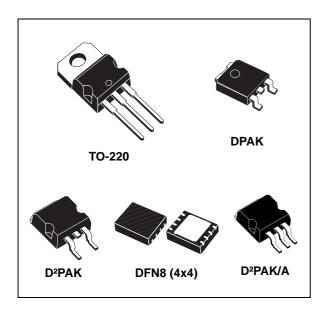


1.5 A adjustable and fixed low drop positive voltage regulator

Datasheet - production data



Features

- Typical dropout: 1.3 V at 1.5 A
- Three-terminal adjustable or fixed output voltage: 1.8 V, 2.5 V, 3.3 V, 5 V, 12 V
- Automotive grade (adjustable V_{OUT} in TO-220 and DPAK packages only)
- Output current guaranteed up to 1.5 A
- Output tolerance: ± 1% at 25 °C and ± 2% in full temperature range
- · Internal power and thermal limit
- Wide operating temperature range 40 °C to 125 °C
- Package available: TO-220, D²PAK, D²PAK/A, DPAK and DFN8 (4x4)
- Pinout compatibility with standard adjustable voltage regulators

Description

The LD1086 is a low drop voltage regulator capable of providing up to 1.5 A of output current. Dropout is guaranteed at a maximum of 1.2 V at the maximum output current, decreasing at lower loads. The LD1086 is pin-to-pin compatible with older 3-terminal adjustable regulators, but has better performance in terms of drop and output tolerance. Unlike PNP regulators, where a part of the output current is wasted as quiescent current. the LD1086 quiescent current flows into the load, increasing efficiency. Only a 10 µF (minimum) capacitor is needed for stability. The device is available in a TO-220, D2PAK, D2PAK/A, DPAK or DFN8 (4x4) package. On-chip trimming allows the regulator to reach a very tight output voltage tolerance; within ± 1% at 25 °C. The LD1086 is available as automotive grade for adjustable output voltages in the TO-220 and DPAK packages. The PAT, SYL, SBL statistical tests have been performed, and the devices are qualified according to the AEC-Q100 specification for the automotive market in the temperature range of - 40 °C to 125 °C.

Contents LD1086

Contents

1	Diag	ram5
2	Pin	configuration
3	Max	mum ratings
4	Sche	ematic application8
5	Elec	trical characteristics9
6	Турі	cal application
7	Pack	rage information
	7.1	TO-220 (STD-ST dual gauge) type A package information 23
	7.2	DPAK package information
	7.3	D²PAK (SMD 2L STD-ST) type A package information
	7.4	D2PAK (SMD 3L STD-ST) type A package information 30
	7.5	DPAK and D ² PAK packing information
	7.6	DFN8 (4x4) package information
	7.7	DFN8 (4x4) packing information
8	Orde	ering information
9	Revi	sion history 40



LD1086 List of tables

List of tables

Table 1.	Absolute maximum ratings	7
Table 2.	Thermal data	
Table 3.	Electrical characteristics of LD1086#18	9
Table 4.	Electrical characteristics of LD1086#25	10
Table 5.	Electrical characteristics of LD1086#33	11
Table 6.	Electrical characteristics of LD1086#50	12
Table 7.	Electrical characteristics of LD1086#12	13
Table 8.	Electrical characteristics of LD1086B#	14
Table 9.	Electrical characteristics of LD1086#	15
Table 10.	Electrical characteristics of LD1086DTTRY and LD1086VY (Automotive grade)	16
Table 11.	TO-220 (STD-ST dual gauge) type A mechanical data	24
Table 12.	DPAK mechanical data	26
Table 13.	D ² PAK (SMD 2L STD-ST) type A mechanical data	29
Table 14.	D ² PAK (SMD 3L STD-ST) type A mechanical data	31
Table 15.	DPAK and D2PAK tape and reel mechanical data	
Table 16.	DFN8 (4x4) mechanical data	36
Table 17.	DFN8 (4x4) reel mechanical data	37
Table 18.	Order code	39
Table 19.	Document revision history	40



List of figures LD1086

List of figures

Figure 1.	Schematic diagram	
Figure 2.	Pin connections (top view)	. 6
Figure 3.	Application circuit	
Figure 4.	Output voltage vs. temp. (VI = 5 V)	
Figure 5.	Output voltage vs. temp. (VI = 15 V)	17
Figure 6.	Output voltage vs. temperature (VI = 4.25 V)	17
Figure 7.	Short circuit current vs. dropout voltage	17
Figure 8.	Line regulation vs. temperature	17
Figure 9.	Load regulation vs. temperature	17
Figure 10.	Dropout voltage vs. temperature	18
Figure 11.	Dropout voltage vs. output current	
Figure 12.	Adjust pin current vs. input voltage	
Figure 13.	Adjust pin current vs. temperature	18
Figure 14.	Adjust pin current vs. output current	18
Figure 15.	Quiescent current vs. output current	18
Figure 16.	Quiescent current vs. input voltage	
Figure 17.	Supply voltage rejection vs. output current	
Figure 18.	Supply voltage rejection vs. frequency	
Figure 19.	Supply voltage rejection vs. temperature	
Figure 20.	Minimum load current vs. temperature	
Figure 21.	Stability for adjustable	
Figure 22.	Stability for 2.85 V	
Figure 23.	Stability for 12 V	
Figure 24.	Line transient (VI = 12 to 13 V)	
Figure 25.	Line transient (IO = 200 mA)	
Figure 26.	Line transient (CADJ = 1 μ F)	
Figure 27.	Load transient	
Figure 28.	Load transient (Trise = Tfall = 10 µs)	
Figure 29.	Thermal protection	
Figure 30.	TO-220 (STD-ST dual gauge) type A package outline	
Figure 31.	DPAK package outline	
Figure 32.	DPAK recommended footprint	
Figure 33.	D ² PAK (SMD 2L STD-ST) type A package outline	
Figure 34.	D ² PAK (SMD 3L STD-ST) type A outline	
Figure 35.	D ² PAK (SMD 3L) recommended footprint	
Figure 36.	DPAK and D ² PAK tape outline	
Figure 37.	DPAK and D ² PAK reel outline	
Figure 38.	DFN8 (4x4) package outline	
Figure 39.	DFN8 (4x4) recommended footprint	
Figure 40.	DFN8 (4x4) tape outline (dimension are in mm)	
Figure 41.	DFN8 (4x4) reel outline	38



