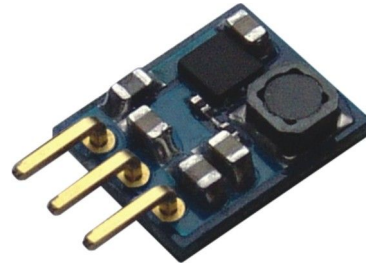


78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A OutputData Sheet
Dec. 29, 2008**78NS1R5A-5 Series – 3-Terminal Non-isolated DC/DC converters****Features**

- Low Output Ripple and Noise
- Wide operating temperature range
(-40°C to +85°C)
- 4.5Vdc ~ 5.5Vdc input range
- Dimensions 9.9 x 12.0 x 3.4 (mm)
- UVLO (Typ. 3.7 Vin)
- Output Over Current Protection
- Over Temperature Protection
- Long Life Design
- Cost-efficiency open frame design
- RoHS directive

**Applications**

- Telecommunication equipment
- Network equipment
- Distributed power systems
- Industrial application

Description

78NS1R5A-5 Series is 1.5A 3-terminal non-isolated DC/DC converter offering low cost and space-efficient solution, Features include precisely regulation, input under voltage lockout, output over current protection and over temperature protection.

The -40°C to 85°C operating temperature range makes the 78NS1R5A-5 series ideal for mixed analog/digital subsystems, data communication equipments, distributed power systems. It is an excellent choice for both new design-information network system and upgrading older systems.

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
 4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

 Data Sheet
 Dec. 29, 2008

Absolute Maximum Ratings

Parameter	Min	Max	Unit	Notes
Input Voltage	-0.3	6	Vdc	
Operating Ambient Temperature	-40	85	°C	
Storage Temperature	-40	85	°C	

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device

Electrical Specifications

Input Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Operating Input voltage Range	V_{IN}	4.5		5.5	V
Maximum Input Current ($V_{IN} = 4.5V$, $V_{OUT} = 3.3V$, $I_{OUT} = 1.5A$)	$I_{IN,max}$			1.3	A
UVLO Threshold	$V_{IN,Rising}$	3.4	3.7	4.0	V
	Hysteresis		150		mV
No Load Input Current					
78NS1R5A-5-1R0V				18	mA
78NS1R5A-5-1R2V				18	mA
78NS1R5A-5-1R5V				18	mA
78NS1R5A-5-1R8V				18	mA
78NS1R5A-5-2R0V				18	mA
78NS1R5A-5-2R5V				18	mA
78NS1R5A-5-3R3V				18	mA
Input Reflected Ripple Current ($V_{IN} = 5.0V$, $V_{OUT} = 3.3V$, $I_{OUT} = 1.5A$)	$I_{reflect,ripple}$				mApp

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
 4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

 Data Sheet
 Dec. 29, 2008

Output Characteristics
 $T_A = +25^\circ\text{C}$, $V_{in} = 4.5 \sim 5.5\text{V}$ unless otherwise specified

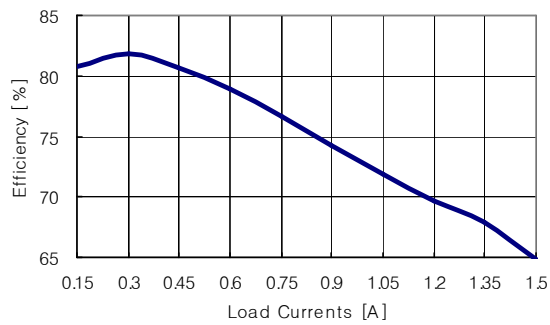
Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage Range	V_{OUT}	1.0	-	3.3	V
Output Voltage Tolerance	$V_{OUT,Tol}$	-3	-	+3	%, V_{OUT}
Output Current	I_{OUT}			1.5	A
Output Regulation; - Line Regulation ($V_{IN} = 4.5\text{V}$ to 5.5V) - Load Regulation ($I_{OUT} = 0\text{A}$ to 1.5A)		-0.2 -2.0	- -	+0.2 +2.0	%, V_{OUT} %, V_{OUT}
Output Over Current Protection (Automatic recovery)		2200	2600	3500	mA
Output Ripple and Noise ($V_{IN} = 5\text{V}$, $I_{OUT} = 1.5\text{A}$, Bandwidth 20MHz, $C_{OUT,EXT} = 100\mu\text{F}$ (OSCON))	Vripple&noise	-	-	20	mV _{PP}
Efficiency 78NS1R5A-5-1R0V 78NS1R5A-5-1R2V 78NS1R5A-5-1R5V 78NS1R5A-5-1R8V 78NS1R5A-5-2R0V 78NS1R5A-5-2R5V 78NS1R5A-5-3R3V ($V_{IN} = 5\text{V}$, $I_{OUT} = 1.5\text{A}$)	η		65 69 72 76 77 81 85		% % % % % % %
Dynamic Load Response ($I_{OUT} = 50\%$ to 100% to 50% , See the Fig.9)		-2		+2	%, V_{OUT}
Recovery Time (with in 1% Nominal V_o)			100		μs
Start – Up Time			700		μs
Turn – on overshoot			5		%
External Output Capacitance	$C_{OUT,EXT}$				μF
Switching frequency	f_{sw}	1.0	1.3	1.6	MHz

