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December 2013

FAN7601B
Green Current Mode PWM Controller

Features

- Green Current Mode PWM Control
- Low Operating Current: Maximum 4 mA
- Burst Mode Operation
- Internal High-Voltage Startup Switch
- Under-Voltage Lockout (UVLO): 12 V / 8 V
- Latch Protection and Soft-Start Function
- Over-Voltage Protection: 19 V
- Operating Frequency up to 300 kHz
- Maximum Duty Cycle: 95%

Applications

- Offline Adapter Applications
- Auxiliary Power Supplies

Related Resources

- *AN4129 — Green Current Mode PWM Controller FAN7601*

Description

The FAN7601B is a programmable frequency green current mode PWM controller. It is specially designed for the offline adapter applications and the auxiliary power supplies that require high efficiency at light load and no load. The internal high-voltage startup switch and burst mode reduce the power loss.

FAN7601B includes protections, such as latch protection and over-voltage protection. The latch protection can be used for over-voltage protection, thermal protection, and others. The soft-start prevents the output voltage overshoot at startup.

Ordering Information

Part Number	Operating Junction Temperature	Top Mark	Package	Packing Method
FAN7601BMX	-40°C to +150°C	7601B	8-SOP	Tape & Reel

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Block Diagram

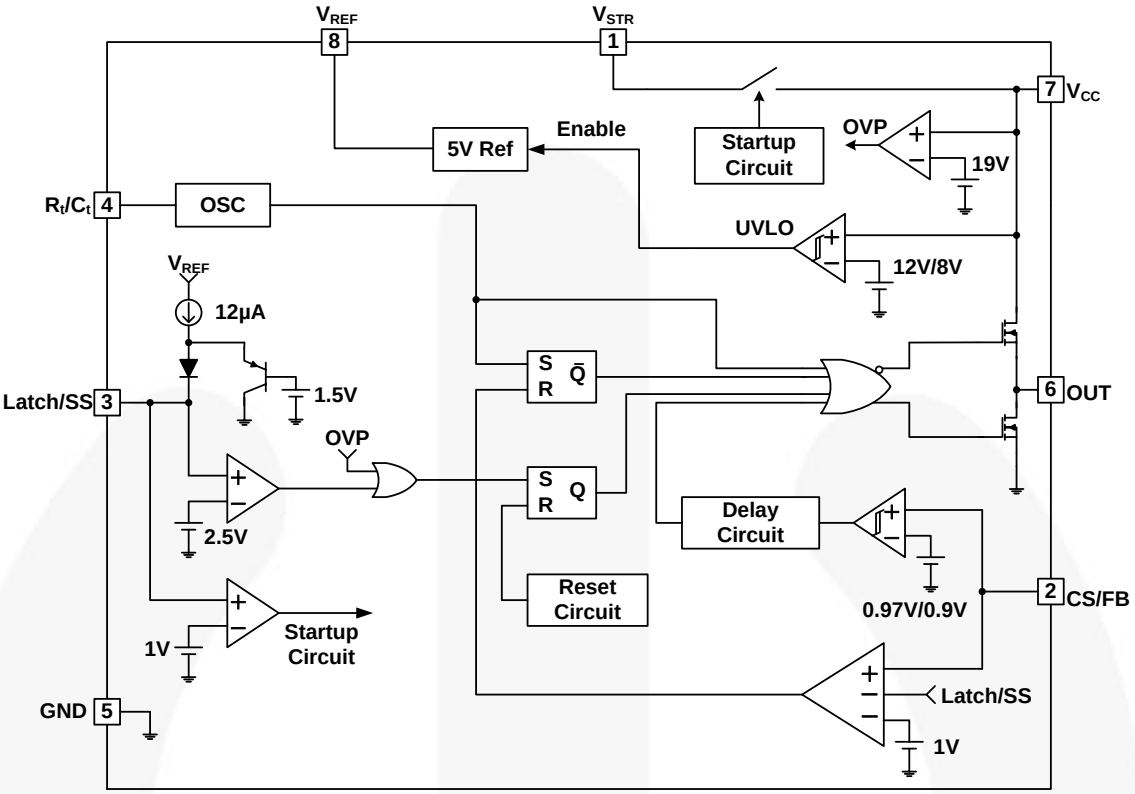

Figure 1. Internal Block Diagram

Pin Configuration

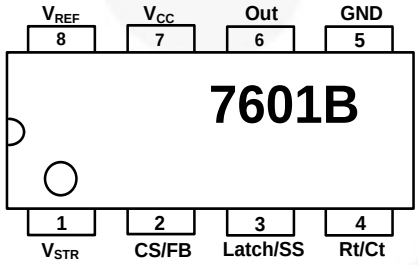

Figure 2. Pin Assignments (Top View)

Pin Definitions

Pin # (8-Pin)	Name	Description
1	V_{STR}	Startup
2	CS/FB	Current Sense and Feedback
3	Latch/SS	Latch Protection and Soft-Start
4	Rt/Ct	Oscillator Timing
5	GND	Ground
6	Out	Gate Drive Output
7	V_{CC}	IC Power Supply
8	V_{REF}	Voltage Reference

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Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
V_{CC}	Supply Voltage			20	V
$V_{CS/FB}$	Input Voltage CS/FB		-0.3	20.0	V