LD1086 Diagram

1 Diagram

THERMAL PROTECTION

VIN VIN

Figure 1. Schematic diagram

VOUT

SC14280

Pin configuration LD1086

2 Pin configuration

INPUT INPUT OUTPUT OUTPUT OUTPUT ADJ/GND ADJ/GND TO-220 D²PAK INPUT ⊐ INPUT OUTPUT OUTPUT ADJ/GND ADJ/GND CS00890 **DPAK** D²PAK/A 0 1 NC 8 IN IN NC 2 7 OUTPUT ADJ/GND 3 6 NC 5 NC NC 4 DFN8 (4x4)

Figure 2. Pin connections (top view)

Note: The TAB is physically connected to the output (this is valid for the TO-220 package too).

LD1086 Maximum ratings

3 Maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
VI	DC input voltage	30	V
Io	Output current	Internally Limited	mA
P _D	Power dissipation	Internally Limited	mW
T _{STG}	Storage temperature range	-55 to +150	°C
T _{OP}	Operating junction temperature range	-40 to +125	°C

Note:

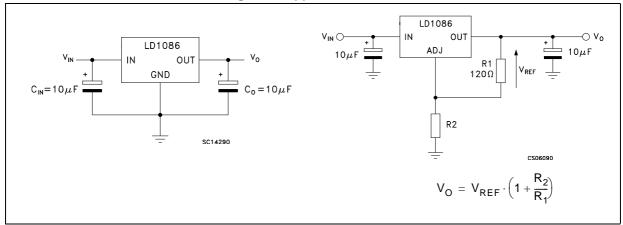
Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

Table 2. Thermal data

Symbol	Parameter	TO-220	D²PAK D²PAK/A	DPAK	DFN8 (4x4)	Unit
R _{thJC}	Thermal resistance junction-case	5	3	8	1.5	°C/W
R _{thJA}	Thermal resistance junction-ambient	50	62.5	100	33	°C/W

4 Schematic application

Figure 3. Application circuit



5 Electrical characteristics

 V_I = 4.8 V, C_I = C_O =10 $\mu F,\, T_A$ = -40 to 125 °C, unless otherwise specified.

Table 3. Electrical characteristics of LD1086#18

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
\/	Output voltage (1)	I _O = 0 mA, T _J = 25 °C	1.782	1.8	1.818	V
$\begin{tabular}{c c} Symbol \\ \hline V_O \\ \hline ΔV_O \\ \hline V_d \\ \hline I_q \\ \hline I_{sc} \\ \hline SVR \\ \hline eN \\ \hline S \\ \hline S \\ \hline \end{tabular}$	Output voltage (*)	$I_0 = 0$ to 1.5 A, $V_1 = 3.4$ to 30 V	1.764	1.8	1.836	V
ΔV _O	Line regulation	$I_O = 0$ mA, $V_I = 3.4$ to 18 V, $T_J = 25$ °C		0.2	4	mV
		$I_O = 0$ mA, $V_I = 3.4$ to 15 V		0.4	4	mV
4)/	Lood regulation	I _O = 0 to 1.5 A, T _J = 25 °C		.782	8	mV
V _O O ΔV _O Li ΔV _O Li V _d D I _q Q I _{sc} S TI SVR S eN (9) S Te	Load regulation	I _O = 0 to 1.5 A		1	16	mV
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
Iq	Quiescent current	V _I ≤ 30 V		5	10	mA
	01	$V_I - V_O = 5 V$	1.5	2		Α
'sc	Short-circuit current	V _I - V _O = 25 V	0.05	0.02		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	$f = 120 \text{ Hz}, C_O = 25 \mu\text{F}, I_O = 1.5 \text{ A}$ $V_I = 6.8 \pm 3 \text{ V}$	60	82		dB
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

^{1.} See short-circuit current curve for available output current at fixed dropout.

Electrical characteristics LD1086

 V_I = 5.5 V, C_I = C_O =10 $\mu F,\, T_A$ = -40 to 125 °C, unless otherwise specified.