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A OutputData Sheet
Dec. 29, 2008**General Specifications**

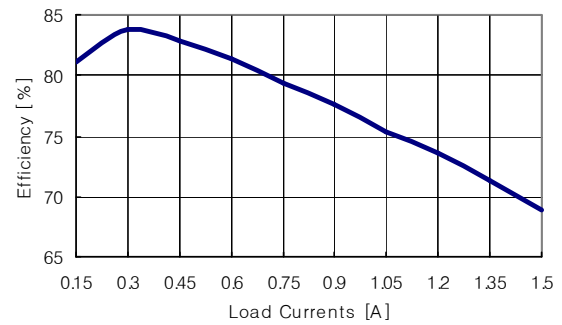
Parameter	Symbol	Min	Typ	Max	Unit
MTBF			4.0 x 10 ⁶		hrs
Weight			0.58		Grams
Dimensions (W x H x L)		10.2 x 12.0 x 3.3			mm

Environmental

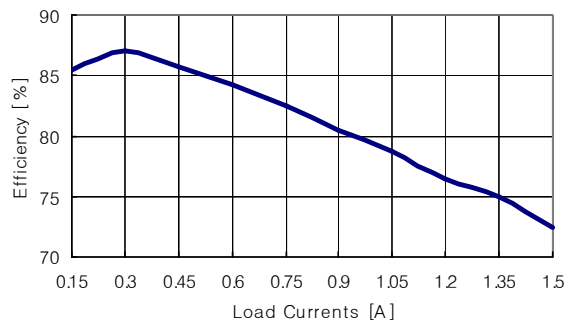
Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature		-40		85	°C
Operating Humidity (RH non-condensing)					%
Storage Temperature		-40		85	°C
Lead Temperature (Soldering, 10 [sec])				300	°C

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A OutputData Sheet
Dec. 29, 2008**Characteristic Curves****Efficiency Curves****- 78NS1R5A-5-1R0 -**

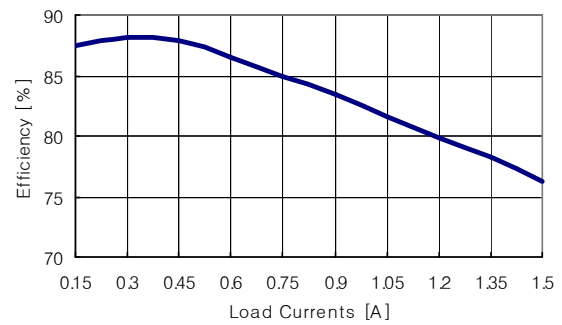
Vin=5V, Vo=1.0V@1.5A , At 25°C

- 78NS1R5A-5-1R2 -

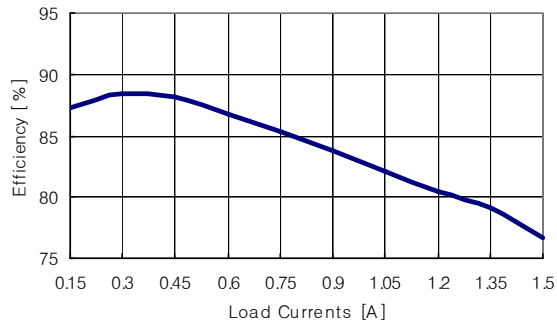
Vin=5V, Vo=1.2V@1.5A , At 25°C

- 78NS1R5A-5-1R5 -

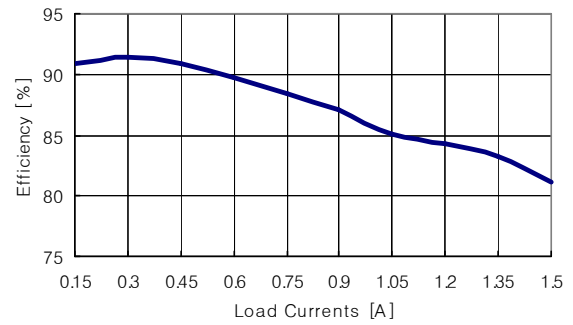
Vin=5V, Vo=1.5V@1.5A , At 25°C

- 78NS1R5A-5-1R8 -

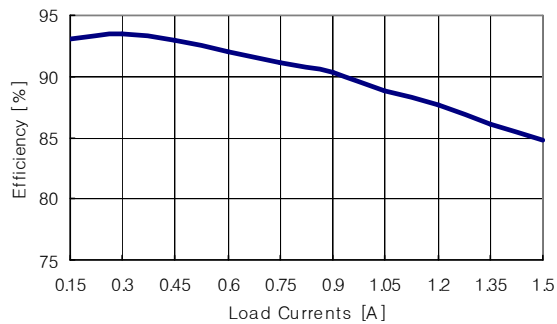
Vin=5V, Vo=1.8V@1.5A , At 25°C

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A OutputData Sheet
Dec. 29, 2008**Efficiency Curves****- 78NS1R5A-5-2R0 -**