T_{STG}	Storage Temperature		-55	+150	°C
T_J	Recommended Operating Junction Temperature		-40	+150	°C
I_O	Output Current			250	mA
V_{STR}	V_{STR} Input Voltage			500	V
ESD	Electrostatic Discharge Capability	Human Body Model, JESD22-A114		2000	V
		Charged Device Model, JESD22-C101		1500	

Thermal Impedance

Symbol	Parameter	Value	Unit
θ_{JA}	Thermal Resistance, Junction-to-Ambient	180	°C/W

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Electrical Characteristics

T_A=-25°C~125°C, V_{CC}=14 V, R_T=9.5 kΩ, C_T=2.2 nF unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Reference Section						
V_{REF}	Reference Output Voltage	I_O=1 mA	4.85	5.00	5.15	V
ΔV_{REF1}	Line Regulation	V_{CC}=10 V~18 V		10	20	mV
ΔV_{REF2}	Load Regulation	I_O=1 mA ~ 10 mA		20	30	mV
Oscillator Section						
f_{OSC}	Initial Accuracy		90	100	110	kHz
ST_V	Voltage Stability	V_{CC}=10 V~18 V		1.0	1.5	%
V_{OSC}	Amplitude	$V_{pin4\ peak\text{-}to\text{-}peak}$		1.25		V
PWM Section						
$V_{CS/FB1}$	CS/FB Threshold Voltage1		0.9	1.0	1.1	V
D_{MAX}	Maximum Duty Cycle	T_A=25°C	92	95	98	%
D_{MIN}	Minimum Duty Cycle				0	%
Burst Mode Section						
$V_{CS/FB2}$	CS/FB Threshold Voltage2[1]		0.77	0.97	1.17	V
$V_{CS/FB3}$	CS/FB Threshold Voltage3[1]		0.7	0.9	1.1	V
Soft-Start Section						
I_{SS}	Soft-Start Current	V_{pin3}=GND	9	12	15	μA
V_{SL}	Soft-Start Limit Voltage[2]	I_{SS}=1 μA	1.2	1.5	1.8	V
Protection Section						
V_{LATCH}	Latch Voltage		2.25	2.50	2.75	V
V_{OVP}	Over-Voltage Protection		18	19	20	V
UVLO Section						
V_{tH}	Start Threshold Voltage		11	12	13	V
V_{tL}	Minimum Operating Voltage		7	8	9	V
Total Current Section						
I_{OP}	Operating Supply Current			3	4	mA
Output Section						
V_{OL}	Low Output Voltage	T_A=25°C, I_O=100 mA		2.0	2.5	V
V_{OH}	High Output Voltage	T_A=25°C, I_O=-100 mA	11.5	12.0	14.0	V
t_r	Rising Time[1]	T_A=25°C, C_l=1 nF		45	150	ns
t_f	Falling Time[1]	T_A=25°C, C_l=1 nF		35	150	ns
Startup Section						
I_{str}	V_{STR} Startup Current	V_{STR}=30V, T_A=25°C	0.5	1.0	1.5	mA