Table 4. Electrical characteristics of LD1086#25

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V	Output voltage (1)	$I_O = 0$ mA, $T_J = 25$ °C	2.475	2.5	2.525	V
Vo	Output voltage V	$I_O = 0$ to 1.5 A, $V_I = 4.1$ to 30 V	2.45	2.5	2.55	٧
ΔV _O	Line regulation	$I_O = 0$ mA, $V_I = 4.1$ to 18 V, $T_J = 25$ °C		0.2	4	mV
		$I_O = 0 \text{ mA}, V_I = 4.1 \text{ to } 18 \text{ V}$		0.4	4	mV
4)/	Load regulation	$I_{O} = 0$ to 1.5 A, $T_{J} = 25$ °C		0.5	8	mV
ΔV _O	Load regulation	I _O = 0 to 1.5 A		1	16	mV
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
Iq	Quiescent current	V _I ≤ 30 V		5	10	mA
	Short-circuit current	$V_I - V_O = 5 V$	1.5	2		Α
I _{sc}	Short-circuit current	V _I - V _O = 25 V	0.05	0.2		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	$f = 120 \text{ Hz}, C_O = 25 \mu\text{F}, I_O = 1.5 \text{ A}$ $V_I = 7.5 \pm 3 \text{ V}$	60	81		dB
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

^{1.} See short-circuit current curve for available output current at fixed dropout.



 V_I = 6.3 V, C_I = C_O =10 $\mu F,\, T_A$ = -40 to 125 °C, unless otherwise specified.

Table 5. Electrical characteristics of LD1086#33

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
\/	Output voltage ⁽¹⁾	I _O = 0 mA, T _J = 25 °C	3.267	3.3	3.333	V
۷O	Output voltage V	I _O = 0 to 1.5 A, V _I = 4.9 to 30 V	3.234	3.3	3.366	V
ΔV_{O}	Line regulation	$I_O = 0$ mA, $V_I = 4.9$ to 18 V, $T_J = 25$ °C		0.5	6	mV
		$I_O = 0 \text{ mA}, V_I = 4.9 \text{ to } 18 \text{ V}$		1	3.3 3.333 3.3 3.366 0.5 6 1 6 1 10 7 25 1.3 1.5 5 10 2 0.2 008 0.04 79 003 0.5	mV
V_{O} C ΔV_{O} C ΔV_{O} C	Load regulation	$I_{O} = 0$ to 1.5 A, $T_{J} = 25$ °C		1	10	mV
		I _O = 0 to 1.5 A		7	25	mV
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
Iq	Quiescent current	V _I ≤ 30 V		5	10	mA
,	Oh ant airea it account	$V_I - V_O = 5 V$	1.5	2		Α
Isc	Short-circuit current	V _I - V _O = 25 V	0.05	0.2	3.333 3.366 6 6 10 25 1.5	Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 μ F, I_O = 1.5 A V_I = 8.3 \pm 3 V	60	79		dB
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

^{1.} See short-circuit current curve for available output current at fixed dropout.

Electrical characteristics LD1086

 V_{I} = 8 V, C_{I} = C_{O} =10 $\mu F,\, T_{A}$ = -40 to 125 °C, unless otherwise specified.

Table 6. Electrical characteristics of LD1086#50

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
W	Output voltage ⁽¹⁾	I _O = 0 mA, T _J = 25 °C	4.95	5	5.05	V
$\begin{array}{c} V_{O} \\ \\ \Delta V_{O} \\ \\ \Delta V_{O} \\ \\ V_{d} \\ \\ I_{q} \\ \\ I_{sc} \\ \\ \\ SVR \\ \\ eN \\ \\ S \\ \end{array}$	Output voltage V	I _O = 0 to 1.5 A, V _I = 6.6 to 30 V	4.9	5	5.1	V
ΔV _O	Line regulation	$I_O = 0$ mA, $V_I = 6.6$ to 20V, $T_J = 25$ °C		0.5	10	mV
		$I_O = 0 \text{ mA}, V_I = 6.6 \text{ to } 20 \text{ V}$		1	10	mV
V_{O} C ΔV_{O} L ΔV_{O} S ΔV_{O} C ΔV_{O} L ΔV_{O} L ΔV_{O} S ΔV_{O}	Load regulation	I _O = 0 to 1.5 A, T _J = 25 °C		5	20	mV
	Load regulation	I _O = 0 to 1.5 A		10	35	mV
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
Iq	Quiescent current	V _I ≤ 30 V		5	10	mA
,	0	V _I - V _O = 5 V	1.5	2		Α
Isc	Short-circuit current	V _I - V _O = 25 V	0.05	0.2		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	$f = 120 \text{ Hz}, C_O = 25 \mu\text{F}, I_O = 1.5 \text{ A} $ $V_I = 10 \pm 3 \text{ V}$	60	75		dB
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

^{1.} See short-circuit current curve for available output current at fixed dropout.



 V_I = 15 V, C_I = C_O =10 $\mu F,\, T_A$ = -40 to 125 °C, unless otherwise specified.

Table 7. Electrical characteristics of LD1086#12

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
\/	Output voltage (1)	I _O = 0 mA, T _J = 25 °C	11.88	12	12.12	V
Vo	Output voltage (*)	I _O = 0 to 1.5 A, V _I = 13.8 to 30 V	11.76	12	12.12 12.24 25 25 36 72 3 1.5 10	V
ΔV _O	Line regulation	$I_O = 0$ mA, $V_I = 13.8$ to 25 V, $T_J = 25$ °C		1	25	mV
		I _O = 0 mA, V _I = 13.8 to 25 V		2	25	mV
4)/	Load regulation	$I_{O} = 0$ to 1.5 A, $T_{J} = 25$ °C		.88 12 12.12 .76 12 12.24 1 25 2 25 12 36 24 72 1.3 1.5 5 10 .5 2 05 0.2 0.01 0.04	36	mV
ΔV _O	Load regulation	I _O = 0 to 1.5 A	11.88	mV		
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
Iq	Quiescent current	V _I ≤ 30 V		5	10	mA
	Short-circuit current	$V_I - V_O = 5 V$	1.5	2		Α
I _{sc}	Short-circuit current	V _I - V _O = 25 V	0.05	0.2		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 μ F, I_O = 1.5 A V_I = 17 \pm 3 V	54	66		dB
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

^{1.} See short-circuit current curve for available output current at fixed dropout.

