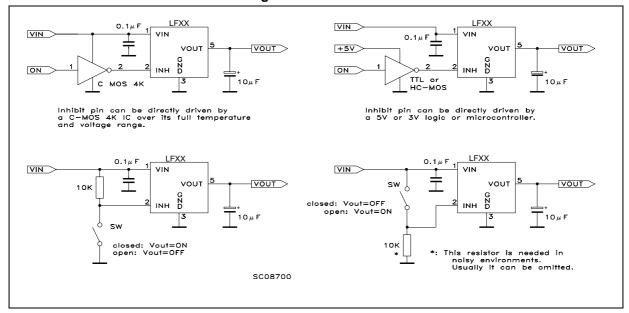




Figure 14. Delayed turn-on

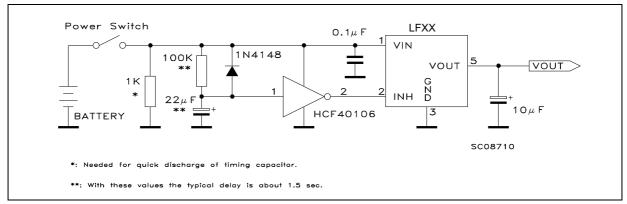
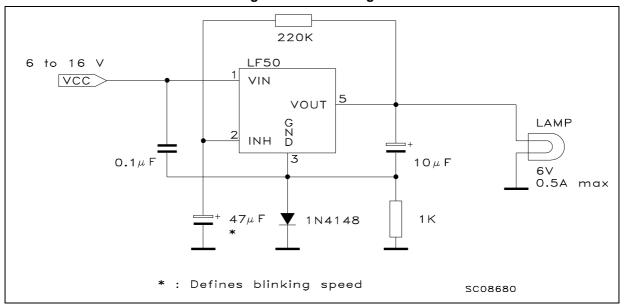


Figure 15. Low voltage bulb blinker



6 Package information

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. ECOPACK[®] is an ST trademark.



6.1 TO-220 package information

TYPE "A" STD-ST øΡ "GATE" Notes 1-2H1 <u>D1</u> L20 L30 b1(X3) b (X3) "GATE" Notes 1-20015988_S

Figure 16. TO-220 (STD-ST dual gauge) package outline

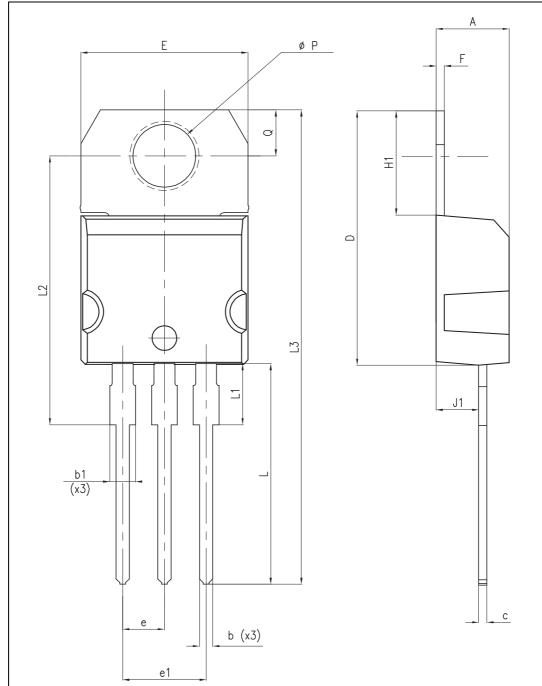


Figure 17. TO-220 (STD-ST single gauge) package outline

577

Table 29. TO-220 mechanical data

Dim.	Type STD - ST dual gauge			Type STD - ST single gauge		
	mm			mm		
	Min.	Тур.	Max.	Min.	Тур.	Max.
А	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
С	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
е	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

Note: Despite of some differences in tolerances, packages are compatible

Dia L6 *L2 L7* L3 F1 **L4** F2 Ε -G1_ 7012510_Rev_K_B

Figure 18. TO-220FP package outline



Table 30. TO-220FP mechanical data

Dim.	mm					
5	Min.	Тур.	Max.			
А	4.4		4.6			
В	2.5		2.7			
D	2.5		2.75			
E	0.45		0.7			
F	0.75		1			
F1	1.15		1.70			
F2	1.15		1.70			
G	4.95		5.2			
G1	2.4		2.7			
Н	10		10.4			
L2		16				
L3	28.6		30.6			
L4	9.8		10.6			
L5	2.9		3.6			
L6	15.9		16.4			
L7	9		9.3			
Dia	3		3.2			

