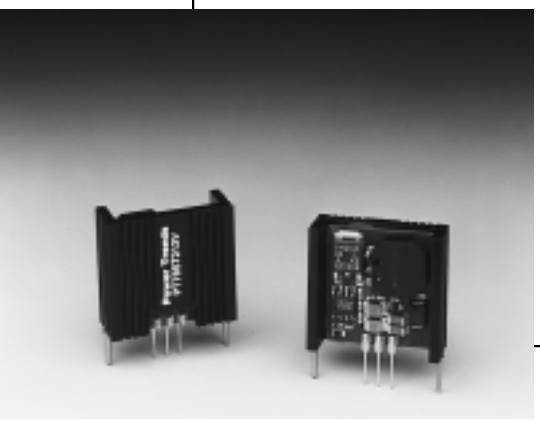
78ST212 Series

12V 2 AMP POSITIVE STEP-DOWN INTEGRATED SWITCHING REGULATOR

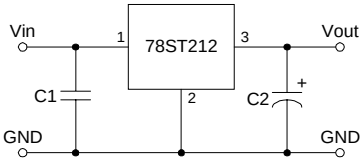
Revised 6/30/98



- High Efficiency > 87%
- Wide Input Range
- Aluminum Heatsink for Applications with Airflow
- Self-Contained Inductor
- Short Circuit Protection
- Over-Temperature Protection

The 78ST212 is a series of wide input voltage, 3-terminal Integrated Switching Regulators (ISRs). With a surge capability of 3A and an output voltage that is laser trimmed, it is ideal for inductive load applications such as disk drive motors.

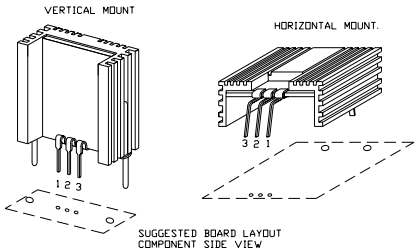
Standard Application



C_1 = Optional 1µF ceramic
C_2 = Required 100µF electrolytic

Pin-Out Information

Pin	Function
1	V_{in}
2	GND
3	V_{out}



Ordering Information

78ST2 XX Y C

Output Voltage	Package Suffix
12 = 12.0 Volts	**V** = Vertical Mount **H** = Horizontal Mount

(For dimensions and PC board layout see Package Style 600.)

Specifications

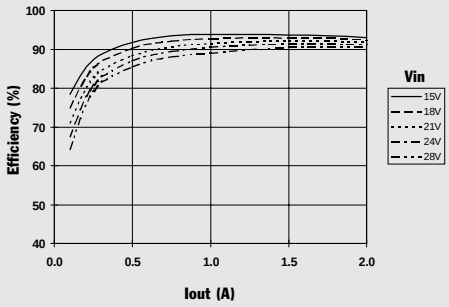
Characteristics (T_a = 25°C unless noted)	Symbols	Conditions	78ST212 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range With forced air cooling	0.1*	—	2.0	A
Input Voltage Range	V_{in}	$0.1 \le I_o \le 2.0A$	14.5	—	28	V
Output Voltage Tolerance	ΔV_o	Over V_{in} range, I_o= 2.0A T_a= 0°C to +55°C	—	±1.0	±2.0	%Vo
Line Regulation	Reg_{line}	Over V_{in} range	—	±0.4	±0.8	$\%V_o$
Load Regulation	Reg_{load}	$0.1 \le I_o \le 2.0A$	—	±0.2	±0.4	$\%V_o$
V_o Ripple/Noise	V_n	V_{in}=17V, I_o=2.0A, V_o=12V	—	1.0	—	$\%V_o$
Transient Response (with 100µF output cap)	t_{tr}	50% load change V_o over/undershoot	— —	100 3.0	— —	µSec $\%V_o$
Efficiency	η	V_{in}=17V, I_o=2.0A	—	87	—	%
Switching Frequency	f_o	Over V_{in} and I_o ranges	0.95	1.0	1.05	MHz
Absolute Maximum Operating Temperature Range	T_a	—	-40	—	+65	°C
Recommended Operating Temperature Range	T_a	Free Air Convection, (40-60LFM) at V_{in}= 24V, I_o=2A	-40	—	+55**	°C
Thermal Resistance	θ_{ja}	Free Air Convection, (40-60LFM)	—	35	—	°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	—	10	—	G's
Weight	—	—	—	11	—	Grams

*ISR will operate down to no load with reduced specifications. **See Thermal Derating chart.

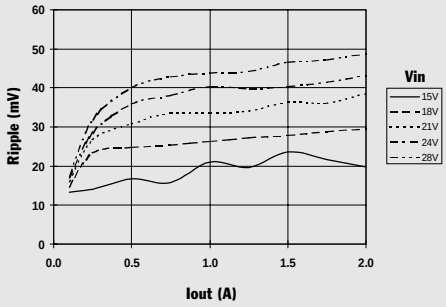
Note: *The 78ST212 Series requires a 100µF electrolytic or tantalum output capacitor for proper operation in all applications.*

78ST212_ 12.0 VDC (See Note 1)

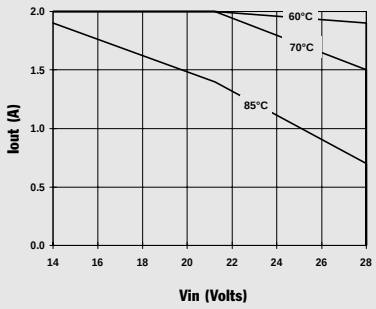
Efficiency vs Output Current



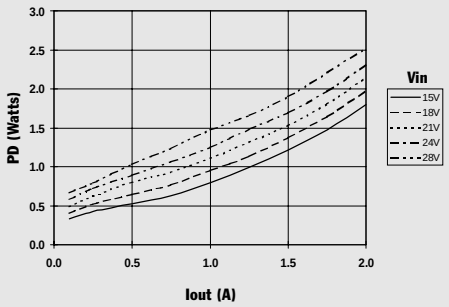
Ripple vs Output Current



Thermal Derating (T_a) (See Note 2)



Power Dissipation vs Output Current



Note 1: *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 2: *Thermal derating graphs are developed in free air convection cooling of 40-60 LFM. (See Thermal Application Notes.)*

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
78ST212HC	NRND	SIP MODULE	EFH	3	20	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
78ST212VC	NRND	SIP MODULE	EFF	3	20	Pb-Free (RoHS)	Call TI	N / A for Pkg Type

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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