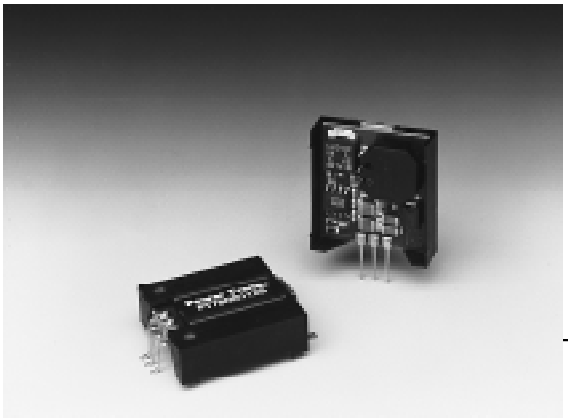
PT78NR100 Series

1 Amp Plus to Minus Voltage Integrated Switching Regulator

Power Trends Products from Texas Instruments

SLTS058B

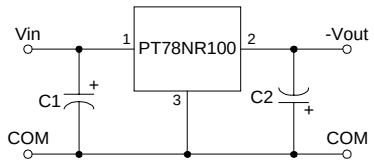
(Revised 8/31/2000)



- Negative output from positive input
- Wide Input Range
- Self-Contained Inductor
- Short Circuit Protection
- Over-Temperature Protection
- Fast Transient Response

The PT78NR100 Series creates a negative output voltage from a positive input voltage greater than 7V. These easy-to-use, 3-terminal, Integrated Switching Regulators (ISRs) have maximum output power of 5 watts and a negative output voltage that is laser trimmed. They also have excellent line and load regulation.

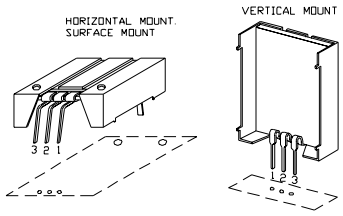
Standard Application



C1 = Required 100µF electrolytic (1)
C2 = Required 100µF electrolytic (1)

Pin-Out Information

Pin	Function
1	$+V_{in}$
2	$-V_{out}$
3	GND



Pkg Style 500

Ordering Information

PT78NR1 XX Y

Output Voltage	Package Suffix
03 = -3.0 Volts	**V** = Vertical Mount
05 = -5.0 Volts	**S** = Surface Mount
52 = -5.2 Volts	**H** = Horizontal Mount
06 = -6.0 Volts	
07 = -7.0 Volts	
08 = -8.0 Volts	
09 = -9.0 Volts	
10 = -10.0 Volts	
12 = -12.0 Volts	
14 = -13.9 Volts	
15 = -15.0 Volts	

Specifications

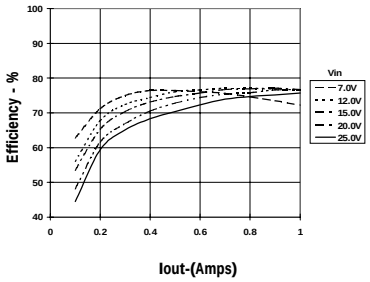
Characteristics (T_a= 25°C unless noted)	Symbols	Conditions	PT78NR100 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range V_o=-5V	0.05 (2)	—	1.00	A
		V_o=-6V	0.05 (2)	—	0.8	
		V_o=-7, -8, -9V	0.05 (2)	—	0.55	
		V_o=-10V	0.05 (2)	—	0.5	
		V_o=-12V	0.05 (2)	—	0.40	
		V_o=-13.9, -15V	0.05 (2)	—	0.30	
Short Circuit Current	I_{sc}	V_{in}=10V	—	4×I_{max}	—	Apk
Inrush Current	I_{ir}	V_{in}=10V	—	4	—	A
	t_{ir}	On start-up	—	0.5	—	mSec
Input Voltage Range	V_{in}	0.1 ≤ I_o ≤ I_{max} V_o=-5V	7	—	25	V
		V_o=-6, -7, -8, -9V	7	—	21	V
		V_o=-10, -12V	7	—	18	V
		V_o=-13.9, -15V	7	—	15	V
Output Voltage Tolerance	ΔV_o	Over V_{in} range, T_a=-20°C to +70°C	—	±1.0	±3.0	%V_o
Line Regulation	Reg_{line}	Over V_{in} range	—	±0.5	±1.0	%V_o
Load Regulation	Reg_{load}	0.1 ≤ I_o ≤ I_{max}	—	±0.5	±1.0	%V_o
V_o Ripple/Noise	V_n	V_{in}=10V, I_o=I_{max}	—	±2	—	%V_o
Transient Response (with 100µF output cap)	t_{tr}	50% load change	—	100	250	µSec
		V_o over/undershoot	—	5.0	—	%V_o
Efficiency	η	V_{in}=10V, I_o=0.5×I_{max}, V_o = -5V	—	75	—	%
Switching Frequency	f_o	Over V_{in} and I_o ranges	600	650	700	kHz
Absolute Maximum Operating Temperature Range	T_a	Free Air Convection, (40-60LFM) Over V_{in} Range	-40	—	+85 (3)	°C
Thermal Resistance	θ_{ja}	Free Air Convection, (40-60LFM)	—	45	—	°C/W
Storage Temperature	T_s	—	-40	—	+125	°C
Mechanical Shock	—	Per Mil-STD-883D, Method 2002.3	—	500	—	G's
Mechanical Vibration	—	Per Mil-STD-883D, Method 2007.2, 20-2000 Hz, soldered in a PC board	—	5	—	G's
Weight	—	—	—	6.5		Grams

Notes: (1) *The PT78NR100 Series requires a 100µF electrolytic or tantalum capacitor at both the input and output for proper operation in all applications. The input capacitor, C_1 must have a ripple current rating ≥600 mArms, and an ESR ≤0.2Ω.*
(2) The ISR will operate down to no load with reduced specifications.
(3) See Thermal Derating chart.

