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1A BICMOS VERY LOW DROPOUT REGULATORS

PRELIMINARY DATA SHEET

DESCRIPTION

The LX8610 family are positive very low dropout regulators. They are designed to provide a power supply for very low headroom applications, such as 3.3V - 2.5V.

BiCMOS technology allows an effective series pass element resistance, $R_{DS(ON)}$ of $250 \mathrm{m}\Omega$ resulting in a typical dropout voltage of $250 \mathrm{mV}$ at 1A.

Low Quiescent Current and Logic-Controlled Shutdown help conserve battery life and increase system efficiency. Typical quiescent current is under 400µA irrespective of load current, while the

shutdown current is only 10µA. The device will enter shutdown mode when the ENABLE pin is pulled low.

Thermal and Short-Circuit Current Limiting: the LX8610 limits the current when the output is shorted, so protecting sensitive load circuits. The device will also turn off if the junction temperature exceeds 165°C.

Available in small outline SOT-223 and 8-pin SOIC: adjustable versions use the 8-pin SOIC, and fixed output voltage devices are supplied in the 3-lead SOT-223

KEY FEATURES

- Dropout Voltage Typically 250mV At 1A And 50mV At 10mA
- Low Quiescent Current, Under 400µA, Irrespective Of Load
- Shutdown Current 10uA
- Adjustable Output Version In 8-Pin SOIC Package
- Fixed Outputs Of 2.5V, 3.3V Available In 3-Pin SOT-223 Package
- Low Reverse Leakage Current
- Short-Circuit And Thermal Shutdown Protection

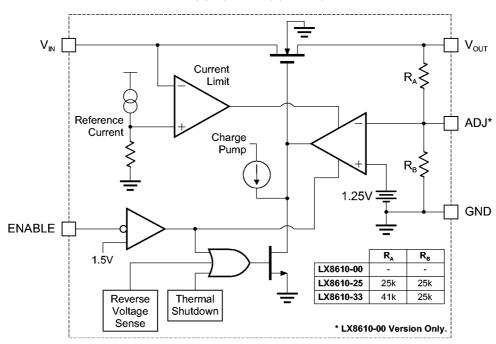
APPLICATIONS

- 3.3V & 2.5V Supplies For Memory, Microprocessors, Clock Circuits, Etc.
- Portable Equipment

NOTE: For current data & package dimensions, visit our web site: http://www.linfinity.com.

PRODUCT HIGHLIGHT

LX8610-XX BLOCK DIAGRAM



PACKAGE ORDER INFORMATION				
T _A (°C)	Output Voltage	ST Plastic SOT-223 3-pin	DM Plastic SOIC 8-pin	
	3:3	LX8610- ₃₃ CST	LX8610- ₃₃ CDM	
0 to 70	2.5	LX8610-25CST	LX8610-25CDM	
	ADJ (00)	-	LX8610-00CDM	

Note: All surface-niount packages are available in Tape & Reel, append the letter "T" to part number. (i.e. LX8610-xxCDMT)

PRELIMINARY DATA SHEET

ABSOLUTE MAXIMUM RATINGS (Note 1)

Input Voltage (V _{IN})	6.5V
Enable Pin	
Operating Junction Temperature	
Plastic (ST & DM Packages)	
Storage Temperature Range	65°C to 150°C
Lead Temperature (Soldering, 10 seconds)	300°C

Note 1. Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

THERMAL DATA

ST PACKAGE:

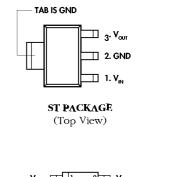
THERMAL RESISTANCE-JUNCTION TO TAB, $\theta_{_{\mathrm{JT}}}$	15°C/W
THERMAL RESISTANCE-JUNCTION TO AMBIENT, $\theta_{_{JA}}$	*150°C/W
DM PACKAGE:	
THERMAL RESISTANCE-JUNCTION TO AMBIENT, $\theta_{_{JA}}$	165°C/W

Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.

The θ_{l_A} numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

* θ_{JA} can be improved with package soldered to 0.51N² copper area over backside ground plane or internal power plane. θ_{JA} can vary from 20°C/W to > 40°C/W depending on mounting technique.

