NON-ISOLATED DC/DC CONVERTERS
3.3V Input / 5V Output / 1.5A

bel POWER PRODUCTS

BP03x7AH-02C

S7AH-02C / V7AH-02C Modules

- Nonisolated
- Compact, low profile surface mount package
- Fixed frequency*
- High efficiency means less power dissipation
- Excellent thermal performance
- Optimized for cost
- Allows burst mode operation at low load currents

Description

The Bel S7AH-02C and V7AH-02C modules are non-isolated, step up DC/DC power converters that operate from a nominal 3.3V source with an output voltage of 5V. They are packaged in a compact, overmolded package rated at 1.5A. Optional lead forming provides a vertical mount product for minimal footprint or a surface mount option for a very low profile. Standard features include output voltage adjust and industrial temperature range (-40° to +85° C). The output is closely regulated and the efficiency is typically 87% at full load. These products may be used almost anywhere low voltage silicon is employed and a 3.3V source is available. Typical applications include file servers, routers, line cards and other computing and communications equipment.

*Optional Burst/skip mode operating at light load or no load.

Applications

- Distributed power architectures
- Data networking equipment
- Telecommunications
- Computers and peripherals

Options

- Trim function

Part Number Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Part Number Surface Mount	Part Number Vertical Mount
5V	3.3V	1.5A	7.5W	87%	S7AH-02C500	V7AH-02C500

Note: For parts with Burst/skip mode disabled, change the last character to a B (e.g. S7AH-02C50B).

Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit
Continuous Input Voltage	Vin	2.8		4	V
Output Enable Terminal Voltage	Vouten				V
Ambient Temperature	Tamb	-40		85	°C
Storage Temperature	Tstor	-40		125	°C

Note: Use beyond the maximum ratings may cause a reliability degradation of the DC/DC converter or may permanently damage the device.

Input Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Operating Input Voltage	All	Vin	3		3.6	V
Input Current	All	Iin			3.3	A
Input Reflected Ripple Current[1]	All			30	60	mA_{rms}
Input Reflected Ripple Current (P-P)[1]	All			100	150	mApk
I^2t Inrush Current Transient	All			0.02	0.05	A^2s
Turn On Voltage Threshold	All			2.8	2.9	V

Note: Input capacitance one 270µF/16V, ESR = 0.018 Ω max at 100kHz @ 25° C.
1. With simulated source impedance of 500nH, 5Hz to 20MHz.

Output Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Output Voltage Set Point [1]	All	Vout	4.825	5	5.175	V
Load Regulation	All			25	40	mV
Line Regulation	All			20	30	mV
Regulation Over Temperature	All			45	80	mV
Total Output Voltage Regulation	All				150	mV
Output Ripple and Noise [2]	All			50	100	mVp-p
Output Ripple and Noise [2]	All			15	25	mVrms
Output Current Range	All	Iout	0		1.5	A
Overshoot at Turn On	All			0	5	%
Output Capacitance	All	Cout	0		600	µF
Transient Response						
ΔV 50% to 100% of Max Load	All			100	150	mV
Settling Time		Ts		50	100	µs
ΔV 100% to 50% of Max Load				100	150	mV
Settling Time		Ts		50	100	µs

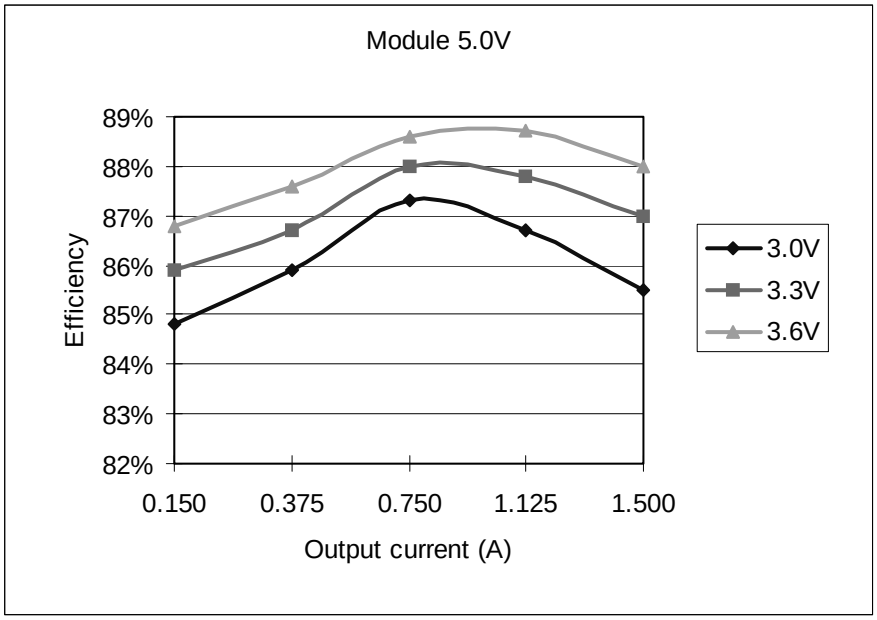
Note: All specifications are typical at nominal input, full load at 25° C unless otherwise stated.
1. Vin = 3.3V, Iout = full load, Ta = 25° C.
2. 0 - 20MHz, 1µF ceramic cap on output.

General Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Efficiency[1]	All	η	84	87		%
Switching Frequency	All	Fsw	500	550	650	kHz
Output Voltage Trim Range[2]	All		95		110	%
Weight	All			5.2		g

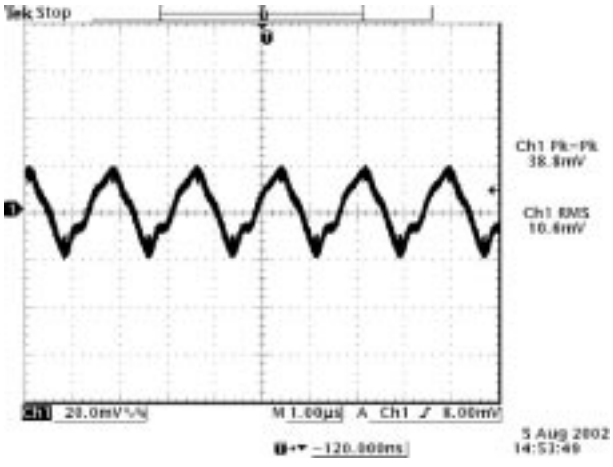
1. Vin=3.3V, full load and Ta=25° C.
2. See graphs on page 6.

Efficiency Data

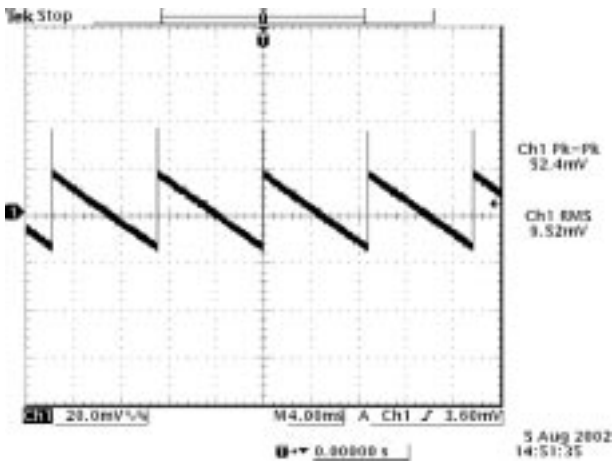


Ripple and Noise

1µF ceramic cap at the output.



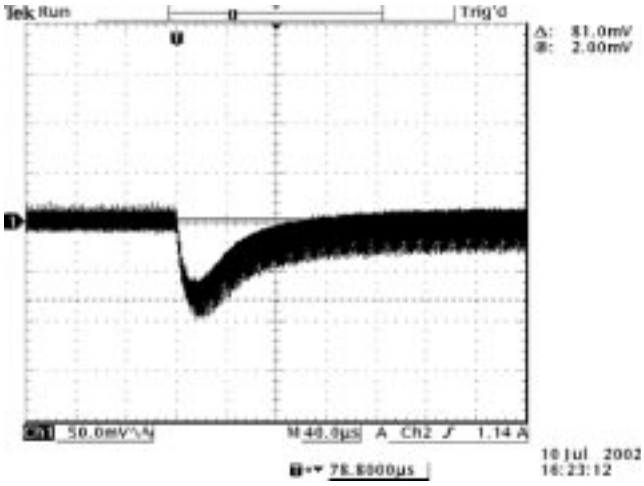
Ripple and noise at full load and 3.3Vdc input, 5Vdc output and Ta=25° C