Electrical characteristics LD1086

 V_I = 4.25 V, C_I = C_O =10 $\mu F,\, T_A$ = -40 to 125 °C, unless otherwise specified.

Table 8. Electrical characteristics of LD1086B#

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
		$I_O = 10$ mA $T_J = 25$ °C	1.231	1.25	1.269	V
V _{ref}	Reference voltage (1)	I_O = 10 mA to 1.5 A, V_I = 2.85 to 30 V	1.219	1.25	1.281	V
ΔVO	Line regulation	$I_O = 10 \text{ mA}, V_I = 2.8 \text{ to } 16.5 \text{ V},$ $T_J = 25 \text{ °C}$		0.015	0.2	%
V_{ref} F ΔV_{O} L ΔV_{O} L V_{d} E $I_{O(min)}$ M I_{sc} S I_{ADJ} A ΔI_{ADJ} A ΔI_{ADJ} A ΔI_{ADJ} A		I _O = 10 mA, V _I = 2.8 to 16.5 V		0.035	0.2	%
4)/	Load regulation	I_{O} = 10 mA to 1.5 A, T_{J} = 25 °C	1.231 1.25 1.219 1.25 0.015	0.3	%	
Δνο	Load regulation	I _O = 0 to 1.5 A		0.2	0.4	%
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
I _{O(min)}	Minimum load current	V _I = 30 V		3	10	mA
	Short-circuit current	$V_I - V_O = 5 V$	1.5	2.3		Α
Isc	Short-circuit current	V _I - V _O = 25 V	0.05	0.2		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	$ f = 120 \text{ Hz}, C_O = 25 \mu\text{F}, C_{ADJ} = 25 \mu\text{F}, \\ I_O = 1.5 \text{ A}, \ V_I = 6.25 \pm 3 \text{ V} $	60	88		dB
I _{ADJ}	Adjust pin current	V _I = 4.25 V, I _O = 10 mA		40	120	μΑ
Δl _{ADJ}	Adjust pin current change (1)	I_O = 10 mA to 1.5 A, V_I = 2.8 to 16.5 V		0.2	5	μΑ
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

^{1.} See short-circuit current curve for available output current at fixed dropout.



 V_I = 4.25 V, C_I = C_O =10 $\mu F,\, T_A$ = -40 to 125 °C, unless otherwise specified.

Table 9. Electrical characteristics of LD1086#

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
		$I_O = 10$ mA $T_J = 25$ °C	1.237	1.25	1.263	V
V _{ref}	Reference voltage (1)	I_O = 10 mA to 1.5 A, V_I = 2.85 to 30 V	1.225	1.25	1.275	V
ΔVO	Line regulation	$I_O = 10 \text{ mA}, V_I = 2.8 \text{ to } 16.5 \text{ V},$ $T_J = 25 \text{ °C}$		0.015	0.2	%
V_{ref} F ΔV_{O} L ΔV_{O} L V_{d} E $I_{O(min)}$ M I_{sc} S I_{ADJ} A ΔI_{ADJ} A ΔI_{ADJ} A ΔI_{ADJ} A		I _O = 10 mA, V _I = 2.8 to 16.5 V		0.035	0.2	%
4)/	Load regulation	I_{O} = 10 mA to 1.5 A, T_{J} = 25 °C		0.1	0.3	%
Δνο	Load regulation	I _O = 0 to 1.5 A		0.2	0.4	%
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
I _{O(min)}	Minimum load current	V _I = 30 V		3	10	mA
	Short-circuit current	$V_I - V_O = 5 V$	1.5	2.3		Α
Isc	Short-circuit current	V _I - V _O = 25 V	0.05	0.2		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	$ f = 120 \text{ Hz}, C_O = 25 \mu\text{F}, C_{ADJ} = 25 \mu\text{F}, \\ I_O = 1.5 \text{ A}, \ V_I = 6.25 \pm 3 \text{ V} $	60	88		dB
I _{ADJ}	Adjust pin current	V _I = 4.25 V, I _O = 10 mA		40	120	μΑ
Δl _{ADJ}	Adjust pin current change (1)	I_O = 10 mA to 1.5 A, V_I = 2.8 to 16.5 V		0.2	5	μΑ
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

^{1.} See short-circuit current curve for available output current at fixed dropout.



Electrical characteristics LD1086

 V_I = 4.25 V, C_I = C_O =10 $\mu F,\, T_A$ = -40 to 125 °C, unless otherwise specified.

