NON-ISOLATED DC/DC CONVERTERS

3 –15V Input / Programmable Output / 25A

bel POWER PRODUCTS

S7KS- 25D (Keystone) PRELIMINARY

- Compact surface mount package
- Ultra Wide input range (3 – 15V)
- 6 bit digital voltage programming (0.7 to 5.4V)
- 25A of output current
- Remote sense
- Remote On/Off
- Power Good
- Analog Trim
- Single wire current sharing
- Autophasing

Description

The S7KS Keystone Series from Bel is a non-isolated step down DC/DC converters providing up to 25A of output current in a compact surface mount package with the capability of paralleling and autophasing to provide up to 200A of output current. This product is designed to operate from any source voltage from 3 to 15V and provide any output voltage from 0.7V to 5.4V with 6-bit digital programming and 50mV resolution. This DC/DC converter requires no external components to operate and provides the ultimate in flexibility. It also greatly simplifies inventory management since a single part can be configured to service a very broad range of applications.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	On/Off Logic	Part Number
0.7 – 5.4V	3 - 15V	25A	Active High	S7KS-25D1P0
0.7 – 5.4V	3 - 15V	25A	Active Low	S7KS-25D1PL

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage Range	3.0 VDC		15 VDC	
Input Current (full load)			18A	
Bias Voltage	4.8 VDC		5.2 VDC	
Input Current (bias supply)		100mA	200mA	
Reflected Ripple Current			150mA rms	With 100uF, 30mOhm capacitor and 500nH of input inductance.

Output Specifications

Parameter	Min	Typ	Max	Notes
Voltage Programmability	0.7V		5.4V	
Output Current	0A		25A	
Set Point Accuracy			2%	
Regulation Line Regulation Load Regulation Temperature			 10mV 35mV 40mV	
Ripple and Noise pk-pk rms		 50mV 20mV		0 to 20MHz Bandwidth Full load with external 680uF oscon capacitor on output.
Turn on Time		8mS	10mS	From Enable
Transient Response Deviation Settling Time		 150mV 280uS		di/dt = 5A/uS Load step =50% of max load. with external 680uF oscon

Output Specifications (cont.)

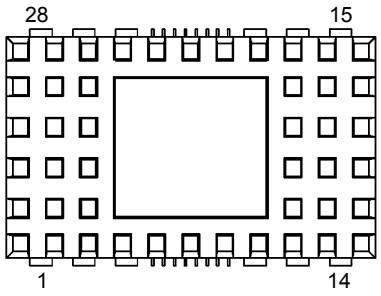
Parameter	Min	Typ	Max	Notes
Remote Sense Compensation		±0.3VDC		
Output Capacitance			TBD uF	For applications requiring higher output capacitance please consult factory.

General Specifications

Parameter	Specification
Switching Frequency	300kHz typical (fixed)
Dimensions inches mm	 1.80 x 1.09 x .49 45.7 x 27.7 x 12.4
Weight	TBD
Operating Temperature	-40°C to 85°C
Non-Operating Temperature	-40°C to 100°C
Protection Features Over current Undervoltage	 110% to 140% max Io UVLO Vin < 3.0V
Remote On/Off	Active Low
Analog Trim Range	+/- 10%

Pin Connections

Pin	Function
1	Vout
2	Vout
3	Vout
4	+Sense
5	Trim (analog)
6	Vpp (program/reset)
7	I share
8	CLK
9	Autophase A
10	Autophase B
11	Power Good
12	Vin
13	Vin
14	Vin
15	Gnd
16	Gnd
17	V bias (+5V)
18	On/Off
19	VID5
20	VID4
21	VID3
22	VID2
23	VID1
24	VID0
25	-Sense
26	Gnd
27	Gnd
28	Gnd