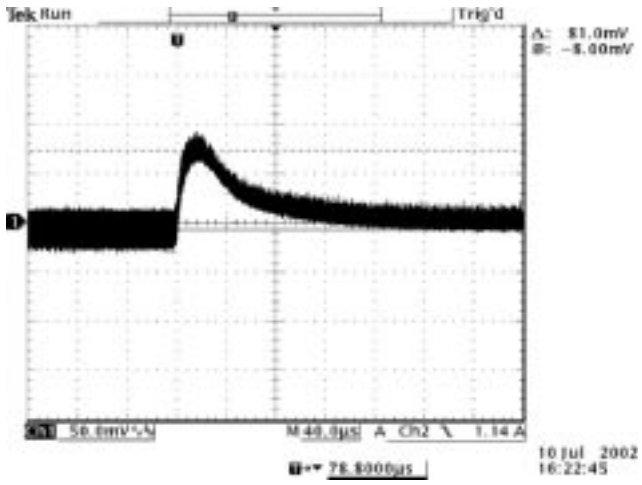
Ripple and noise when operating in burst mode at no load and 3.3Vdc input, 5Vdc output and Ta=25° C

Transient Response

Transient response: di/dt = 0.5A/µS, no external load capacitance



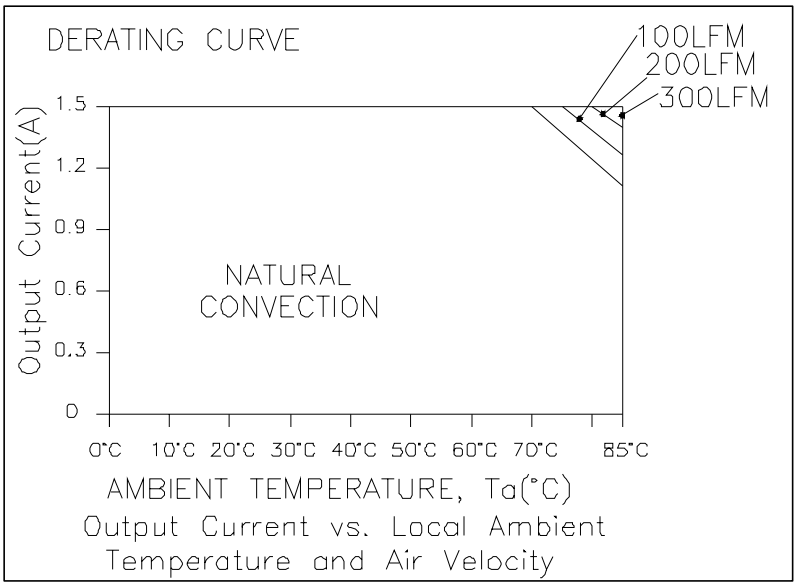
Vout=5V
50% to 100% load transients at 3.3V input and Ta=25° C