Table 10. Electrical characteristics of LD1086DTTRY and LD1086VY (Automotive grade)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V	Reference voltage (1)	$I_O = 10 \text{ mA T}_A = 25 \text{ °C}$	1.237	1.25	1.263	V
V _{ref}	Reference voltage V	I_{O} = 10 mA to 1.5 A, V_{I} = 2.85 to 30 V	1.225	1.25	1.275	V
ΔV_{O}	Line regulation	$I_O = 10 \text{ mA}, V_I = 2.8 \text{ to } 16.5 \text{ V}$		0.035	0.2	%
ΔV _O	Load regulation	I _O = 0 to 1.5 A		0.2	0.4	%
V _d	Dropout voltage	I _O = 1.5 A		1.3	1.5	V
I _{O(min)}	Minimum load current	V _I = 30 V		3	10	mA
		V _I - V _O = 5 V, T _A = 25 °C	1.5	2.3		Α
I _{sc}	Short-circuit current	V _I - V _O = 25 V, T _A = 25 °C	0.05	0.2		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	$ \begin{array}{l} f = 120 \; Hz, \; C_O = 25 \; \mu F, C_{ADJ} = 25 \; \mu F, \\ I_O = 1.5 \; A, \; V_I = 6.25 \pm 3 \; V, \; T_A = 25 \; ^{\circ}C \\ \end{array} $	60	88		dB
I _{ADJ}	Adjust pin current	V _I = 4.25 V, I _O = 10 mA		40	120	μΑ
ΔI_{ADJ}	Adjust pin current change (1)	$I_O = 10 \text{ mA to } 1.5 \text{ A}, V_I = 2.8 \text{ to } 16.5 \text{ V}$		0.2	5	μΑ
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 Hrs		0.5		%

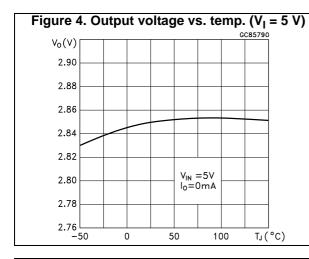
^{1.} See short-circuit current curve for available output current at fixed dropout.



LD1086 Typical application

6 Typical application

Unless otherwise specified $T_J = 25$ °C, $C_I = C_O = 10 \mu F$.



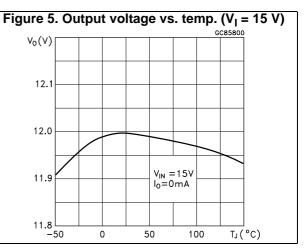


Figure 6. Output voltage vs. temperature
(V_I = 4.25 V)

V_O(V)

1.26

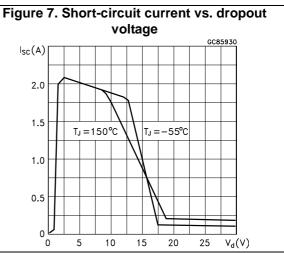
1.24

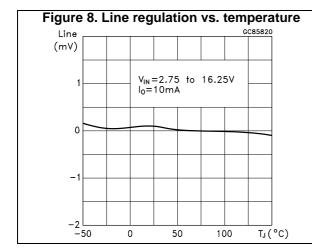
1.22

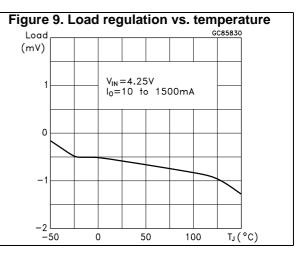
V_{IN} = 4.25V
I_O = 10mA

100

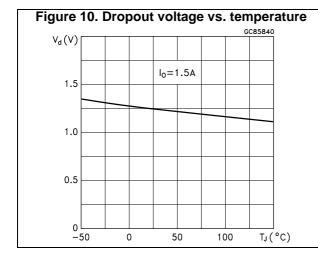
T_J(°C)

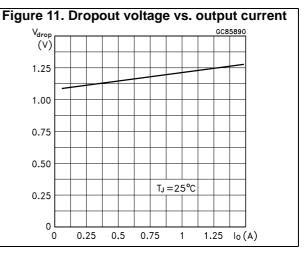


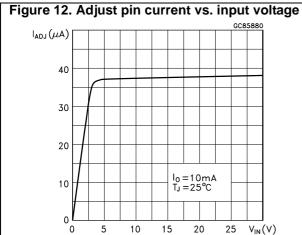


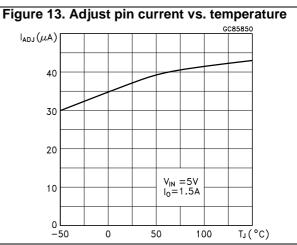


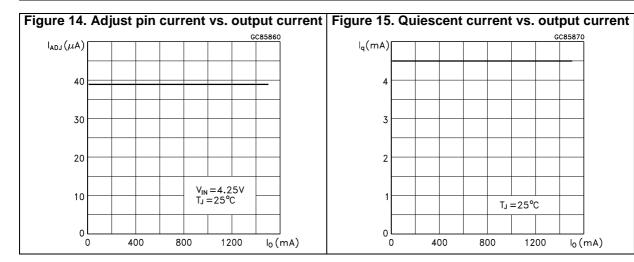
Typical application LD1086

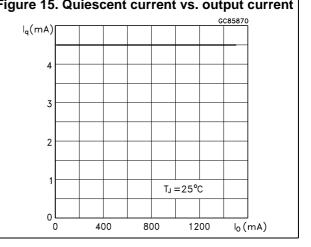












LD1086 Typical application

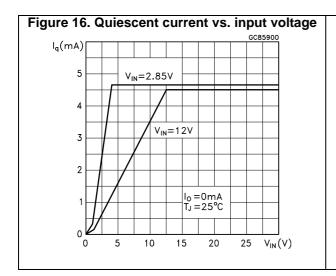
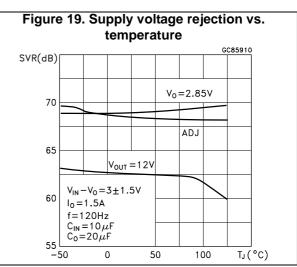
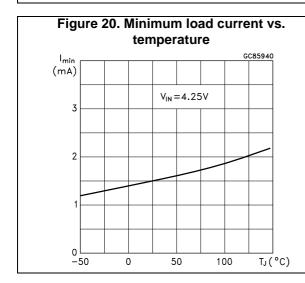
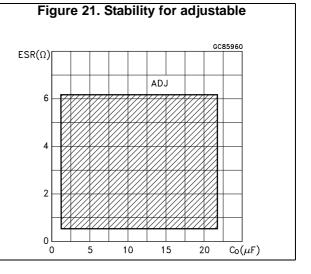