Vin=5V, Vo=2.0V@1.5A, At 25°C

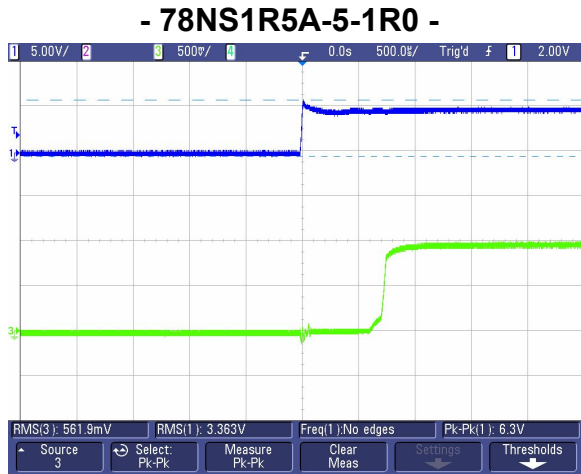
- 78NS1R5A-5-2R5 -

Vin=5V, Vo=2.5V@1.5A, At 25°C

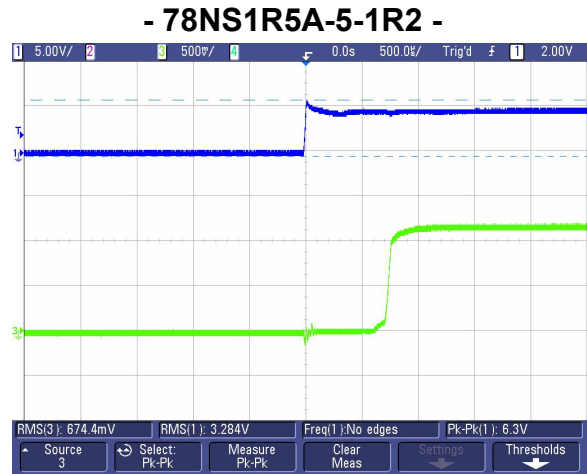
- 78NS1R5A-5-3R3 -

Vin=5V, Vo=3.3V@1.5A, At 25°C

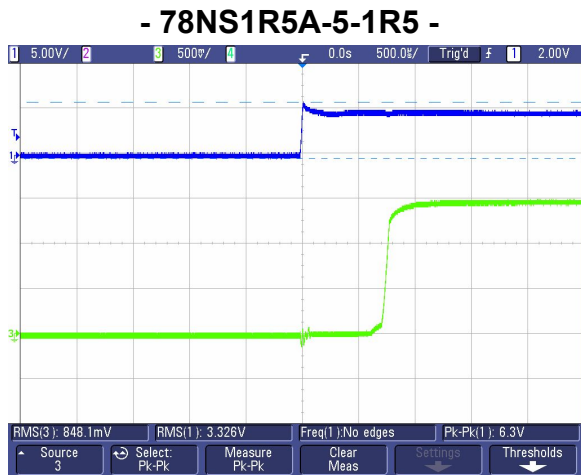
Start-up from Vin



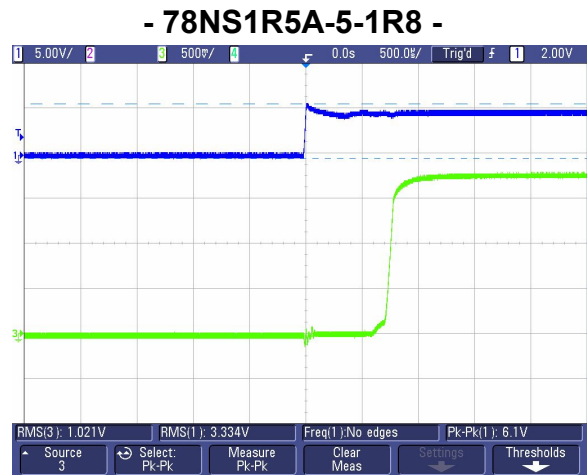
Vin=5V, Vo=1.0V@1.5A , At 25°C



Vin=5V, Vo=1.2V@1.5A , At 25°C



Vin=5V, Vo=1.5V@1.5A , At 25°C

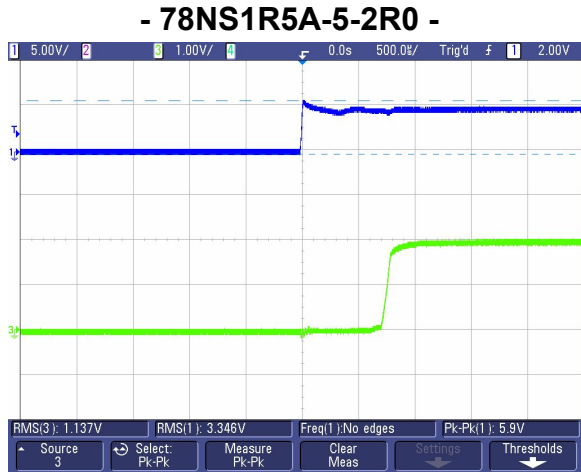


Vin=5V, Vo=1.8V@1.5A , At 25°C