Vout=5V
100% to 50% load transients at 3.3V input and Ta=25° C

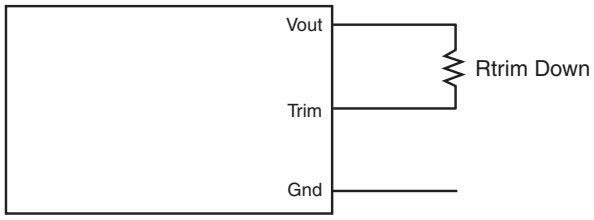
Thermal Considerations

x7AH-02C

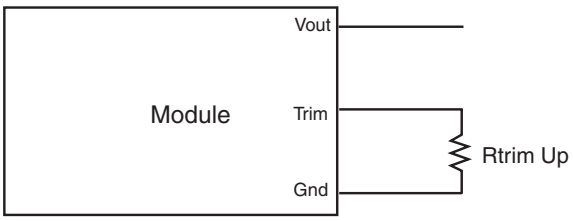


Output Voltage Set-Point Adjustment

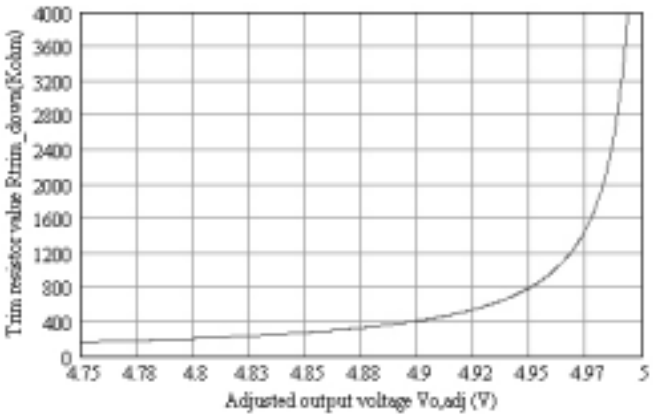
Trim Down Circuit



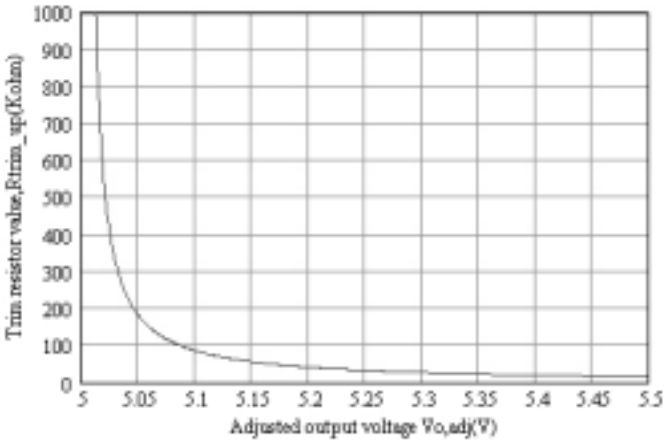
Trim Up Circuit



x7AH-02C Trim Resistor Calculation



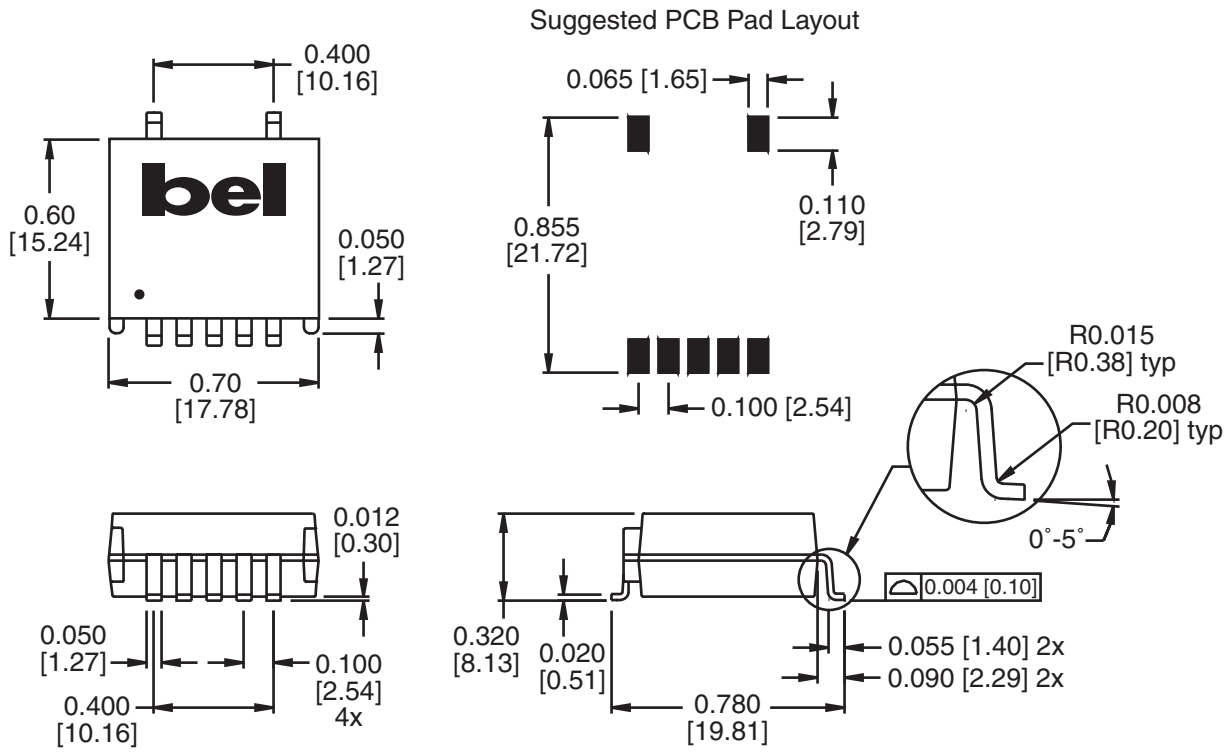
$$\text{Rtrim down} = \left(\frac{44.144}{Vo - Vo,\ adj} - 12.5\right) \text{Kohm}$$