Notes:
1. These parameters, although guaranteed, are not 100% tested in production.
2. It is recommended to connect a 1 MΩ resistor between the Latch/SS pin and GND to prevent abnormal operation of the latch protection by noise coupling.

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Typical Performance Characteristics

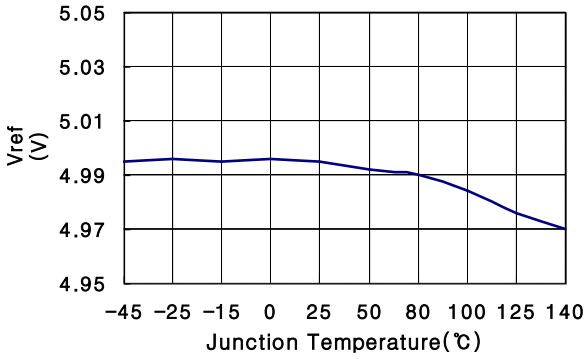

Figure 3. Trimmed Reference Voltage

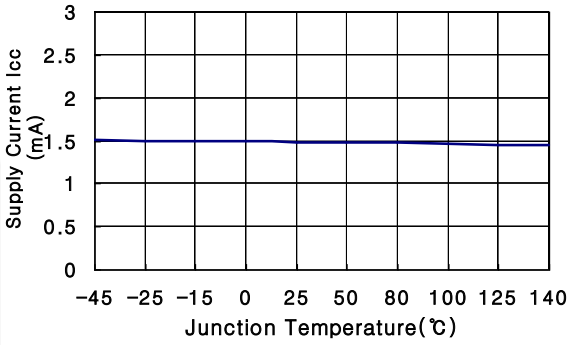

Figure 4. Supply Current

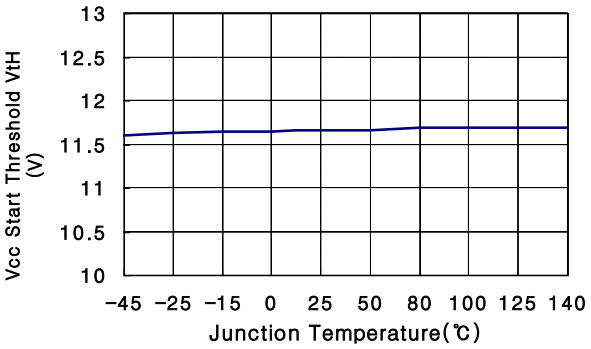

Figure 5. V_{CC} Start Threshold Voltage

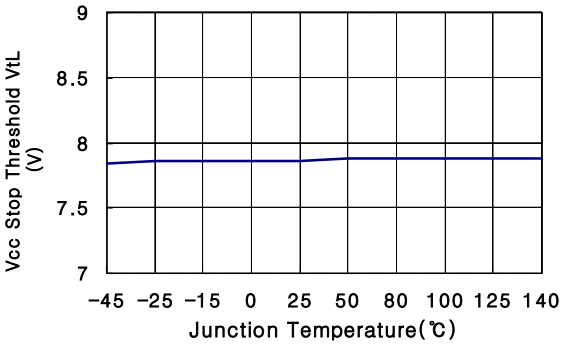

Figure 6. V_{CC} Stop Threshold Voltage

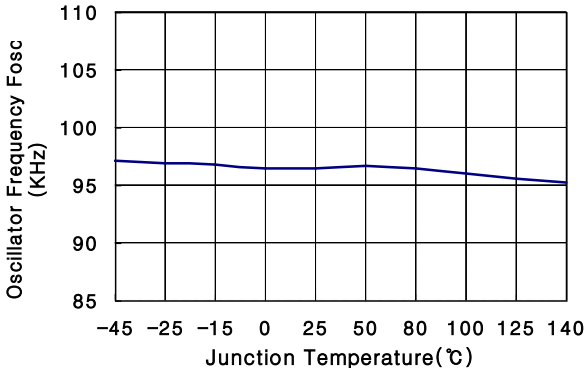

Figure 7. Oscillator Frequency

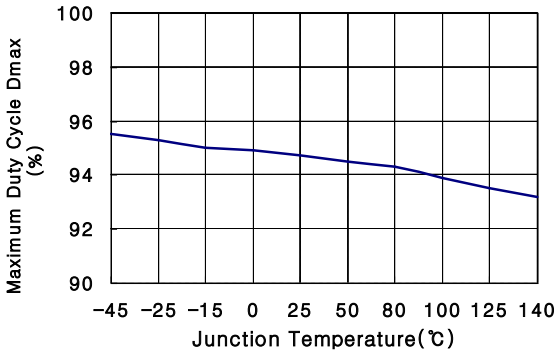

Figure 8. Maximum Duty Cycle

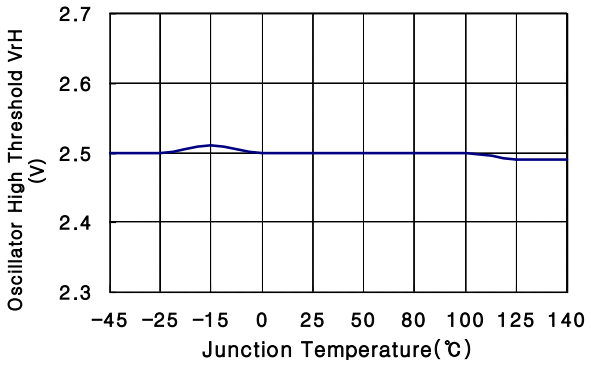

Figure 9. Oscillator High Threshold Voltage

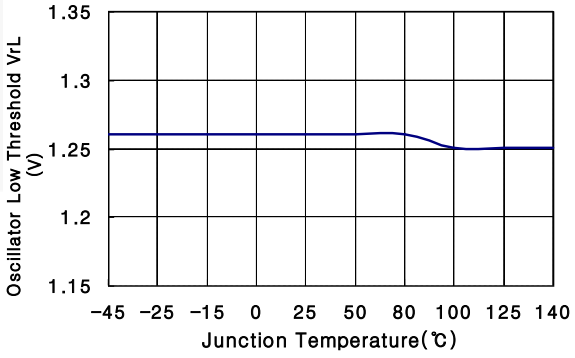

Figure 10. Oscillator Low Threshold Voltage

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Typical Performance Characteristics (Continued)