Figure 17. Supply voltage rejection vs. output current GC85950 SVR(dB) ADJ 70 $V_0 = 2.85V$ 65 $V_0 = 12V$ $V_{IN} - V_{O} = 3 \pm 1.5 V$ 60 $I_0=1.5A$ f=120Hz $C_{IN} = 10 \mu F$ $C_0 = 20 \mu F$ 1000 1250 lo(mA) 250 750 500

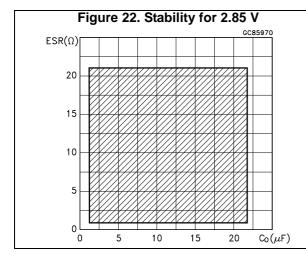
Figure 18. Supply voltage rejection vs. frequency SVR(dB) 80 ADJ 2.85 500mVpp 60 120 40 $V_{IN} = (V_0 + 3.5V) \pm 1.5V$ $I_0 = 1.5A$ $T_J = 25^{\circ}C$ 20 $C_{IN} = 10 \mu F$ $C_{O} = 20 \mu F$ 100 1000 10000 f(KHz)

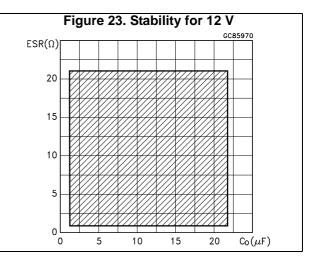


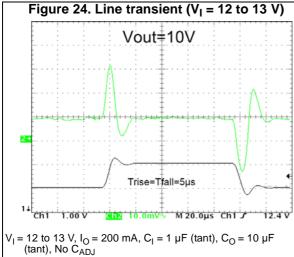


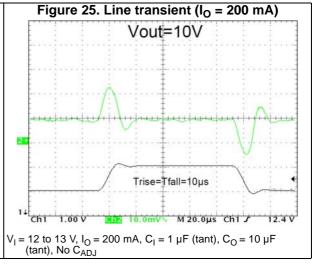


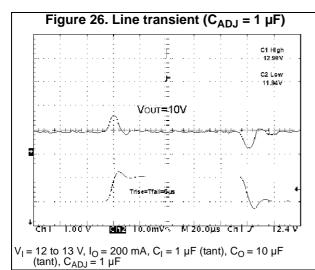
Typical application LD1086

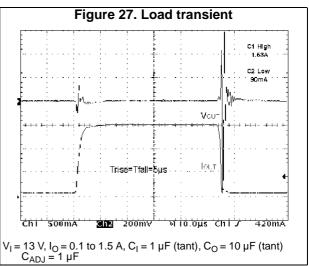




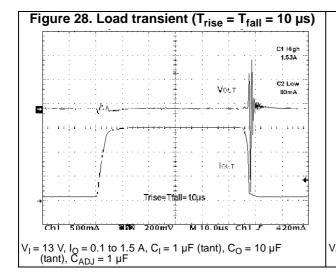


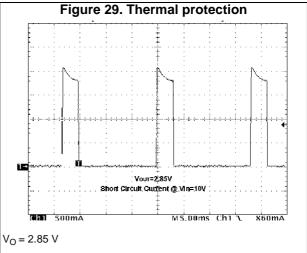






LD1086 Typical application





7 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.



LD1086 Package information

7.1 TO-220 (STD-ST dual gauge) type A package information

Figure 30. TO-220 (STD-ST dual gauge) type A package outline øΡ H1 L20 L30 <u>L</u>1 b1(X3) b (X3)

0015988_typeA_Rev_T

Table 11. TO-220 (STD-ST dual gauge) type A mechanical data

Dim		mm	
Dim. —	Min.	Тур.	Max.
Α	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
С	0.48		0.70
D	15.25		15.75
D1		1.27	
Е	10		10.40
е	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
ØP	3.75		3.85
Q	2.65		2.95

LD1086 Package information

7.2 DPAK package information

E -THERMAL PAD c2 L2 D 1 <u>L4</u> <u>b(</u>2x) R С SEATING PLANE *A2* (L1) *V2* GAUGE PLANE 0068772_K

Figure 31. DPAK package outline

Table 12. DPAK mechanical data

Dim.		mm				
Dim.	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°			

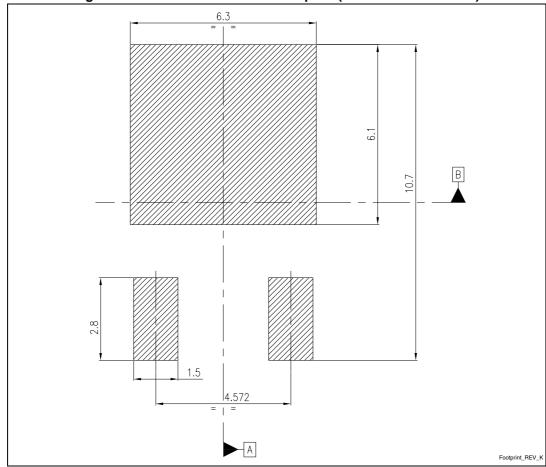


Figure 32. DPAK recommended footprint (dimension are in mm)