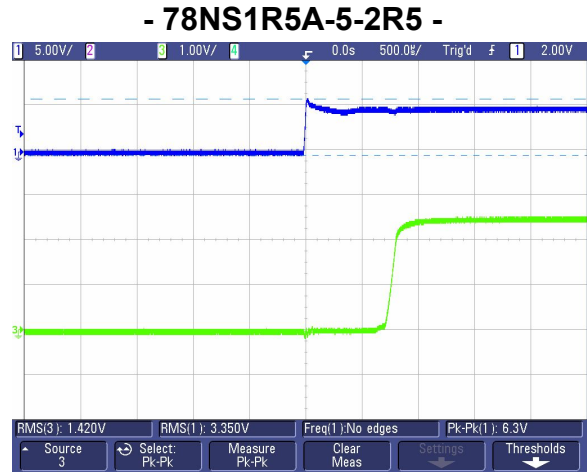
78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

Data Sheet
Dec. 29, 2008

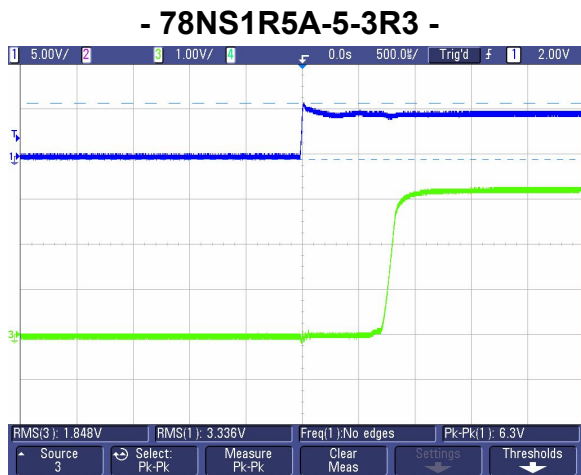
Start-up from Vin



Vin=5V, Vo=2.0V@1.5A , At 25°C



Vin=5V, Vo=2.5V@1.5A , At 25°C

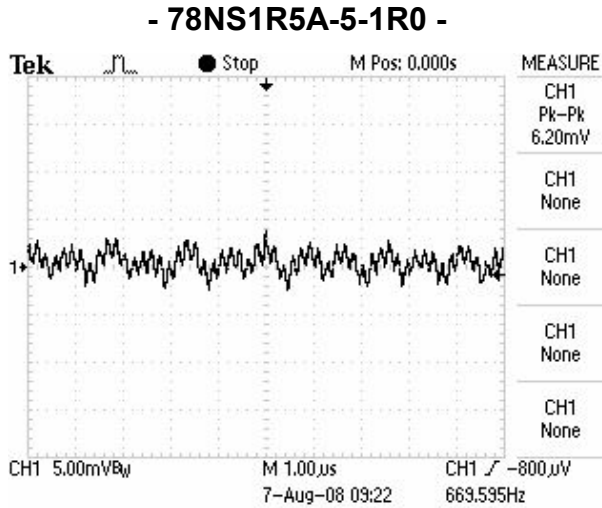


Vin=5V, Vo=3.3V@1.5A , At 25°C

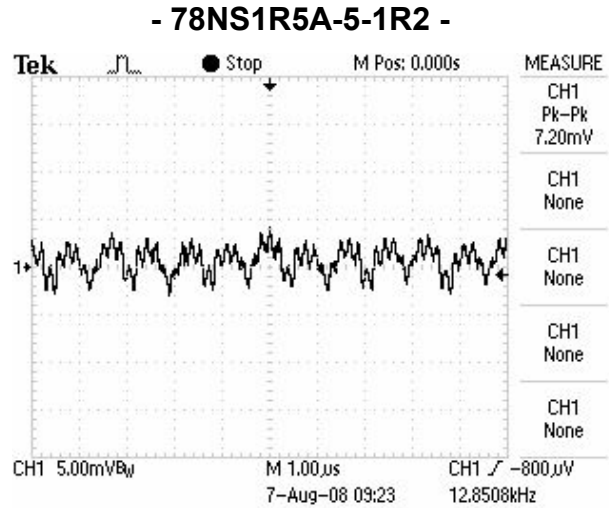
78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
 4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