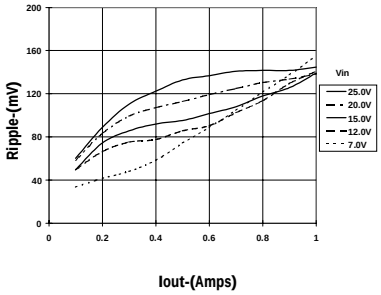
Typical Characteristics

PT78NR105 -5.0 VDC (See Note A)

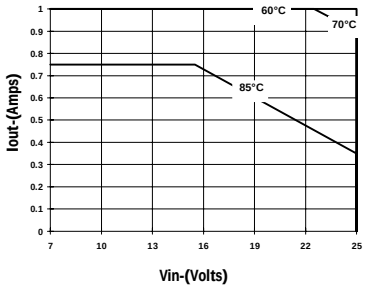
Efficiency vs Output Current



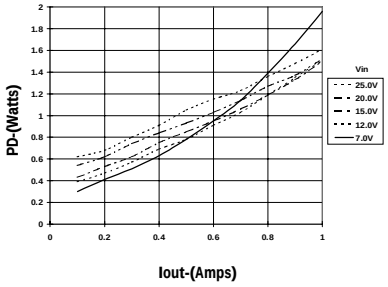
Ripple vs Output Current



Thermal Derating (T_a) (See Note B)

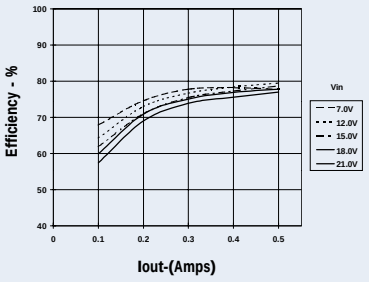


Power Dissipation vs Output Current

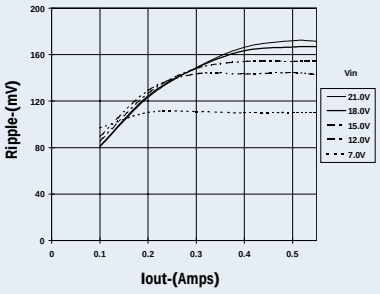


PT78NR109 -9.0 VDC (See Note A)

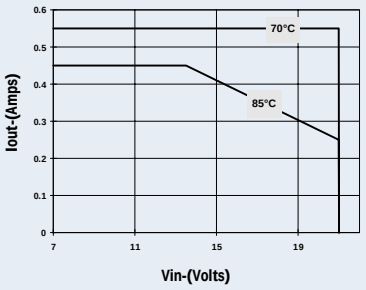
Efficiency vs Output Current



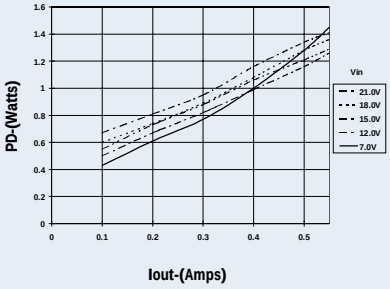
Ripple vs Output Current



Thermal Derating (T_a) (See Note B)

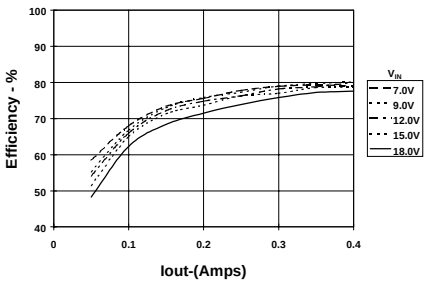


Power Dissipation vs Output Current

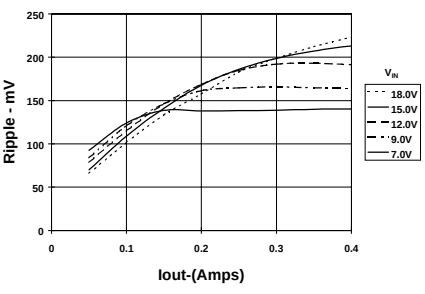


PT78NR112 -12.0 VDC (See Note A)

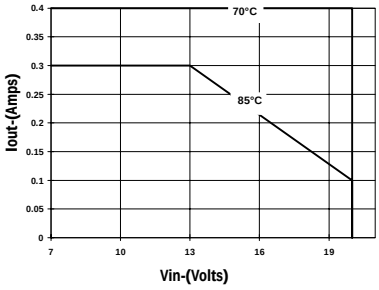
Efficiency vs Output Current



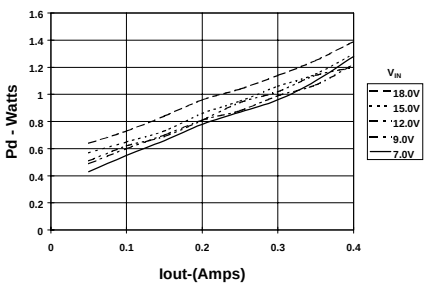
Ripple vs Output Current



Thermal Derating (T_a) (See Note B)



Power Dissipation vs Output Current



Note A: *All data listed in the above graphs, except for derating data, has been developed from actual products tested at 25°C. This data is considered typical data for the ISR.*
Note B: *Thermal derating graphs are developed in free air convection cooling of 40-60 LFM. (See Thermal Application Notes.)*

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Customers are responsible for their applications using TI components.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.