

CHANGE NOTIFICATION



Linear Technology Corporation
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March 07, 2014

Dear Sir/Madam:

PCN# 030714

Subject: Notification of Change to LTC3621/LTC3621-2 Datasheet

Please be advised that Linear Technology Corporation has made changes to the LTC3621 product datasheet in order to reflect the following:

Frequency synchronization capability and performance is now documented and guaranteed. The MODE pin has been renamed MODE/SYNC accordingly. Fixed output voltage options are now offered. Several parametric specifications have been adjusted in order to improve manufacturability. These changes are shown on the attached pages of the marked-up datasheet. Product shipped after May 8, 2014 will be tested to the new limits.

Should you have any further questions, please feel free to contact me at 408-432-1900 ext. 2077, or by e-mail at JASON.HU@linear.com. If I do not hear from you by May 8, 2014, we will consider this change approved by your company.

Sincerely,

Jason Hu
Quality Assurance Engineer

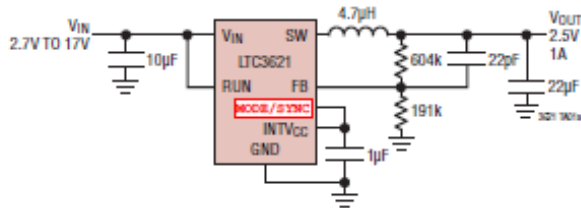
FEATURES

- Wide V_{IN} Range: 2.7V to 17V
- Wide V_{OUT} Range: 0.6V to V_{IN}
- 95% Max Efficiency
- Low $I_Q < 3.5\mu A$, Zero-Current Shutdown
- Constant Frequency (1MHz/2.25MHz)
- Full Dropout Operation with Low I_Q
- 1A Rated Output Current
- $\pm 1\%$ Output Voltage Accuracy
- Current Mode Operation for Excellent Line and Load Transient Response Synchronizable to External Clock
- Pulse-Skipping, Forced Continuous, Burst Mode[®] Operation
- Internal Compensation and Soft-Start
- Overtemperature Protection
- Compact 6-Lead DFN (2mm \times 3mm) Package or 8-Lead MSOPE Package with Power Good Output and Independent SGND Pin Thermally-Enhanced MS8E

APPLICATIONS

- Portable-Handheld Scanners
- Industrial and Embedded Computing
- Automotive Applications
- Emergency Radio

TYPICAL APPLICATION

 2.5V V_{OUT} with 400mA Burst Clamp, $f_{SW} = 1MHz$


DESCRIPTION

The LTC[®]3621/LTC3621-2 is a high efficiency 17V, 1A synchronous monolithic step-down regulator. The switching frequency is fixed to 1MHz or 2.25MHz. The regulator features ultralow quiescent current and high efficiencies over a wide V_{OUT} range. with a $\pm 40\%$ synchronizing range

The step-down regulator operates from an input voltage range of 2.7V to 17V and provides an adjustable output range from 0.6V to V_{IN} while delivering up to 1A of output current. A user-selectable mode input is provided to allow the user to trade off ripple noise for light load efficiency; Burst Mode operation provides the highest efficiency at light loads, while pulse-skipping mode provides the lowest voltage ripple. The MODE pin can also be used to allow the user to sync the switching frequency to an external clock.

LTC3621 Options

PART NAME	FREQUENCY	V_{OUT}
LTC3621	1.00MHz	Adjustable
LTC3621-2	2.25MHz	Adjustable

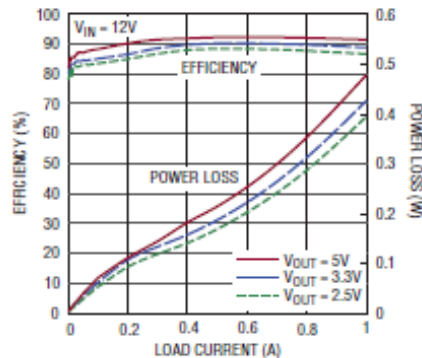
(Updated table, see also attached)

L^T, LT, LTC, LTM, Burst Mod and Hot Swap is a trademark property of their respective owners. © 2011 Linear Technology, Inc. 6498466, 6611131, 6177787

LTC3621 Options

PART NAME	FREQUENCY	V_{OUT}
LTC3621	1.00MHz	Adjustable
LTC3621-3.3	1.00MHz	3.3V
LTC3621-5	1.00MHz	5V
LTC3621-2	2.25MHz	Adjustable
LTC3621-23.3	2.25MHz	3.3V
LTC3621-25	2.25MHz	5V