PACKAGE PIN OUTS





FUNCTIONAL PIN DESCRIPTION

Pin Designator	Description
V_{IN}	Positive supply input for the regulator. Bypass to GND with at least 2.2µF of low ESR, ESL capacitance if supply source is further than 1 inch from the device.
V _{оит}	Output for the regulator. It is recommended to bypass to GND with at least 10µF although this is not required for regulation, rather its needed for transient response. Size your output capacitor to meet the transient loading requirement. If you have a very dynamic load, a larger capacitor will improve the response to these load steps.
GND	Reference ground. The input and output decoupling capacitors should be connected to this pin. In addition the tab on the SOT-223 package and pins 2, 3, 6 and 7 on the SOIC package are also used for heatsinking the device.
ADJ	Feedback pin for the regulator. For the LX8610-00, the output voltage can be set by two external resistors with the following relationship: $V_{\text{OUT}} = 1.25\text{V} * (1+\text{R2/R1})$ where R1 is the resistor connected between V_{OUT} and ADJ, and R2 is the resistor connected between ADJ and GND pin.
ENABLE	Enable input. This pin has a threshold of about 1.5V, it should be actively pulled high to enable the regulator. This can be accomplished with a resistive pull-up or controlled by a logic gate. When low, it turns off the regulator and puts the device in a low current shutdown state.



PRELIMINARY DATA SHEET

RECOMMENDED OPERATING CONDITIONS **Recommended Operating Conditions Symbol** Units **Parameter** Input Voltage V_{IN} 2.5 5.5 10 1000 Load Current (with adequate heatsinking) mΑ Input Capacitor (V_{IN} to GND) 2.2 μF Output Capacitor (V_{OUT} to GND) 10

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over the operating ambient temperatures for the LX8610-xxC with 0°C \leq $T_A \leq$ 70°C; $V_{IN} = V_{OUT} + 1.5V$; $I_{OUT} = 10n_{IA}$; I_{OU

LX8610-33 Fixed 3.3V, 1A

Parameter	Symbol	Test Conditions	LX8610-33			11-24-
			Min.	Тур.	Max.	Units
Output Voltage	V _{OUT}	T _J = 25°C	3.25	3.3	3.35	٧
		Over Temperature	3.22		3.38	٧
Line Regulation	V _{REG}	$V_{IN} = 3.45 \text{V to } 5.5 \text{V}$		4	8	m۷
Load Regulation	I _{REG}	I _{OUT} = 10mA to 1A		5	10	m۷
Dropout Voltage (V _{DO} = V _{IN} - V _{OUT})		$I_{OUT} = 1A$, $V_{OUT} = \Delta V_{OUT} - 1\%$		0.25	0.4	٧
	V _{DO}	$I_{OUT} = 0.5A$, $V_{OUT} = \Delta V_{OUT} - 1\%$		0.15	0.25	٧
		$I_{OUT} = 10 \text{mA}$, $V_{OUT} = \Delta V_{OUT} - 1\%$		0.05	0.15	٧
Current Limit	I _{CL}	$V_{OUT} = V_{OUT} - 1\%$	1.1	1.3	1.8	Α
Short Circuit Current	I _{sc}	$V_{OUT} = 0V$	1	1.25	1.7	Α
Quiescent Current	l _o	I _{OUT} = 10mA to 1A		400	600	μA
Reverse Leakage Current		$0V < V_{IN} < V_{OUT}, V_{OUT} < 3.4V (at V_{OUT})$		400	650	μA
		$0V < V_{IN} < V_{OLIT} / V_{OLIT} < 3.4V (at V_{IN})$	-50	0		mA
Enable Threshold *			0.8	1.5		٧
Shutdown Current *				10	25	μA

LX8610-25 Fixed 9.5V. 1A

Parameter	Symbol	Test Conditions	LX8610-25			l luit-
			Min.	Тур.	Max.	Units
Output Voltage	V _{OUT}	$T_J = 25$ °C	2.46	2.5	2.54	٧
		Over Temperature	2.44	2.5	2.56	٧
Line Regulation	V _{REG}	$V_{IN} = 3.1V \text{ to } 5.5V, I_{OUT} = -10\text{mA}$		3	6	m۷
Load Regulation	I _{REG}	I _{OUT} = 10mA to 1A		5	10	m۷
Dropout Voltage $(V_{DO} = V_{IN} - V_{OUT})$		$I_{OUT} = 1A$, $V_{OUT} = \Delta V_{OUT} - 1\%$		0.25	0.4	٧
	V _{DO}	$I_{OUT} = 0.5A$, $V_{OUT} = \Delta V_{OUT} - 1\%$		0.15	0.25	٧
		$I_{OUT} = 10$ mA, $V_{OUT} = \Delta V_{OUT} - 1\%$		0.05	0.1	٧
Current Limit	I _{CL}	$V_{OUT} = V_{OUT} - 1\%$	1.1	1.3	1.8	Α
Short Circuit Current	I _{sc}	V _{OUT} = 0V	1	1.25	1.7	Α
Quiescent Current	l _o	I _{OUT} = 10mA to 1A		300	600	μΑ
Reverse Leakage Current		$0V < V_{IN} < V_{OUT}, V_{OUT} < 2.6V (at V_{OUT})$		400	650	μA
		$0V < V_{IN} < V_{OUT}$, $V_{OUT} < 2.6V$ (at V_{IN})	-50	0		mA
Enable Threshold *		* '	0.8	1.5		٧
Shutdown Current *				10	25	μA