Data Sheet
 Dec. 29, 2008

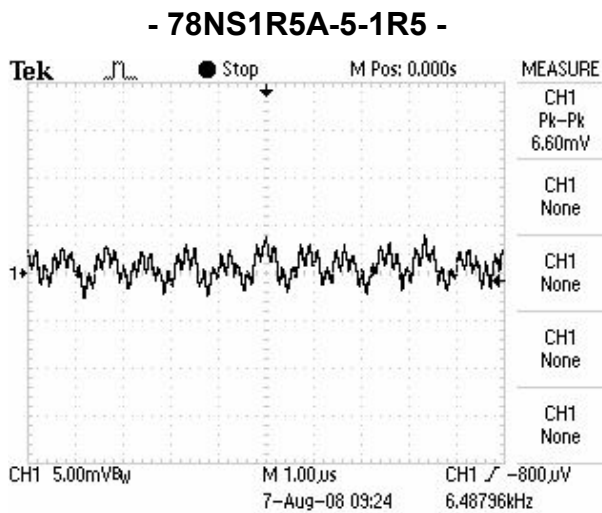
Output Ripple/Noise (I)



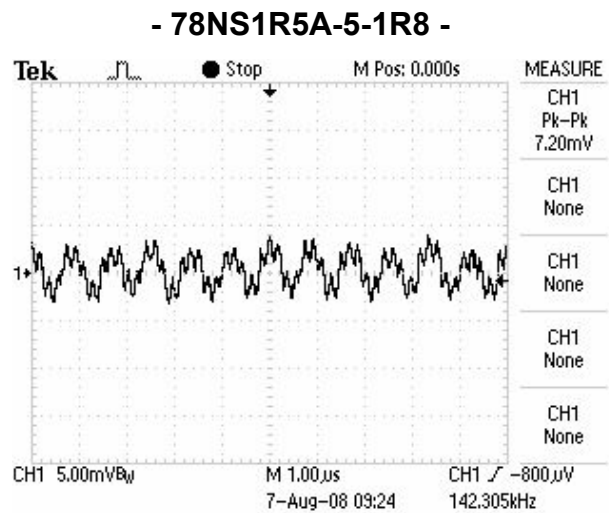
Vin=5V, Vo=1.0V@1.5A , At 25°C



Vin=5V, Vo=1.2V@1.5A , At 25°C



Vin=5V, Vo=1.5V@1.5A , At 25°C

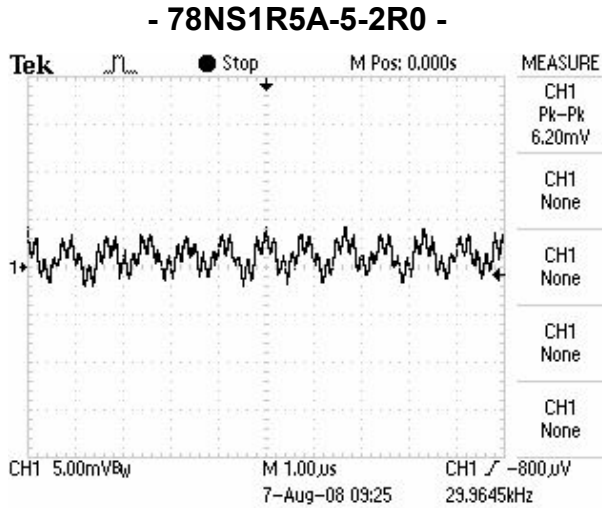


Vin=5V, Vo=1.8V@1.5A , At 25°C

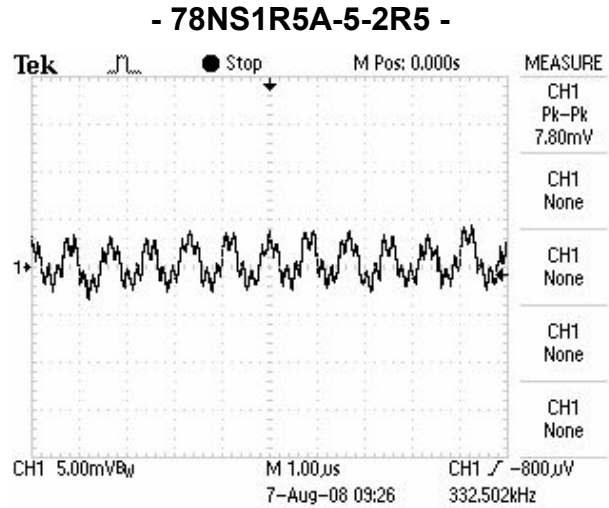
78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
 4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

Data Sheet
 Dec. 29, 2008

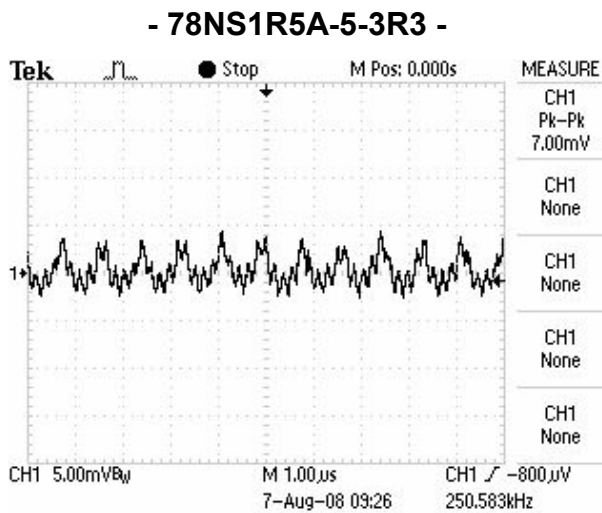
Output Ripple/Noise (II)