Efficiency and Power Loss vs Load at 1MHz

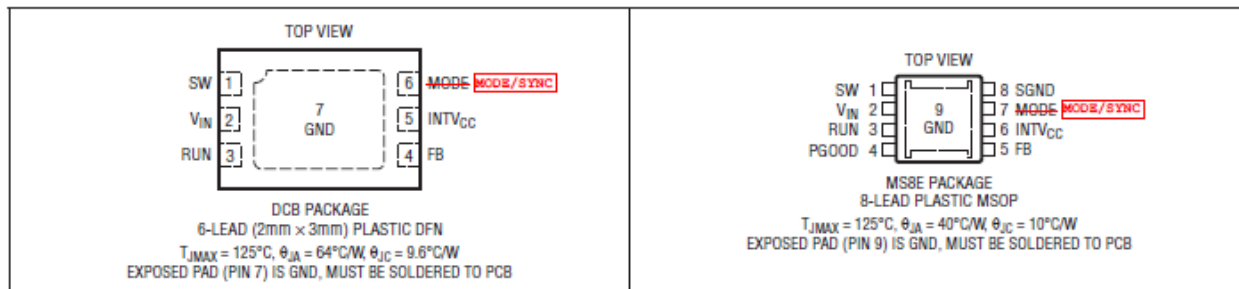


LTC3621/LTC3621-2

ABSOLUTE MAXIMUM RATINGS (Note 1)

V_{IN} Voltage (Note 2).....	17V to -0.3V	INTV _{CC} , PGOOD Voltages	6V to -0.3V
SW Voltage DC.....	$V_{IN} + 0.3V$ to -0.3V	Operating Junction Temperature Range	
Transient (Note 2).....	19V to 2.0V	(Notes 3, 6).....	-40°C to 125°C
RUN Voltage.....	V_{IN} to -0.3V	Storage Temperature Range	-65°C to 125°C
MODE, FB Voltages.....	6V to -0.3V		

PIN CONFIGURATION



ORDER INFORMATION

LEAD FREE FINISH	TAPE AND REEL	PART MARKING*	PACKAGE DESCRIPTION	TEMPERATURE RANGE
LTC3621EDCB#PBF	LTC3621EDCB#TRPBF	LGDG	6-Lead (2mm x 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB#PBF	LTC3621IDCB#TRPBF	LGDG	6-Lead (2mm x 3mm) Plastic DFN	-40°C to 125°C
LTC3621EMS8E#PBF	LTC3621EMS8E#TRPBF	LTGHZ	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E#PBF	LTC3621IMS8E#TRPBF	LTGHZ	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621EDCB-2#PBF	LTC3621EDCB-2#TRPBF	LGHY	6-Lead (2mm x 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB-2#PBF	LTC3621IDCB-2#TRPBF	LGHY	6-Lead (2mm x 3mm) Plastic DFN	-40°C to 125°C
LTC3621EMS8E-2#PBF	LTC3621EMS8E-2#TRPBF	LTGHZ	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E-2#PBF	LTC3621IMS8E-2#TRPBF	LTGHZ	8-Lead Plastic MSOP	-40°C to 125°C

See Next Page for Updated Table with 8 Fixed Output Options (E/I Grades)

Consult LTC Marketing for parts specified with wider operating temperature ranges. *The temperature grade is identified by a label on the shipping container. Consult LTC Marketing for information on non-standard lead based finish parts.

For more information on lead free part marking, go to: <http://www.linear.com/leadfree/>
For more information on tape and reel specifications, go to: <http://www.linear.com/tapeandreel/>

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the specified operating junction temperature range, otherwise specifications are at $T_J = 25^{\circ}C$. (Note 3) $V_{IN} = 12V$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Operating Voltage		2.7		17	V
V_{OUT}	Operating Voltage		0.6		V_{IN}	V
I_{VIN}	Input Quiescent Current	Shutdown Mode, $V_{RUN} = 0V$		0.1	1.0	μA
		Burst Mode Operation		3.5	7	μA
		Forced Continuous Mode (Note 4), $V_{FB} < 0.6V$		1.5		mA

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(Updated Table for Page 1, RED are NEW)

LTC3621 Options

PART NAME	FREQUENCY	VOUT
LTC3621	1.00MHz	Adjustable
LTC3621-3.3	1.00MHz	3.3V
LTC3621-5	1.00MHz	5V
LTC3621-2	2.25MHz	Adjustable
LTC3621-23.3	2.25MHz	3.3V
LTC3621-25	2.25MHz	5V

(Updated Table for Page 2, RED are NEW)