$$\text{Rtrim up} = \left(\frac{8.4}{Vo,\ adj - Vo} - 2\right) \text{Kohm}$$

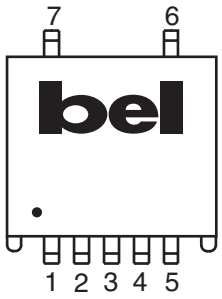
Mechanical

S7AH-02C



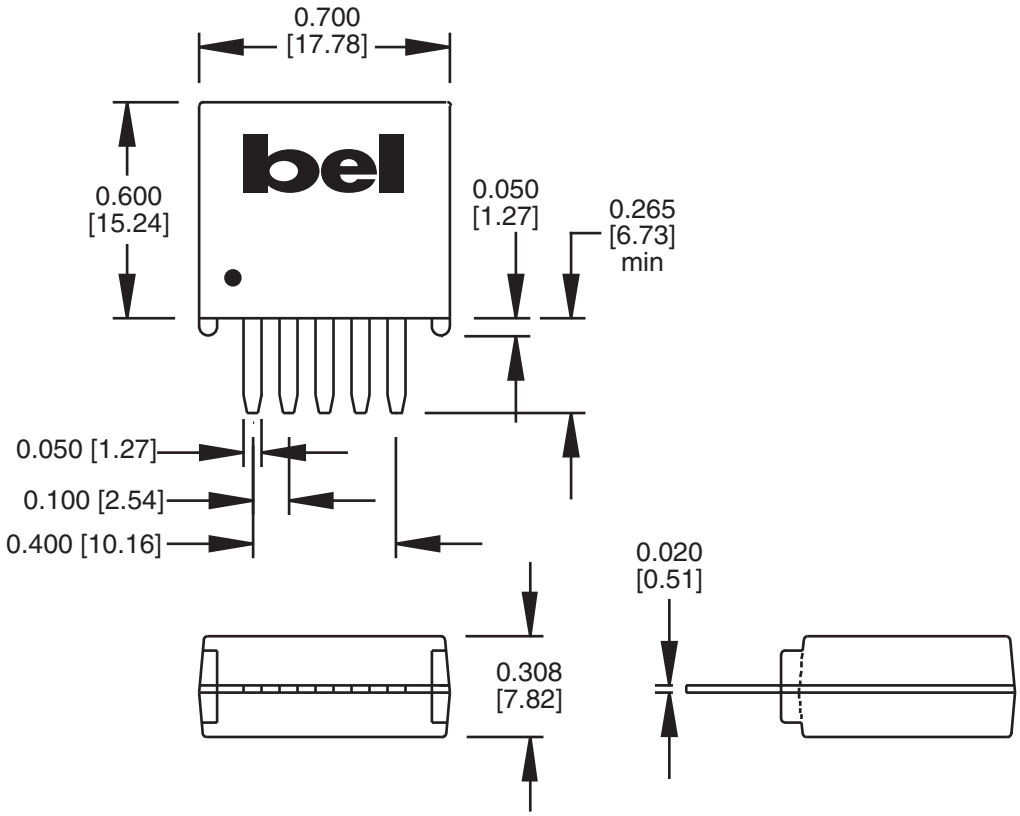
Dimensions are in inches [millimeters].
Standard dimension tolerance is ±0.005 [0.13] unless otherwise noted.

Pin	Function
1	N/A
2	+Vin
3	Ground
4	+Vo
5	Trim
6	N/A
7	N/A



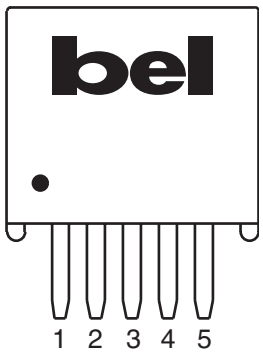
Mechanical

V7AH-02C



Dimensions are in inches [millimeters].
Standard dimension tolerance is ±0.005 [0.13] unless otherwise noted.

Pin	Function
1	N/A
2	+Vin
3	Ground
4	+Vo
5	Trim



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