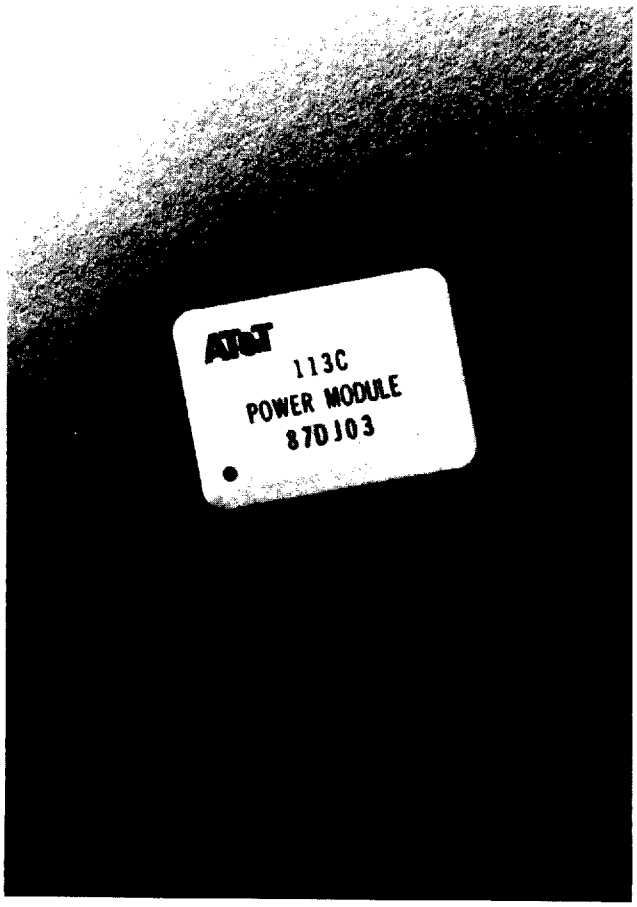
Data Sheet

AT&T

T-57-11

113C Power Module: DC-DC Converter; +5 Vdc Input, −15 Vdc Output, 0.75 W



The AT&T 113C Power Module delivers highly reliable dc-dc conversion in less than one square inch of footprint area.

Features

- High reliability: MTBF > 4,310,000 hours at 40 °C
- Low profile
- Small size: 0.96" x 0.70" x 0.47" (24.4 mm x 17.8 mm x 11.9 mm)
- Printed circuit board mountable
- Operating ambient temperature range: 0 °C to 70 °C
- No minimum load

Applications

- Telecommunications
- Digital circuitry
- Distributed power architecture

Description

The AT&T 113C Power Module features high reliability for digital and telecommunication applications. This non-isolated switching regulator is built on a ceramic substrate and generates a negative output voltage from a positive input voltage. Low power dissipation makes it possible to operate the 113C Power Module from no load to full load over an ambient temperature range of 0 °C to 70 °C with no derating.

With the addition of minimal external filtering components, the 113C Power Module provides 0.75 W of regulated −15 Vdc output power from a nominal 5 Vdc input. The module is fully encapsulated in a 16-pin dual in-line package (DIP), which uses less than one square inch of a printed circuit board.

Absolute Ratings

Exceeding these values can damage the module.

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_I	—	7.0	Vdc
Output Resistive Load		300	—	Ω
Operating Ambient Temperature (natural convection)	T_A	0	70	°C
Storage Temperature		−40	+125	°C

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. External filtering is required.

Parameter	Symbol	Min	Typ	Max	Unit
Input					
Operating Input Voltage	V_I	4.5	5.0	5.5	Vdc
Maximum Input Current (see Figure 1)	$I_{I,\,max}$	—	—	400	mA
Input Reflected Ripple Current, Peak-to-Peak (5 Hz to 20 MHz and 12 μH source impedance)		—	40	—	mA p-p
Required Input Filter (see Figure 4): Capacitance	C_I	100 ± 20%			μF
Capacitor Equivalent Series Resistance (at 100 kHz and T_A = 0 °C to 70 °C)	ESR (C_I)	—	—	125	mΩ