6.2 TO-220 packing information

Figure 19. TO-220 dual gauge tube outline (dimensions in mm)

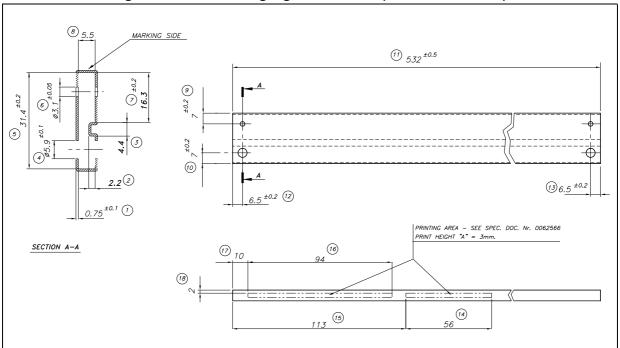
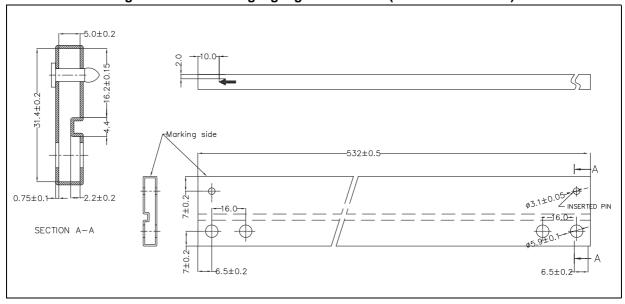


Figure 20. TO-220 single gauge tube outline(dimensions in mm)



47/

6.3 DPAK package information

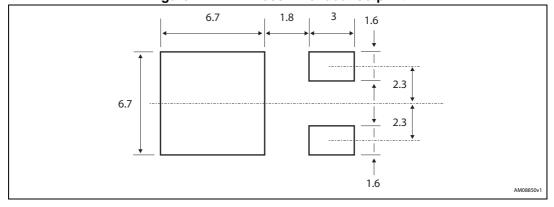
E -THERMAL PAD c2 E1 L2 D1 <u>A 1</u> <u>b(</u>2x) R С SEATING PLANE (L1) *V2* 0,25 0068772_M_type_A

Figure 21. DPAK package outline

Table 31. DPAK mechanical data

Dim.	mm					
	Min.	Тур.	Max.			
А	2.20		2.40			
A1	0.90		1.10			
A2	0.03		0.23			
b	0.64		0.90			
b4	5.20		5.40			
С	0.45		0.60			
c2	0.48		0.60			
D	6.00		6.20			
D1		5.10				
E	6.40		6.60			
E1		4.70				
е		2.28				
e1	4.40		4.60			
Н	9.35		10.10			
L	1.00		1.50			
(L1)		2.80				
L2		0.80				
L4	0.60		1.00			
R		0.20				
V2	0°		8°			

Figure 22. DPAK recommended footprint



6.4 PPAK package information

"GATE" Note 6 THERMAL PAD L2 Ď1 Н A1 B (4x) Note 7 R C SEATING PLANE L5 GAUGE PLANE 0078180_F

Figure 23. PPAK package outline

Table 32. PPAK mechanical data

Dim.	mm				
Dim.	Min.	Тур.	Max.		
А	2.2		2.4		
A1	0.9		1.1		
A2	0.03		0.23		
В	0.4		0.6		
B2	5.2		5.4		
С	0.45		0.6		
C2	0.48		0.6		
D	6		6.2		
D1		5.1			
Е	6.4		6.6		
E1		4.7			
е		1.27			
G	4.9		5.25		
G1	2.38		2.7		
Н	9.35		10.1		
L2		0.8	1		
L4	0.6		1		
L5	1				
L6		2.8			
R		0.20			
V2	0°		8°		

