The DSP1 Series is specifically designed to convert a nominal 5 Volt input into an isolated output voltage.

The semi-regulated output voltages were designed to allow analog circuits and three terminal regulators to operate within their most efficient input voltage range.

This series achieves high power densities through the use of 350 kHz fixed-frequency switching converters.

Key Features & Benefits

- RoHS lead solder exemption compliant
- Up to 1 Watt unregulated output power
- Single-In-Line package
- Four-terminal operation
- Efficiencies to 75%
- Output Voltages: 5V, 7V, 12V, 14V, 15V, 17V
- 700 V isolation
- -40 °C to +85 °C operation

1. MODEL SELECTION

MODEL	INPUT RANGE [VDC]		OUTPUT		
	MIN	MAX	[VDC]	[mA]	POWER [W]
DSP1N5S5	4.5	5.5	5	150	0.75
DSP1N5S7	4.5	5.5	7	140	1
DSP1N5S12	4.5	5.5	12	80	1
DSP1N5S14	4.5	5.5	14	70	1
DSP1N5S15	4.5	5.5	15	65	1
DSP1N5S17	4.5	5.5	17	60	1

2. GENERAL SPECIFICATIONS [1]

PARAMETER	CONDITIONS / DESCRIPTION	MIN	TYP	MAX	UNITS
Isolation					
Isolation Voltage	Input to Output 10 µA	700			VDC
Capacitance	Input to Output		25		pF
Environmental					
Case Operating Range (T_C)[2]		-40		85	°C
Storage Range		-55		105	°C
Thermal Impedance [3]			58		°C / Watt
General					
MTBF	Calculated		700,000		hrs
Weight			0.1/28		oz/g
Case Material		Non Conductive Plastic			

NOTES
[1] All parameters measured at Tc = 25 °C, nominal input voltage and full rated load unless otherwise noted.
[2] Derate output power linearly to 0.6 watts from 70 °C to 85 °C.
[3] The case Thermal Impedance is specified as the case temperature rise over ambient per package dissipated.

3. INPUT SPECIFICATIONS[1]

PARAMETER	CONDITIONS / DESCRIPTION		MIN	TYP	MAX	UNITS
Voltage Range			4.5		5.5	VDC
Reflected Ripple [2]		DSP1N5S5		50		mApp
	DSP1N5S7 / DSP1N5S12 / DSP1N5S14 / DSP1N5S15 / DSP1N5S17			65		
Input Current	Full Load	DSP1N5S5		221		mA
		DSP1N5S7		280		
		DSP1N5S12		263		
		DSP1N5S14		268		
		DSP1N5S15		267		
		DSP1N5S17		279		
	No Load (all models)			20		mA
Efficiency		DSP1N5S5		68		%
		DSP1N5S7		70		
	DSP1N5S12 / DSP1N5S14 / DSP1N5S15 / DSP1N5S17			73		
Switching Frequency				350		kHz

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4. OUTPUT SPECIFICATIONS[1]

PARAMETER	CONDITIONS / DESCRIPTION	MIN	TYP	MAX	UNITS
Output Voltage	DSP1N5S5 DSP1N5S7 DSP1N5S12 DSP1N5S14 DSP1N5S15 DSP1N5S17		5 7 12 14 15 17		VDC
Output Voltage Accuracy [3]	DSP1N5S5 DSP1N5S7 DSP1N5S12 DSP1N5S14 DSP1N5S15 DSP1N5S17	4.75 6.65 11.40 13.30 14.25 16.15	5.00 7.00 12.00 14.00 15.00 17.00	5.25 7.35 12.60 14.70 15.75 17.85	VDC
Output Voltage, No Load	DSP1N5S5 DSP1N5S7 DSP1N5S12 DSP1N5S14 DSP1N5S15 DSP1N5S17		7 10 16 19 21 24		VDC
Rated Load Range	DSP1N5S5 DSP1N5S7 DSP1N5S12 DSP1N5S14 DSP1N5S15 DSP1N5S17	0		150 140 80 70 65 60	mA
Load Regulation [4]	75% - 20% Load 75% - 100% Load		+8 -5		%
Line Regulation [5]			1.6		%
Noise, Peak – Peak [2]			70		mVpp
Temperature Coefficient			400		ppm/°C
Short Circuit Protection to Common [6]			Momentary		

NOTES
[1] All parameters measured at Tc= 25 °C, nominal input voltage and full rated load unless otherwise noted.
[2] Noise measurement bandwidth is 20 MHz. Input Reflected Ripple and output noise are measured with an external 10µF/25V tantalum capacitor connected across the input and output pins.
[3] Output Voltage Accuracy measured at 75% of maximum Rated Load.
[4] Load Regulations measured relative to 75% of maximum Rated Load Current.
[5] Line Regulation is for a 1.0% change in input Voltage.
[6] Use input fuse for protection. See Applying the input.