7.3 D²PAK (SMD 2L STD-ST) type A package information

SEATING PLANE
COPLANARITY A1

GALCE PLANE
V2

0079457. T

DocID6739 Rev 35

Figure 33. D2PAK (SMD 2L STD-ST) type A package outline

LD1086 Package information

Table 13. D²PAK (SMD 2L STD-ST) type A mechanical data

Dim	mm				
Dim.	Min.	Тур.	Max.		
Α	4.40		4.60		
A1	0.03		0.23		
b	0.70		0.93		
b2	1.14		1.70		
С	0.45		0.60		
c2	1.23		1.36		
D	8.95		9.35		
D1	7.50				
Е	10		10.40		
E1	8.50				
е		2.54			
e1	4.88		5.28		
Н	15		15.85		
J1	2.49		2.69		
L	2.29		2.79		
L1	1.27		1.40		
L2	1.30		1.75		
R		0.4			
V2	0°		8°		

7.4 D²PAK (SMD 3L STD-ST) type A package information

c2-D1 (3x) b_ THERMAL PAD -**b2** (2x) SEATING PLANE A1 COPLANARITY 0.25 GAUGE PLANE 7106164_E

Figure 34. D²PAK (SMD 3L STD-ST) type A outline

577

LD1086 Package information

Table 14. D²PAK (SMD 3L STD-ST) type A mechanical data

Dim		mm	
Dim.	Min.	Тур.	Max.
А	4.40		4.60
A1	0.03		0.23
b	0.70		0.93
b1	0.80		1.30
b2	1.14		1.70
С	0.45		0.60
c2	1.23		1.36
D	8.95		9.35
D1	7.50		
Е	10		10.40
E1	8.50		
е		2.54	
e1	4.88		5.28
Н	15		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
R		0.4	
V2	0°		8°

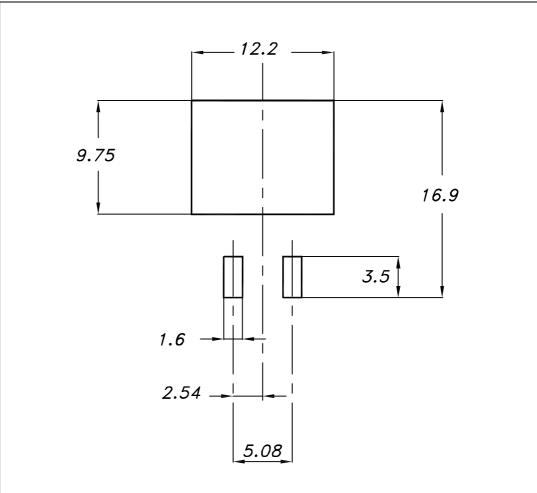


Figure 35. D²PAK (SMD 3L) recommended footprint

LD1086 Package information

7.5 DPAK and D2PAK packing information

Figure 36. DPAK and D2PAK tape outline

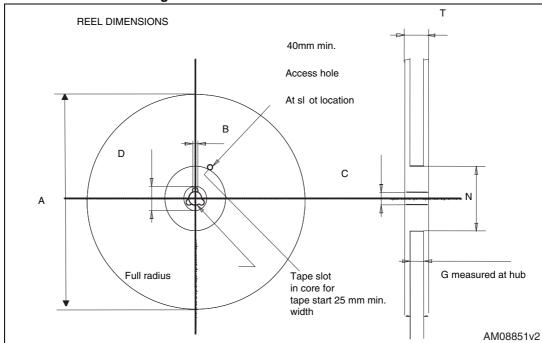


Figure 37. DPAK and D2PAK reel outline

Table 15. DPAK and D2PAK tape and reel mechanical data

Таре				Reel	
Dim.	mm		Dim.	mm	
Dilli.	Min.	Max.	Dilli.	Min.	Max.
A0	6.8	7	А		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			

LD1086 Package information

7.6 DFN8 (4x4) package information

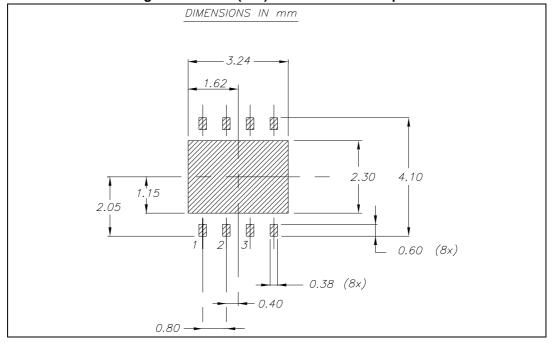
BOTTOM VIEW D2 -EXPOSED PAD PIN 1 ID -E2 - b 8x // 0.1 C -*A3* SEATING PLANE ○ 0.08 C LEADS COPLANARITY PIN 1 ID -**-**D/2→ TOP VIEW 7869653_B