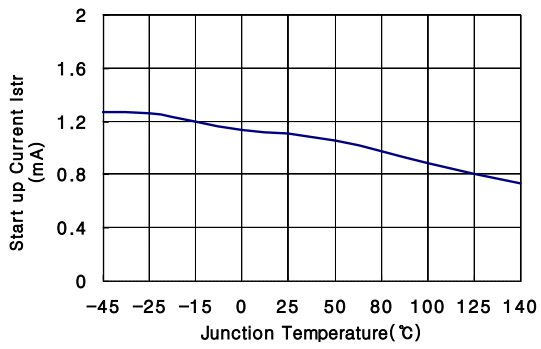


Figure 11. Startup Current

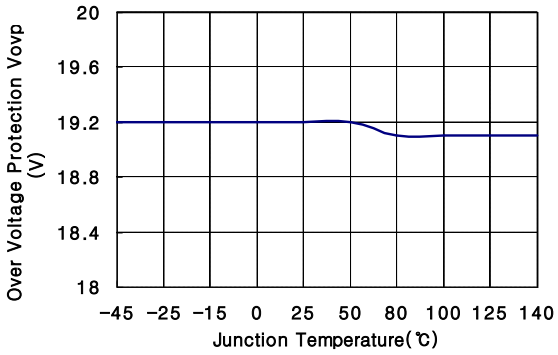


Figure 12. Over-Voltage Protection Level

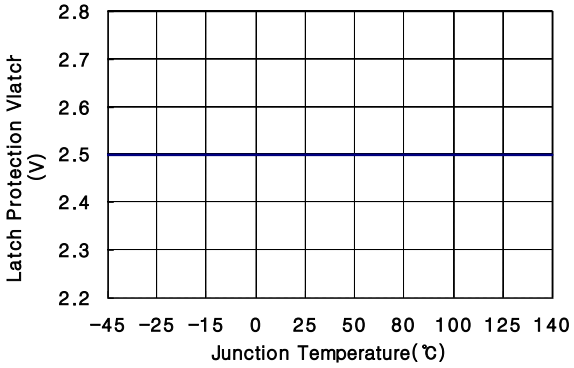


Figure 13. Latch Protection Voltage