5. DSP1 SERIES APPLICATION NOTES

EXTERNAL CAPACITANCE REQUIREMENTS
Output filtering is required for operation. A minimum of 10 F is specified for optimal performance. Output capacitance may be increased for additional filtering, not to exceed 400 F. To meet the reflected ripple requirements of the converter, an input impedance of less than 0.5 Ohms from DC to 350 kHz is required. If a capacitive input source is farther than 2" from the converter, it is recommended to use a 10 F, 25 V solid tantalum capacitor.

REGULATION
This converter uses a semi-regulated design. The output will vary as the load is changed, with output decreasing with increasing load. See Output Voltage vs. Output Load curves. Additionally, output voltage will change in proportion to a change in input voltage. The typical output voltage will change 1.2% for each 1% change in input voltage.

NEGATIVE OUTPUTS
A negative output voltage may be obtained by connecting the +OUT to circuit ground and connecting -OUT as the negative output.
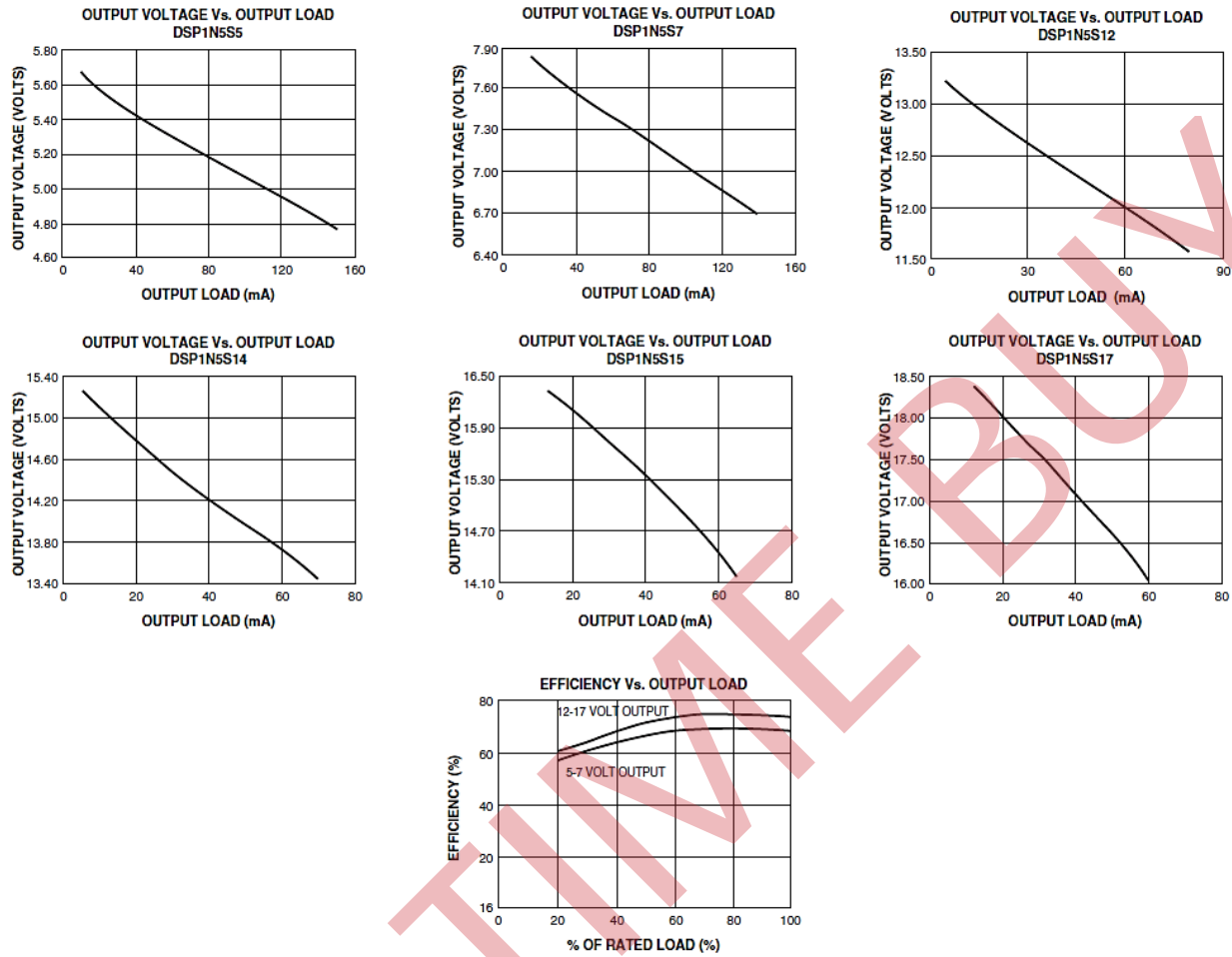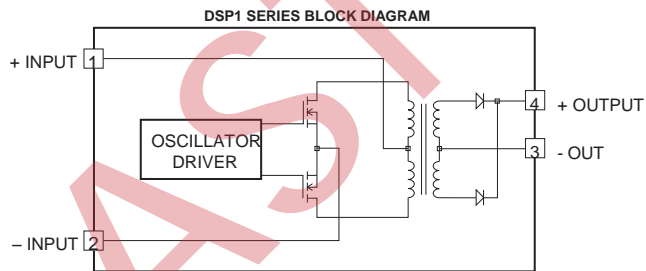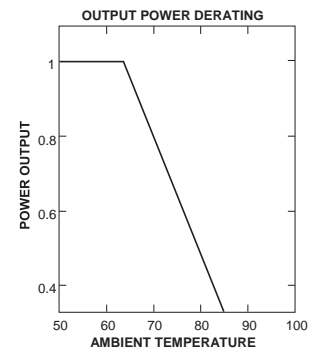
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OUTPUT VOLTAGE Vs. OUTPUT LOAD
DSP1N5S5