^{*} $E_{\rm nable}$ Threshold and Shutdown Current apply only to 8-pin SOIC package outline versions.



PRELIMINARY DATA SHEET

ELECTRICAL CHARACTERISTICS (Continued)

LX8610-00 Adjustable Output, 1A

Parameter	Symbol	Test Conditions	LX8610-00			l leside
			Min.	Тур.	Max.	Units
Reference Voltage	V _{REF}	T _J = 25°C	1.238	1.25	1.262	٧
	1.2	Over Temperature	1.225	1.25	1.270	٧
Line Regulation	V _{REG}	$V_{IN} = V_{OUT} + 150 \text{mV}$ to 5.5V, $I_{OUT} = 10 \text{mA}$		2	4	m۷
Load Regulation	I _{REG}	I _{OUT} = 10mA to 1A		7	15	m۷
Dropout Voltage $(V_{DO} = V_{OUT} - V_{IN})$		$I_{OUT} = 1A, V_{IN} > 4V$		0.25	0.4	٧
	V _{DO}	$I_{OUT} = 0.5A, V_{IN} > 3V$		0.15	0.25	٧
		$I_{OUT} = 10 \text{mA}, V_{IN} > 3 \text{V}$		0.05	0.15	٧
Current Limit	l _{cL}	$V_{OUT} = V_{OUT} - 1\%$	1.1	1.3	1.8	Α
Short Circuit Current	I _{sc}	$V_{OUT} = 0V$	1	1.25	1.7	Α
Quiescent Current	l _o	$I_{OUT} = 10 \text{mA to } 1 \text{A, } V_{IN} = 5.5 \text{V}$		400	600	μA
Reverse Leakage Current		$0V < V_{IN} < V_{OUT}, V_{OUT} < 5.5V (at V_{OUT})$		400	650	μA
		$0V < V_{IN} < V_{OUT}, V_{OUT} < 5.5V (at V_{IN})$	-50	0		mA
Bias Current at ADJ Pin				100	250	nA
Enable Threshold			0.8	1.5		٧
Shutdown Current		Enable < 0.8V		10	25	μA

TYPICAL APPLICATION

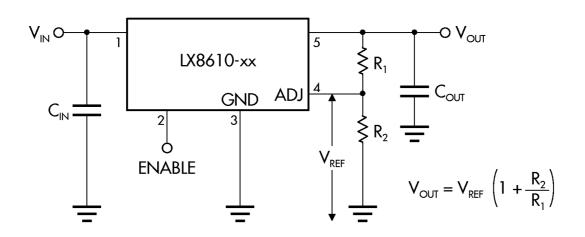


FIGURE 1 — Typical Application

PRELIMINARY DATA SHEET

CHARACTERISTIC CURVES

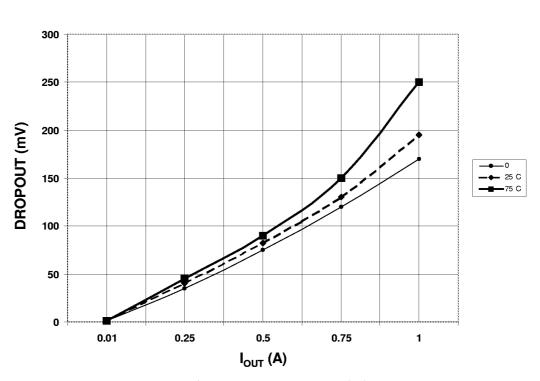


FIGURE 2 — Dropout Voltage vs. Output Current (Typical - LX8610-25CST)

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