Vin=5V, Vo=2.0V@1.5A , At 25°C

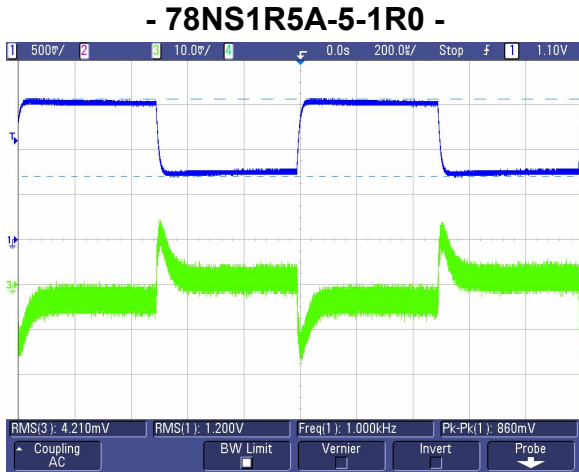


Vin=5V, Vo=2.5V@1.5A , At 25°C

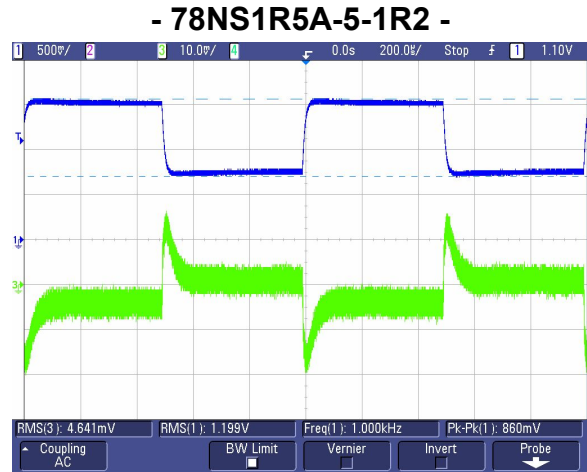


Vin=5V, Vo=3.3V@1.5A , At 25°C

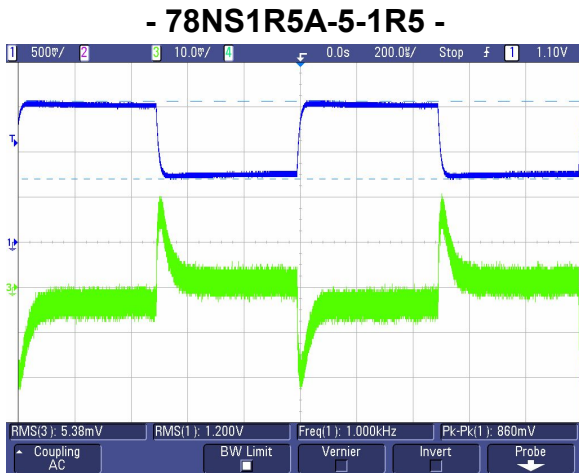
Output Load Transient Response (I)