Voltage Identification (VID) Code

VID4	VID3	VID2	VID1	VID0	VID5=0	VID5=1
0	0	0	0	0	0.70	2.30
0	0	0	0	1	0.75	2.40
0	0	0	1	0	0.80	2.50
0	0	0	1	1	0.85	2.60
0	0	1	0	0	0.90	2.70
0	0	1	0	1	0.95	2.80
0	0	1	1	0	1.00	2.90
0	0	1	1	1	1.05	3.00
0	1	0	0	0	1.10	3.10
0	1	0	0	1	1.15	3.20
0	1	0	1	0	1.20	3.30
0	1	0	1	1	1.25	3.40
0	1	1	0	0	1.30	3.50
0	1	1	0	1	1.35	3.60
0	1	1	1	0	1.40	3.70
0	1	1	1	1	1.45	3.80
1	0	0	0	0	1.50	3.90
1	0	0	0	1	1.55	4.00
1	0	0	1	0	1.60	4.10
1	0	0	1	1	1.65	4.20
1	0	1	0	0	1.70	4.30
1	0	1	0	1	1.75	4.40
1	0	1	1	0	1.80	4.50
1	0	1	1	1	1.85	4.60
1	1	0	0	0	1.90	4.70
1	1	0	0	1	1.95	4.80
1	1	0	1	0	2.00	4.90
1	1	0	1	1	2.05	5.00
1	1	1	0	0	2.10	5.10
1	1	1	0	1	2.15	5.20
1	1	1	1	0	2.20	5.30
1	1	1	1	1	2.25	5.40

Feature Descriptions

Remote Sense
These modules employ double-ended remote sense. The +Sense lead should be connected to Vout at the desired point of regulation (typically as close to the load as possible). Similarly, the –Sense lead should be connected to Gnd at the desired point of regulation. If the Sense feature is not being used, these signals should be connected to Vout and Gnd at the module.

Voltage Programming
The output voltage may be digitally programmed with a 6-bit word to any voltage from 0.7V (000000) to 5.4V (111111). When the most significant bit (MSB) is 0 the resolution is 50mV per step. When the MSB toggles to 1, the resolution becomes 100mV per step.

Analog Trim
An analog trim pin may be used to margin the output voltage up or down 10% for any give digitally programmed set point.

Vpp / Reset
This pin is used in the factory to program the embedded micro-controller.

Power Good
The PwrGood pin is an open drain signal that is pulled low whenever the output voltage is within 10% of its expected voltage. The maximum pull-up voltage for this signal is 7V. Typically it would be pulled high to a 3.3V or 5V rail.

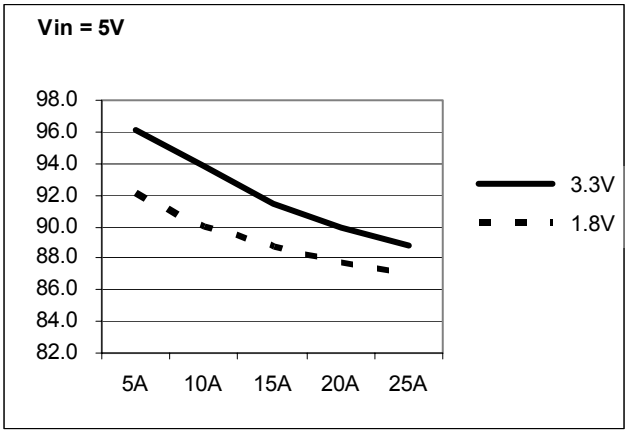
Bias Voltage
This pin supplies voltage to the micro-controller and to the multi-chip module. If the source voltage is 5V then Vin and Vbias may be tied together. If the source voltage is lower or higher than the 5V requirement for the bias voltage then this pins should be connected to a source capable of supplying at least 200mA.

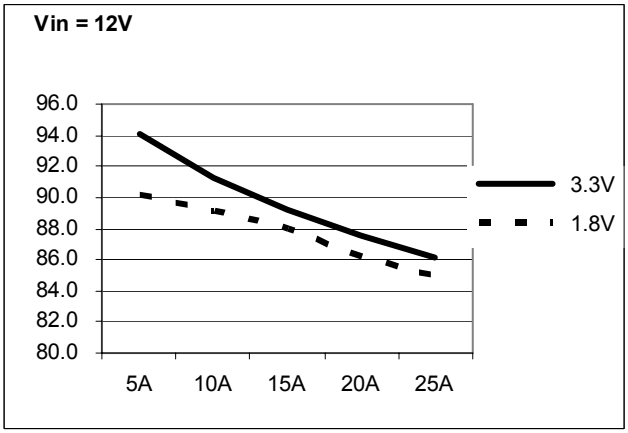
Load Sharing
When the outputs and the I share pins of multiple modules are tied together, the units will share the load to within 2A.

Auto-Phasing
When multiple Keystone modules are used on the same board they may be connected together in a such a way that they operate as a single multiphase unit. Each of the CLK signals should be tied together in a star connection. The A signal of the first unit should be left floating. The B signal of the each unit should be connected to the A signal of the following unit. The B signal of the last unit should be grounded.