ORDER INFORMATION

LEAD FREE FINISH	TAPE AND REEL	MARKING*	PACKAGE DESCRIPTION	TEMPERATURE RANGE
LTC3621EDCB#PBF	LTC3621EDCB#TRPBF	LGDG	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB#PBF	LTC3621IDCB#TRPBF	LGDG	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621EDCB-3.3#PBF	LTC3621EDCB-3.3#TRPBF	LGQF	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB-3.3#PBF	LTC3621IDCB-3.3#TRPBF	LGQF	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621EDCB-5#PBF	LTC3621EDCB-5#TRPBF	LGQC	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB-5#PBF	LTC3621IDCB-5#TRPBF	LGQC	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621EMS8E#PBF	LTC3621EMS8E#TRPBF	LTGDH	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E#PBF	LTC3621IMS8E#TRPBF	LTGDH	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621EMS8E-3.3#PBF	LTC3621EMS8E-3.3#TRPBF	LTGNY	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E-3.3#PBF	LTC3621IMS8E-3.3#TRPBF	LTGNY	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621EMS8E-5#PBF	LTC3621EMS8E-5#TRPBF	LTGNX	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E-5#PBF	LTC3621IMS8E-5#TRPBF	LTGNX	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621EDCB-2#PBF	LTC3621EDCB-2#TRPBF	LGHY	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB-2#PBF	LTC3621IDCB-2#TRPBF	LGHY	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621EDCB-23.3#PBF	LTC3621EDCB-23.3#TRPBF	LGQG	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB-23.3#PBF	LTC3621IDCB-23.3#TRPBF	LGQG	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621EDCB-25#PBF	LTC3621EDCB-25#TRPBF	LGQD	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621IDCB-25#PBF	LTC3621IDCB-25#TRPBF	LGQD	6-Lead (2mm × 3mm) Plastic DFN	-40°C to 125°C
LTC3621EMS8E-2#PBF	LTC3621EMS8E-2#TRPBF	LTGHZ	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E-2#PBF	LTC3621IMS8E-2#TRPBF	LTGHZ	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621EMS8E-23.3#PBF	LTC3621EMS8E-23.3#TRPBF	LTGNZ	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E-23.3#PBF	LTC3621IMS8E-23.3#TRPBF	LTGNZ	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621EMS8E-25#PBF	LTC3621EMS8E-25#TRPBF	LTGQB	8-Lead Plastic MSOP	-40°C to 125°C
LTC3621IMS8E-25#PBF	LTC3621IMS8E-25#TRPBF	LTGQB	8-Lead Plastic MSOP	-40°C to 125°C

VOUT	Regulated Fixed Output Voltage	LTC3621-3.3/LTC3621-23.3	o	3.267	3.3	3.333	V
				3.250	3.3	3.350	V
		LTC3621-5/LTC3621-25	o	4.950	5.0	5.050	V
IFB(VOUT)	Feedback Input Leakage Current	Fixed Output Versions		4.925	5.0	5.075	V
					2	10	uA

LTC3621/LTC3621-2

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the specified operating junction temperature range, otherwise specifications are at $T_J = 25^\circ\text{C}$. (Note 3) $V_{IN} = 12\text{V}$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	
V _{FB}	Regulated Feedback Voltage	LTC3621/LTC3621-2		0.594	0.6	0.606	V
			●	0.591	0.6	0.609	V
I _{FB}	FB Input Current	LTC3621/LTC3621-2			10	nA	
ΔV _{LINE(REG)}	Reference Voltage Line Regulation	V _{IN} = 2.7V to 17V (Note 5)		0.01	0.015	%/V	
ΔV _{LOAD(REG)}	Output Voltage Load Regulation	(Note 5)		0.1		%	
I _{LSW}	NMOS Switch Leakage PMOS Switch Leakage			0.1	1	μA	
				0.1	1	μA	
R _{DS(ON)}	NMOS On-Resistance (Bottom FET) PMOS On-Resistance (Top FET)	V _{IN} = 5V		0.15		Ω	
				0.37		Ω	
D _{MAX}	Maximum Duty Cycle	V _{FB} = 0.5V, V _{MODE} = 1.5V	●	100		%	
t _{ON(MIN)}	Minimum On-Time	V _{FB} = 0.7V, V _{MODE} = 1.5V		60		ns	
V _{RUN}	RUN Input High Threshold RUN Input Low Threshold			0.3	1.0	V	
						V	
I _{RUN}	RUN Input Current	V _{RUN} = 12V		0	20	nA	
V _{MODE} MODE/SYNC	Pulse-Skipping Mode				0.3	V	
	Burst Mode Operation		V _{INTVCC} - 0.4			V	
	Forced Continuous Mode		1.0		V _{INTVCC} - 1.0	1.2	V
I _{MODE} MODE/SYNC	MODE Input Current	V _{MODE} = 3.6V		0	40	20	nA
t _{SS}	Internal Soft-Start Time			0.5	0.8	ms	
I _{LIM}	Peak Current Limit		●	1.44	1.60	1.76	A
				1.30		1.80	A
V _{UVLO}	V _{INTVCC} Undervoltage Lockout	V _{IN} Ramping Up		2.4	2.6	2.7	V
V _{UVLO(HYS)}	V _{INTVCC} Undervoltage Lockout Hysteresis			250		mV	
V _{OVLO}	V _{IN} Overvoltage Lockout Rising		●	18	19	20	V
V _{OVLO(HYS)}	V _{IN} Overvoltage Lockout Hysteresis			300		mV	
f _{OSC}	Oscillator Frequency	LTC3621/LTC3621-3.3/LTC3621-5 LTC3621	●	0.92	1.00	1.08	MHz
				0.82		1.16	MHz
		LTC3621-2/LTC3621-23.3/LTC3621-25 LTC3621	●	2.05	2.25	2.45	MHz
				1.8	2.6	MHz	
V _{INTVCC}	V _{INTVCC} LDO Output Voltage	V _{IN} > 4V		3.3	3.6	3.9	V
ΔV _{PGOOD}	Power Good Range			±7.5	±11	12.5	%
R _{PGOOD}	Power Good Resistance	PGOOD R _{DS(ON)} at 500μA		275	350		Ω
t _{PGOOD}	PGOOD Delay	PGOOD Low to High		0			Cycles
		PGOOD High to Low		32			Cycles
I _{PGOOD}	PGOOD Leakage Current				100	nA	
T _{SYNC}	SYNC Capture Range			60	140	%	