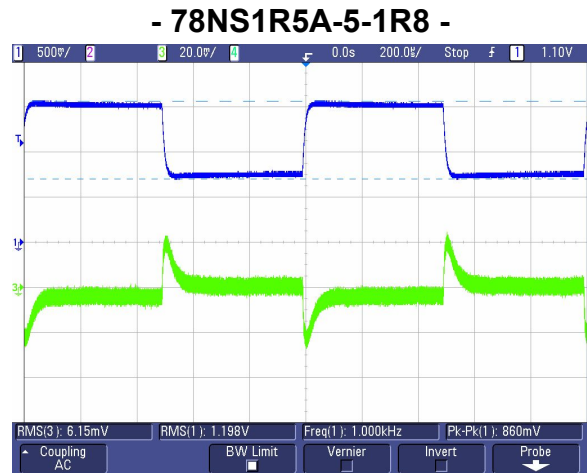
Vin=5V, Vo=1.0V@1.5A , At 25°C



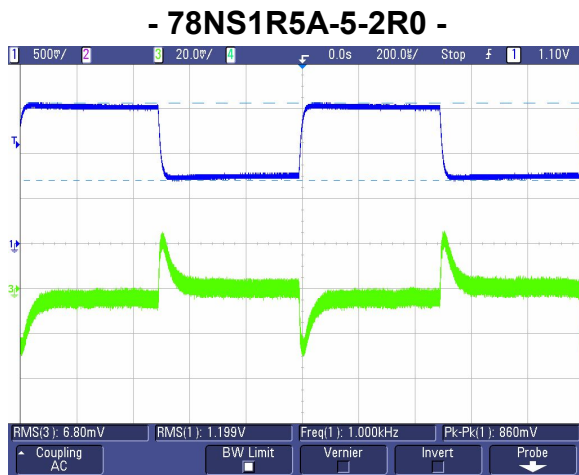
Vin=5V, Vo=1.2V@1.5A , At 25°C



Vin=5V, Vo=1.5V@1.5A , At 25°C



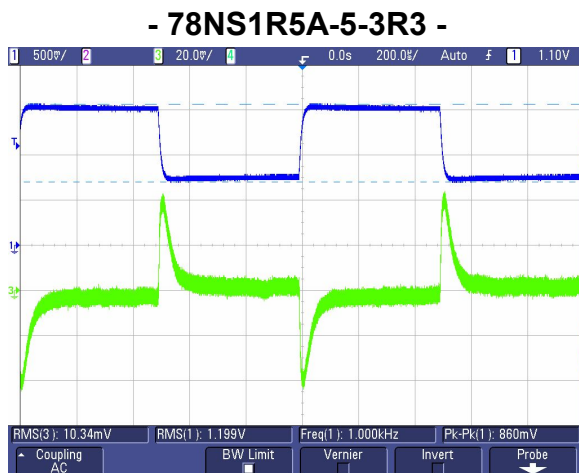
Vin=5V, Vo=1.8V@1.5A , At 25°C

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A OutputData Sheet
Dec. 29, 2008**Output Load Transient Response (II)**

Vin=5V, Vo=2.0V@1.5A , At 25°C



Vin=5V, Vo=2.5V@1.5A , At 25°C



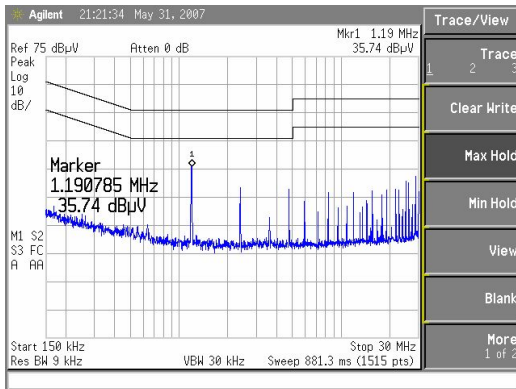
Vin=5V, Vo=3.3V@1.5A , At 25°C

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

Data Sheet
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EMI Test

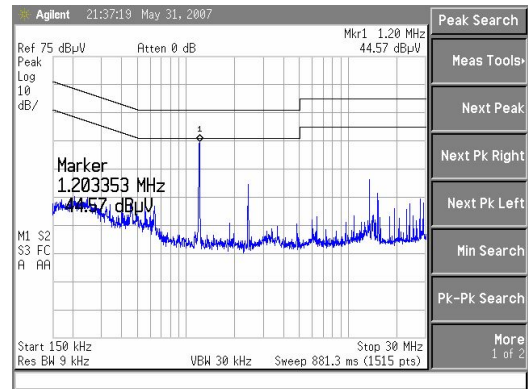
- 78NS1R5A-5-3R3 -



Vin=5V, Vo=3.3V@0A , At 25°C

(External Cin: 220uF Aluminum Capacitor)

- 78NS1R5A-5-3R3 -

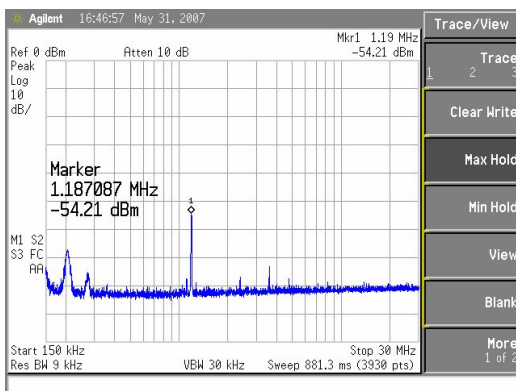


Vin=5V, Vo=3.3V@1.32A , At 25°C

(External Cin : 220uF Aluminum Capacitor)

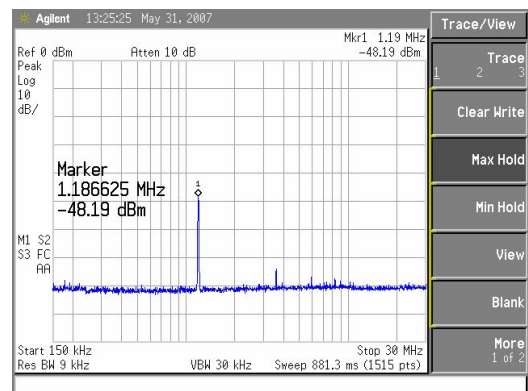
Output Ripple/Noise

- 78NS1R5A-5-1R0 -



Vin=5V, Vo=1.0V@0A , At 25°C

- 78NS1R5A-5-3R3 -

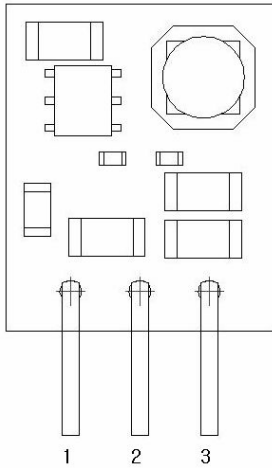


Vin=5V, Vo=3.3V@0A , At 25°C

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
 4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