6.5 DPAK and PPAK packing information

Top cover tolerance on tape +/- 0.2 mm

Top cover tape

For machine ref. only including draft and radii concentric around 80

User direction of feed

User direction of feed

AM08852v1

Figure 24. DPAK and PPAK tape outline

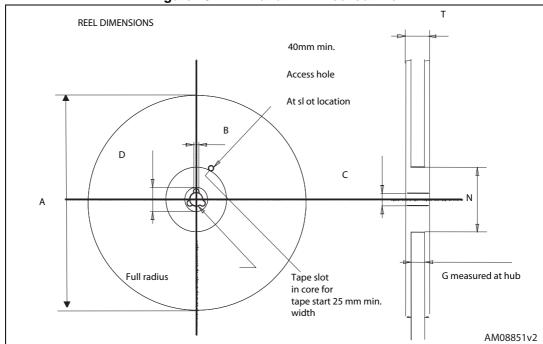


Figure 25. DPAK and PPAK reel outline

Table 33. DPAK and PPAK tape and reel mechanical data

Таре			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.	Dilli.	Min.	Max.
A0	6.8	7	Α		330
В0	10.4	10.6	В	1.5	
B1		12.1	С	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
Е	1.65	1.85	N	50	
F	7.4	7.6	Т		22.4
K0	2.55	2.75			
P0	3.9	4.1		Base qty.	2500
P1	7.9	8.1		Bulk qty.	2500
P2	1.9	2.1			
R	40				
Т	0.25	0.35			
W	15.7	16.3			

LFXX Ordering information

7 Ordering information

Table 34. Order code

Packages					
TO-220	TO-220 (dual gauge)	TO-220FP DPΔK (tane and reel) PPΔK (tane and r		PPAK (tape and reel)	Output voltages
			LF15ABDT-TR		1.5 V
			LF18CDT-TR	LF18CPT-TR	1.8 V
			LF18CDT-TRY ⁽¹⁾		1.8 V
			LF18ABDT-TR	LF18ABPT-TR	1.8 V
			LF25CDT-TR	LF25CPT-TR	2.5 V
			LF25CDT-TRY ⁽¹⁾		2.5 V
			LF25ABDT-TR		2.5 V
			LF25ABDT-TRY ⁽¹⁾		2.5 V
LF33CV	LF33CV-DG		LF33CDT-TR	LF33CPT-TR	3.3 V
			LF33CDT-TRY ⁽¹⁾	LF33CPT-TRY ⁽¹⁾	3.3 V
LF33ABV	LF33ABV-DG		LF33ABDT-TR		3.3 V
LF50CV	LF50CV-DG		LF50CDT-TR	LF50CPT-TR	5 V
			LF50CDT-TRY ⁽¹⁾	LF50CPT-TRY ⁽¹⁾	5 V
LF50ABV	LF50ABV-DG	LF50ABP	LF50ABDT-TR	LF50ABPT-TR	5 V
			LF50ABDT-TRY ⁽¹⁾		5 V
LF60CV			LF60CDT-TR		6 V
LF60ABV			LF60ABDT-TR		6 V
			LF80CDT-TR		8 V
			LF80CDT-TRY ⁽¹⁾		8 V
			LF80ABDT-TR		8 V
			LF85CDT-TR	LF85CPT-TR	8.5 V
			LF85CDT-TRY ⁽¹⁾	LF85CPT-TRY ⁽¹⁾	8.5 V
LF90CV				LF90CPT-TR	9 V
			LF120CDT-TR		12 V
LF120ABV			LF120ABDT-TR		12 V

^{1.} Automotive grade products.

Revision history LFXX

8 Revision history

Table 35. 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 table 1 in cover page.
26-Nov-2007	19	Modified: Table 34.
16-Jan-2008	20	Added new order codes for automotive grade products see <i>Table 34 on page 51</i> .
12-Feb-2008	21	Modified: Table 34 on page 51.
10-Jul-2008	22	Modified: Table 34 on page 51.
05-May-2010	23	Added: <i>Table 29 on page 41</i> , fig 16, fig 17, fig 18 and fig 19.
16-Nov-2010	24	Modified: R _{thJC} value for TO-220 <i>Table 2 on page 7</i> .
10-Feb-2012	25	Added: order code LF33CV-DG and LF33ABV-DG Table 34 on page 51.
09-Mar-2012	26	Added: order code LF50ABV-DG Table 34 on page 51.
28-Feb-2014	27	Changed the part numbers LFxxAB and LFxxC to LFXX. Changed the title. Removed table from cover page. Removed PENTAWATT package from the figure in cover page, the <i>Description</i> and <i>Figure 2</i> . Updated the <i>Description</i> . Updated: <i>Table 2</i> , <i>Table 6</i> , <i>Table 8</i> , <i>Table 10</i> , <i>Table 13</i> , <i>Table 15</i> , <i>Table 17</i> , <i>Table 22</i> , <i>Table 25</i> and <i>Table 34</i> . Changed title of <i>Figure 7</i> . Updated mechanical data.
03-Mar-2015	28	Updated <i>Table 34: Order code</i> . Minor text changes.

IMPORTANT NOTICE - PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics - All rights reserved