may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: Transient absolute maximum voltages should not be applied for more than 4% of the switching duty cycle.

Note 3: The LTC3621 is tested under pulsed load conditions such that $T_J \approx T_A$. The LTC3621E is guaranteed to meet specifications from 0°C to 85°C junction temperature. Specifications over the -40°C to 125°C operating junction temperature range are assured by design, characterization and correlation with statistical process controls. The LTC3621 is guaranteed over the -40°C to 125°C operating junction

consistent with these specifications is determined by specific operating conditions in conjunction with board layout, the rated package thermal impedance and other environmental factors.

Note 4: The quiescent current in forced continuous mode does not include switching loss of the power FETs.

Note 5: The LTC3621 is tested in a proprietary test mode that connects V_{FB} to the output of error amplifier.

Note 6: T_J is calculated from the ambient, T_A , and power dissipation, P_D , according to the following formula:

$$T_J = T_A + (P_D \cdot \theta_{JA})$$

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For more information www.linear.com/LTC3621

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LTC3621/LTC3621-2

PIN FUNCTIONS (DFN/MSOP)

SW (Pin 1/Pin 1): Switch Node Connection to the Inductor of the Step-Down Regulator.

V_{IN} (Pin 2/Pin 2): Input Voltage of the Step-Down Regulator.

RUN (Pin 3/Pin 3): Logic Controlled RUN Input. Do not leave this pin floating. Logic high activates the step-down regulator.

FB (Pin 4/Pin 5): Feedback Input to the Error Amplifier of the Step-Down Regulator. Connect a resistor divider tap to this pin. The output voltage can be adjusted from 0.6V to V_{IN} by:

$$V_{OUT} = 0.6V \cdot [1 + (R1/R2)]$$

MODE/SYNC (Pin 6/Pin 7): Burst Mode Select and External Clock Synchronization of the Step-Down Regulator. Tie MODE/SYNC to INTV_{CC} for Burst Mode operation with a 400mA peak current clamp, tie MODE/SYNC to GND for pulse skipping operation, and tie MODE/SYNC to a voltage between 1V and V_{INTVCC} - 1.2V for forced continuous mode. Furthermore, connecting MODE/SYNC to an external clock will sync the system clock to the external clock and put the part in forced continuous mode.

PGOOD (Pin 4, MSOP Package Only): V_{OUT} within Regulation Indicator.

INTV_{CC} (Pin 5/Pin 6): Low Dropout Regulator. Bypass with at least 1μF to Ground.

~~**MODE (Pin 6/Pin 7):** Burst Mode Select of the Step-Down Regulator. Tie MODE to INTV_{CC} for Burst Mode operation with a 400mA peak current clamp, tie MODE to GND for pulse skipping operation, and tie MODE to a voltage between 1V and V_{INTVCC} - 1V for forced continuous mode.~~

GND (Exposed Pad Pin 7/Pin 9): Ground Backplane for Power and Signal Ground. Must be soldered to PCB ground.

SGND (Pin 8, MSOP Package Only): Signal Ground.

BLOCK DIAGRAM