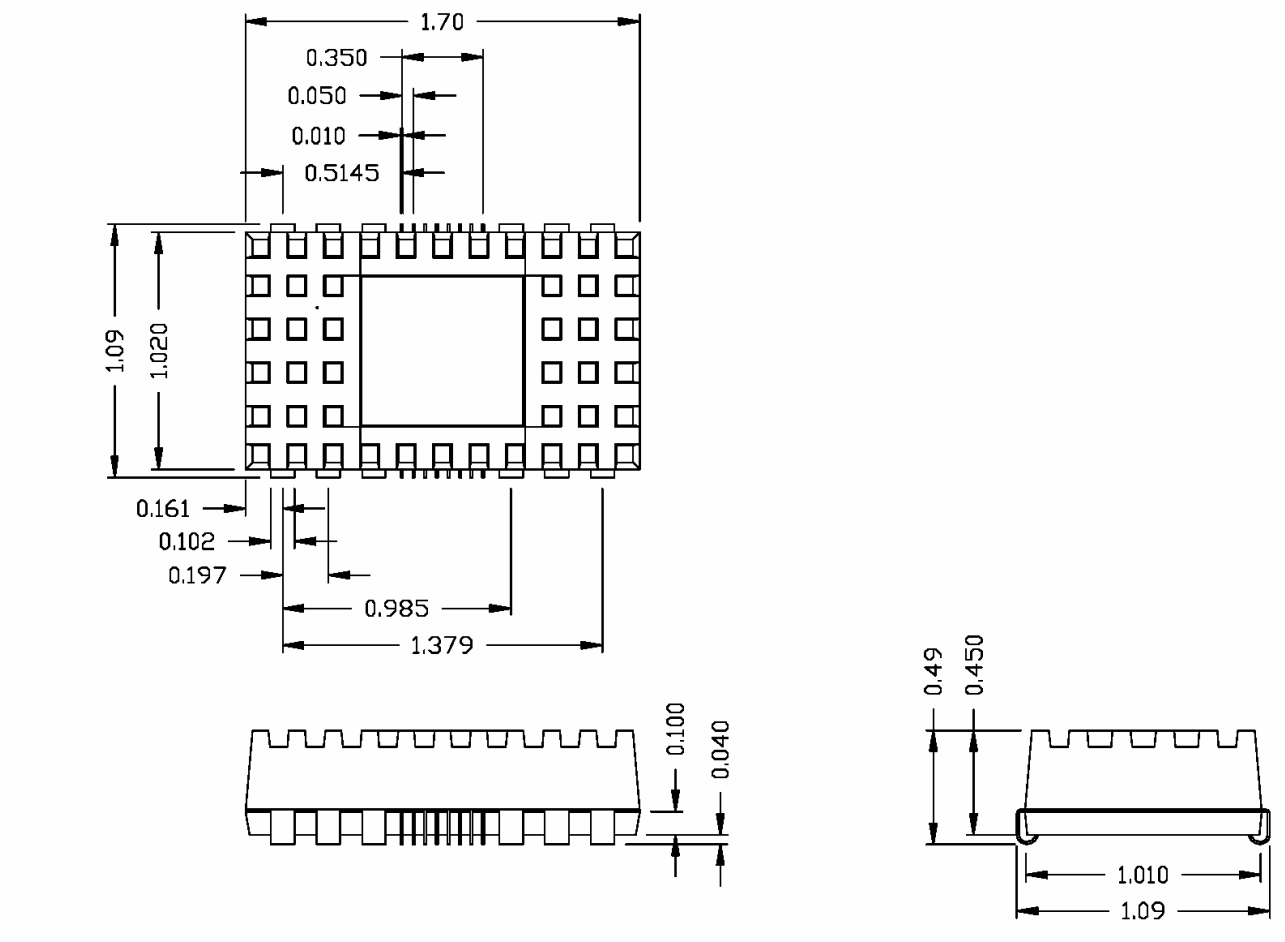
Regardless of whether or not the units are of the same output voltage and/or whether or not they are load sharing, the units may still be autophased to provide for input ripple current cancellation.

Efficiency





Product Dimensions



Note: This information is for discussion purposes only and product specifications are subject to change without notice. Publication of these specifications does not imply any commitment by Bel to manufacture this or similar products.

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