Figure 38. DFN8 (4x4) package outline

Table 16. DFN8 (4x4) mechanical data

Dim.	mm.				
Dilli.	Min.	Тур.	Max.		
Α	0.80	0.90	1		
A1	0	0.02	0.05		
A3		0,20			
b	0.23	0.30	0.38		
D	3.90	4	4.10		
D2	2.82	3	3.23		
E	3.90	4	4.10		
E2	2.05	2.20	2.30		
е		0.80			
L	0.40	0.50	0.60		

Figure 39. DFN8 (4x4) recommended footprint



LD1086 Package information

7.7 DFN8 (4x4) packing information

--8.0000 - 2.0000 **-**-4.000¢ 0.3000-ڑے005∤ Ø0.6000 5.5000 12,0000 4.3500 1.1000--4.3500 <u>Section A - A</u> NOTES: 1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2 4,35 4,35 1,1 2. CABER IN COMPLIANCE WITH EIA 481
3. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED
AS TRUE POSITION OF POCKET, NOT POCKET HOLE P₂ 2.0±0.1 (I) Po 4.0±0.1 (II) 0.30 ±0.05 E1 -1.75±0.1 \oplus $\widehat{\underline{\mathbb{B}}}$ SECTION Y-Y DETAIL 'A' 4.30 +/- 0.1 Во 4.30 +/- 0.1 1.10 +/- 0.1 Measured from centreline of sprocket hole to centreline of pocket. Cumulative tolerance of 10 sprocket holes is ± 0.20 . Measured from centreline of sprocket hole to centreline of pocket. Other material available. (1) (II) (III) Р1 8.00 +/- 0.1 12.00 +/- 0.3 7279936 (IV)

Figure 40. DFN8 (4x4) tape outline (dimension are in mm)

Table 17. DFN8 (4x4) reel mechanical data

			· /			
Dim.		mm.			inch.	
	Min.	Тур.	Max.	Min.	Тур.	Max.
А			330			12.992
С	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
Т			22.4			0.882

A D D Note: Drawing not in scale

Figure 41. DFN8 (4x4) reel outline

8 Ordering information

Table 18. Order code

Packages						
TO-220	D²PAK	D²PAK/A	DPAK	DFN8 (4x4)	Output voltages	
LD1086V18-DG	LD1086D2T18TR		LD1086DT18TR		1.8 V	
			LD1086DT25TR		2.5 V	
LD1086V33-DG	LD1086D2T33TR	LD1086D2M33TR	LD1086DT33TR		3.3 V	
	LD1086D2T50TR		LD1086DT50TR		5.0 V	
	LD1086D2T12TR				12.0 V	
LD1086V-DG	LD1086D2TTR	LD1086D2MTR	LD1086DTTR	LD1086PUR	ADJ	
LD1086VY (1)			LD1086DTTRY (2)		ADJ	
LD1086BV-DG	LD1086BD2TTR	LD1086BD2MTR	LD1086BDTTR		ADJ	

^{1.} Automotive grade products.

Revision history LD1086

9 Revision history

Table 19. Document revision history

Date	Revision	Changes
16-May-2006	14	Order codes updated and new template.
19-Jan-2007	15	D²PAK mechanical data updated and add footprint data.
05-Apr-2007	16	Order codes updated.
07-Jun-2007	17	Order codes updated.
19-Jul-2007	18	Add note on Figure 2.
03-Dec-2007	19	Modified: Table 18.
31-Jan-2008	20	Added new order codes for Automotive grade products.
18-Feb-2008	21	Modified: Table 18 on page 39.
14-Jul-2008	22	Modified: Table 1 on page 7 and Table 18 on page 39.
10-Mar-2010	23	Added: Table 12 on page 26, Figure 30 on page 23, Figure 31 on page 25, Figure 31 and Figure 32 on page 27.
15-Nov-2010	24	Modified: RthJC value for TO-220 Table 2 on page 7.
11-Jul-2011	25	Modified: Figure 24, Figure 25 on page 20 and Table 18 on page 39.
10-Feb-2012	26	Added: order code LD1086V-DG Table 18 on page 39.
15-Mar-2012	27	Added: new order code LD1086PUR Table 18 on page 39 and new package mechanical data DFN8 (4x4 mm) Table 16 on page 36, Figure 38 on page 35, Figure 39 on page 36, Figure 40 on page 37 and Figure 41 on page 38.
19-Oct-2012	28	Added: RthJA value for DPAK Table 2 on page 7.
13-Feb-2013	29	Modified: Output voltage in Voltage reference parameter Table 8 on page 14 and Table 10 on page 16.
01-Mar-2013	30	Modified: DFN8 (4 x 4) pin configuration Figure 2 on page 6.
17-Jun-2013	31	Added Table 8: Electrical characteristics of LD1086B# and Section 7.7: DFN8 (4x4) packing information. Updated Section 7: Package information and Table 18: Order code. Minor text changes.
22-Oct-2013	32	RPN LD1086xx changed to LD1086. Updated the Description in cover page. Cancelled Table 1: Device summary. Updated Figure 2: Pin connections (top view), Section 5: Electrical characteristics, Section 7: Package information and Table 18: Order code. Minor text changes.
18-Dec-2014	33	Updated Table 6.: Electrical characteristics of LD1086#50, Section 7: Package information and Section 7.7: DFN8 (4x4) packing information. Minor text changes.

LD1086 Revision history

Table 19. Document revision history (continued)

Date	Revision	Changes
10-Feb-2015	34	Updated Table 18: Order code. Minor text changes.
16-Nov-2015	35	Updated Section 7: Package information and Table 18: Order code. 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