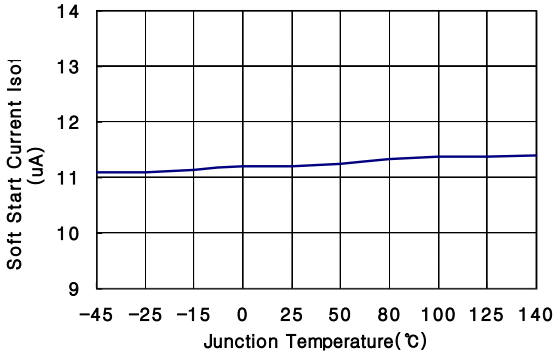


Figure 14. Soft-Start Current

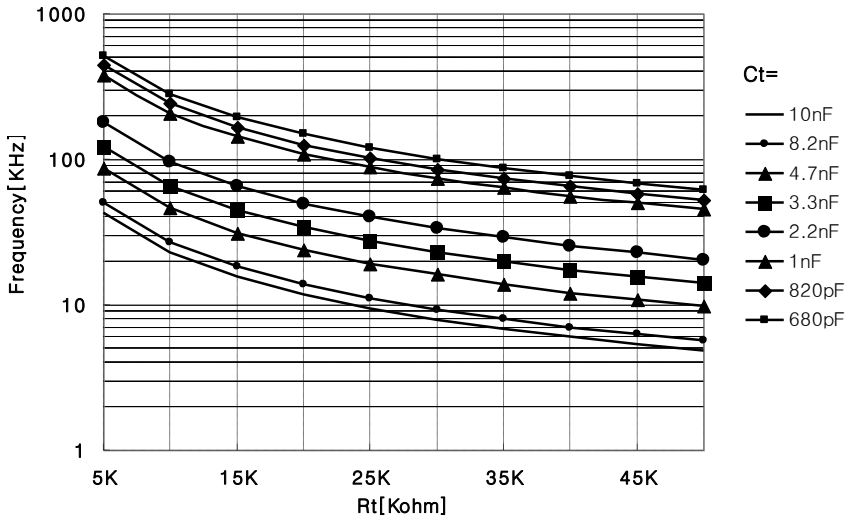
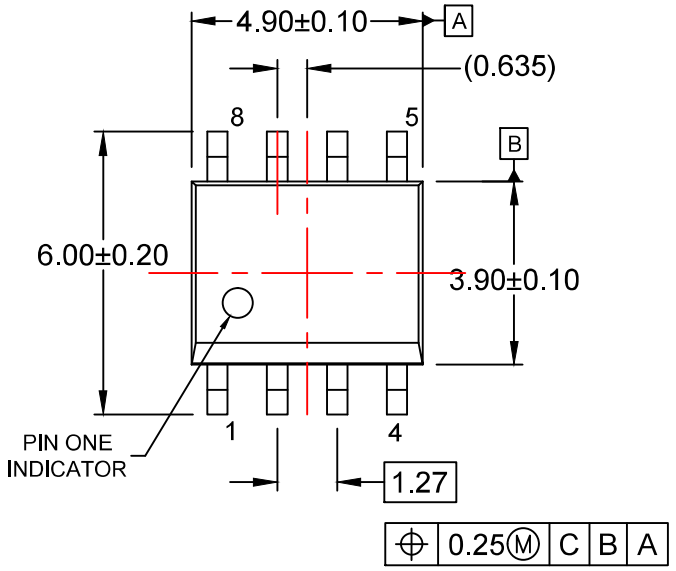
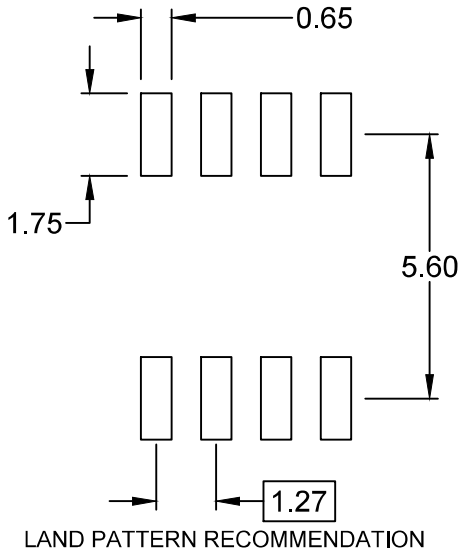
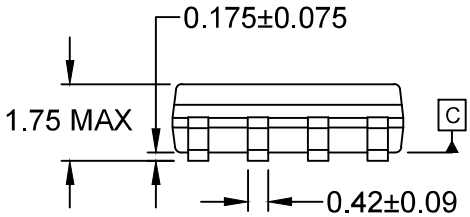