Parameter	Symbol	Min	Typ	Max	Unit
Output					
Output Voltage (over all operating input voltage, resistive load, and temperature conditions until end of life)	V_O	−14.25	—	−15.75	Vdc
Output Voltage Set Point (V_I = 5 V, I_O at full load, and T_A = 25 °C)	$V_{O\,set}$	−14.70	−15.00	−15.30	Vdc
Output Regulation: Temperature (T_A = 0 °C to 70 °C) (see Figure 2)		—	—	60	mV
Output Ripple and Noise: RMS		—	—	35	mV rms
Peak-to-Peak (5 Hz to 20 MHz)		—	—	200	mV p-p
Output Current	I_O	0	—	50	mA
Efficiency (see Figure 3) (V_I = 5 V, I_O at full load, and T_A = 25 °C)	η	62	69	—	%
Required Output Filter (see Figure 4): Capacitance	C_O	100 ± 20%			μF
Capacitor Equivalent Series Resistance (at 100 kHz and T_A = 0 °C to 70 °C)	ESR (C_O)	—	—	125	mΩ

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Calculated MTBF (80% full load and case temperature = 40 °C)		4,310,000			hours
Weight		—	—	0.3	oz.

Characteristics

Input and output filters are required (see Figure 4).

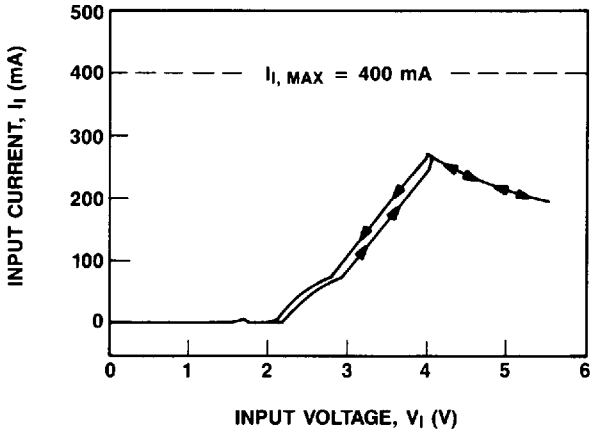


Figure 1. Typical Input Characteristic With a Resistive Load of I_O = Full Load and T_A = 25 °C (Arrows Indicate Hysteresis)

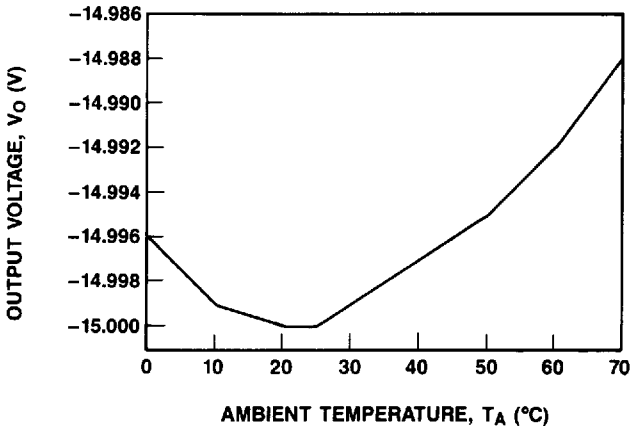


Figure 2. Typical Output Voltage Variation Over Operating Ambient Temperature Range at Full Load With V_I = 5 Vdc

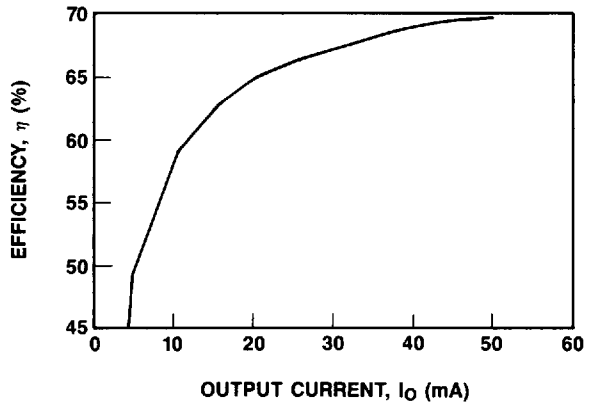
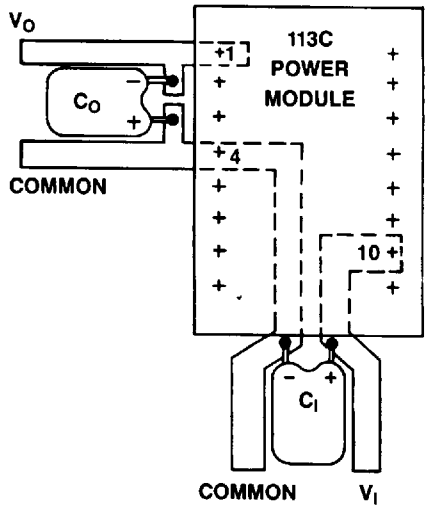


Figure 3. Typical Converter Efficiency as a Function of Output Current With V_I = 5 Vdc and T_A = 25 °C

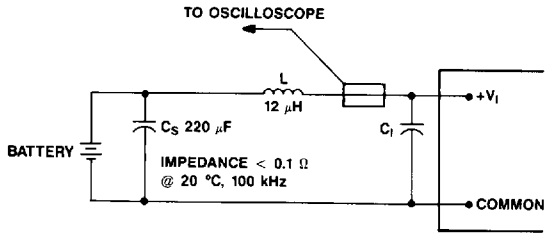
Connection Diagram



Note: Input and output filter components should be placed as close as possible to the module leads. To further enhance the filtering capabilities of the filter capacitor, connect module leads directly to the capacitor terminals.