OUTPUT VOLTAGE Vs. OUTPUT LOAD
DSP1N5S7

OUTPUT VOLTAGE Vs. OUTPUT LOAD
DSP1N5S12

OUTPUT VOLTAGE Vs. OUTPUT LOAD
DSP1N5S14

OUTPUT VOLTAGE Vs. OUTPUT LOAD
DSP1N5S15

OUTPUT VOLTAGE Vs. OUTPUT LOAD
DSP1N5S17

EFFICIENCY Vs. OUTPUT LOAD

12-17 VOLT OUTPUT

5-7 VOLT OUTPUT

Figure 1. Typical Performance (Tc = 25°C)

DSP1 SERIES BLOCK DIAGRAM

+ INPUT 1

OSCILLATOR
DRIVER

4 + OUTPUT

3 - OUT

– INPUT 2

OUTPUT POWER DERATING

Figure 2. Block Diagram

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FRONT VIEW

0.40
(10.16)

0.02
(0.51)

0.000

IN +
IN -
OUT
OUT

1 2 3 4

0.000
0.100 (2.54)
0.200 (5.08)
0.400 (10.16)
0.600 (15.24)
0.77 (19.56)
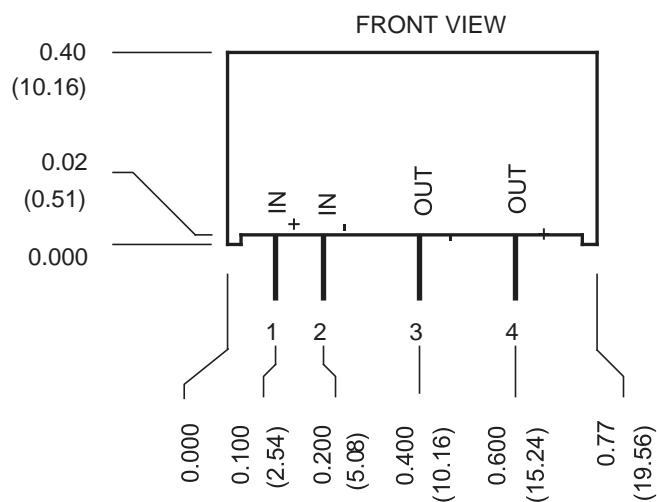
Figure 3. Mechanical Dimensions

PIN	FUNCTION
1	+INPUT
2	-INPUT
3	- OUT
4	+OUT

Mechanical tolerances unless otherwise noted:

X.XX dimensions: ±0.020 inches
X.XXX dimensions: ±0.010 inches

* This dimension to decrease to 0.24±0.01" (6.09±0.25) in 1998

** This dimension to decrease to 0.035±0.015" (0.89±0.38) in 1998

For more information on these products consult: tech.support@psbel.com

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