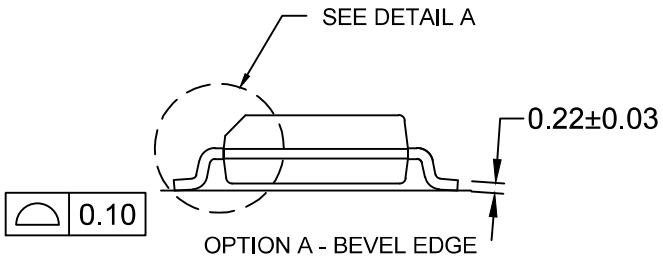
Figure 15. Oscillator Frequency Characteristic



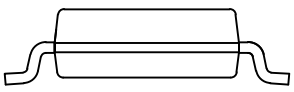


LAND PATTERN RECOMMENDATION

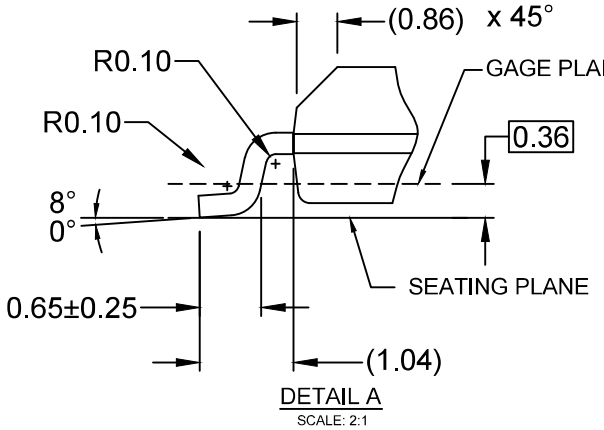




OPTION A - BEVEL EDGE



OPTION B - NO BEVEL EDGE



DETAIL A
SCALE: 2:1

NOTES:

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E) DRAWING FILENAME: M08Arev16

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