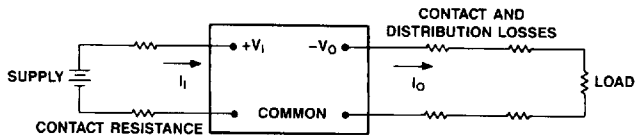
Figure 4. Filter Connection Diagram

Test Configurations



Note: Input reflected ripple current is measured with a simulated source impedance of 12 μH. Capacitor C_S will offset possible battery impedance. Current is measured at the input of the module.

Figure 5. Input Reflected Ripple Test Set-Up



Note: All measurements are taken at the module terminals. When socketing, place Kelvin connections at module terminals to avoid measurement errors due to socket contact resistance.

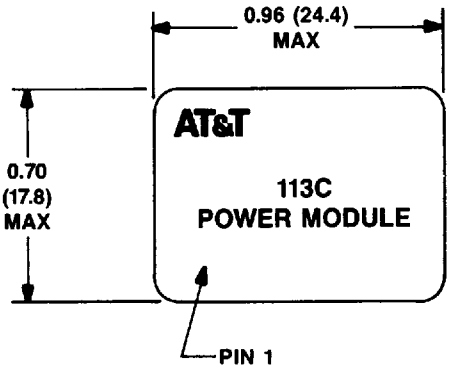
$$\eta = \frac{[-V_O - (V_{com})]\, I_O}{[+V_I - (V_{com})]\, I_I}$$

Figure 6. Output Voltage and Efficiency Measurement Test Set-Up

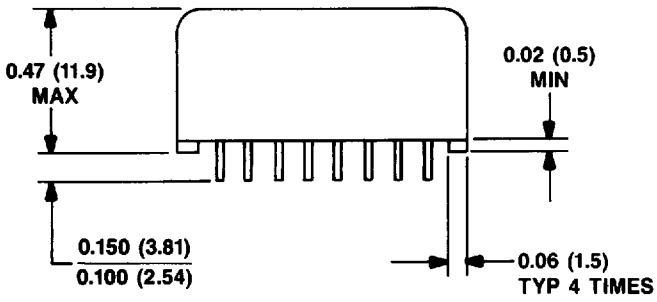
Module Dimensions

Dimensions are in inches and (millimeters).
Module tolerances: x.xx ± 0.02 inch (0.5 mm), x.xxx ± 0.005 inch (0.13 mm).

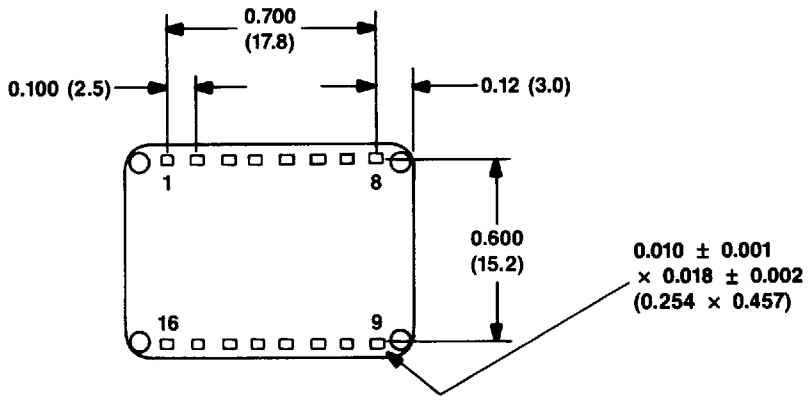
Top View



Side View



Bottom View



Pin	Description
1	$-V_O$
2	NC
3	NC
4	Common
5	NC
6	NC
7	NC
8	NC
9	NC
10	$+V_I$
11	NC
12	NC
13	NC
14	NC
15	NC
16	NC

Note: All unused pins must be soldered to the printed circuit board with no electrical connections.

Recommended Hole Pattern (Component-Side Footprint)

Dimensions are in inches and (millimeters).