Data Sheet
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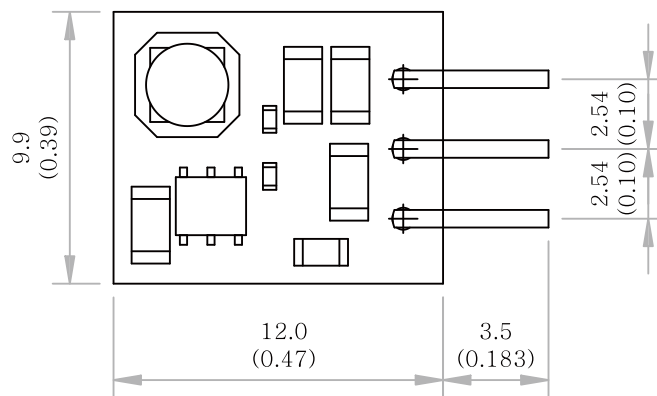
Pin assignments



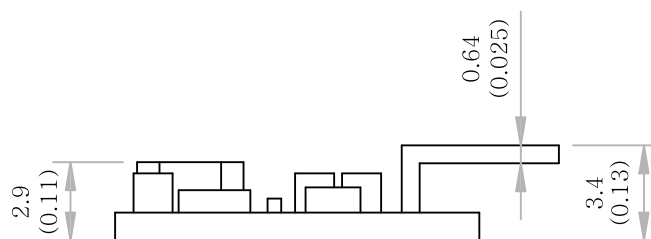
PIN NO.	NAME	FUNCTION
1	+Vin	Positive terminal for input
2	COM	Ground
3	+Vout	Positive terminal for output

Mechanical Specification

TOP VIEW



SIDE VIEW



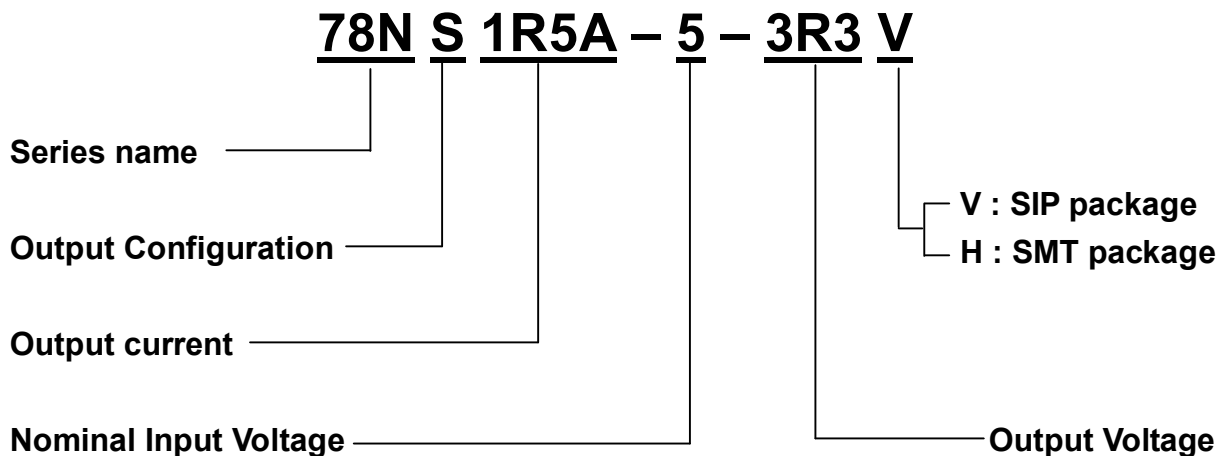
All dimensions are mm(inches)

78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
 4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A Output

 Data Sheet
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Ordering Information

Input	Output	Maximum Power[W]	Ripple & Noise Max.[mV _{PP}]	Efficiency Typ.[%]	Model Number
4.5 – 5.5V	1.0V@1.5A	1.50	20	65	78NS1R5A-5-1R0V
	1.2V@1.5A	1.80	20	69	78NS1R5A-5-1R2V
	1.5V@1.5A	2.25	20	72	78NS1R5A-5-1R5V
	1.8V@1.5A	2.70	20	76	78NS1R5A-5-1R8V
	2.0V@1.5A	3.00	20	77	78NS1R5A-5-2R0V
	2.5V@1.5A	3.75	20	81	78NS1R5A-5-2R5V
	3.3V@1.5A	4.95	20	85	78NS1R5A-5-3R3V

Part Number Structure


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78NS1R5A-5(V)Series– Non-isolated DC/DC Converters
4.5 – 5.5Vdc Input, 1.0Vdc to 3.3Vdc Output, 1.5A OutputData Sheet
Dec. 29, 2008**HEAD OFFICE & FACTORY**

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Korea
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GENERAL SALES INQUIRIES

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: sales@powerplaza.co.kr

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