

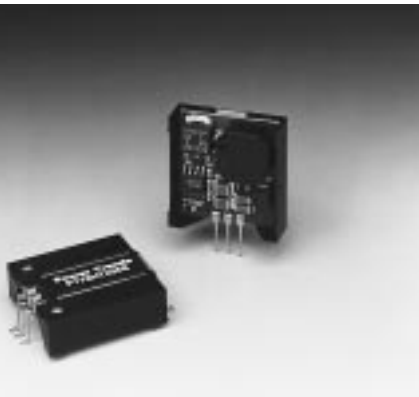
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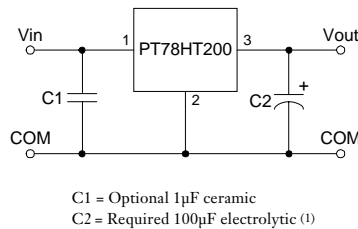
- High Efficiency: Up to 90%
- Wide Input Range
- Self-Contained Inductor
- Short-Circuit Protection
- Over-Temperature Protection
- Fast Transient Response

The PT78HT200 is a series of fixed output, wide-input range, 3-terminal Integrated Switching Regulators (ISRs). These ISRs have a maximum output

current of 2A. The output voltage is also laser trimmed for high accuracy. Features include excellent line and load regulation, internal short-circuit and over-temperature protection.

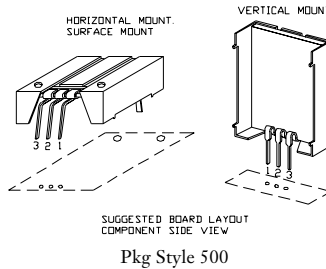
The PT78HT200 series is available in three package outlines, including horizontal SMD. Their small size and output voltage selection makes these regulators ideal for use in a variety of applications.

Standard Application



Pin-Out Information

Pin	Function
1	V _{in}
2	GND
3	V _{out}



Ordering Information

PT78HT2	XX	Y
Output Voltage		Package Suffix
33	05	V = Vertical Mount
53	65	S = Surface Mount
65	08	H = Horizontal Mount
08		

Specifications

Characteristics (T _a = 25°C unless noted)	Symbols	Conditions	PT78HT200 SERIES			Units	
			Min	Typ	Max		
Output Current	I _o	Over V _{in} range	0.1 (2)	—	2.0	A	
Short Circuit Current	I _{sc}	V _{in} = V _{in min}	—	6.0	—	Apk	
Input Voltage Range	V _{in}	0.1 ≥ I _o ≥ 2.0A					
		V _o = 3.3V	9	—	15	V	
		V _o = 5.0V	9	—	28		
		V _o = 6.5V	10.5	—	28		
		V _o = 8.0V	12	—	28		
Output Voltage Tolerance	ΔV _o	Over V _{in} range, I _o = 2.0A T _a = 0°C to +60°C	—	±1.0	±2.0	%V _o	
Line Regulation	Reg _{line}	Over V _{in} range	—	±0.4	±0.8	%V _o	
Load Regulation	Reg _{load}	0.1 ≤ I _o ≤ 2.0A	—	±0.2	±0.4	%V _o	
V _o Ripple/Noise	V _n	V _{in} = V _{in min} , I _o = 2.0A	—	±1	—	%V _o	
Transient Response (with 100 μ F output cap)	t _{tr}	50% load change V _o over/undershoot	—	100 5.0	—	μ Sec %V _o	
Efficiency	η	V _{in} = 9V, I _o = 2.0A V _{in} = 12V, I _o = 2.0A V _{in} = 15V, I _o = 2.0A	V _o = 3.3V — —	80 85 90	— — —	%	
Switching Frequency	f _o	Over V _{in} and I _o ranges	V _o ≥ 5.0V V _o = 3.3V	700 950	750 1,000	800 1,050	kHz
Absolute Maximum Operating Temperature Range	T _a	Over V _{in} range	—	—	+85 (3)	°C	
Thermal Resistance	θ_{ja}	Free Air Convection, (40-60LFM)	—	40	—	°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	

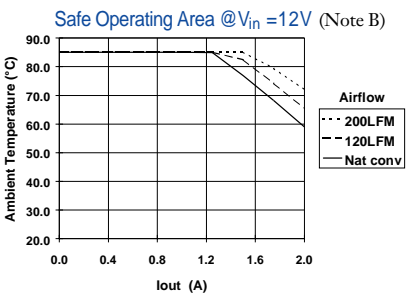
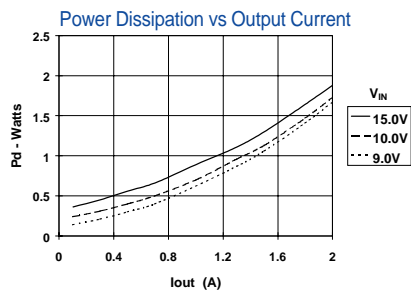
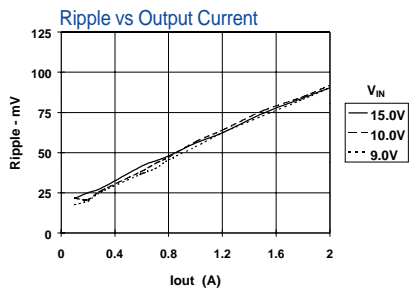
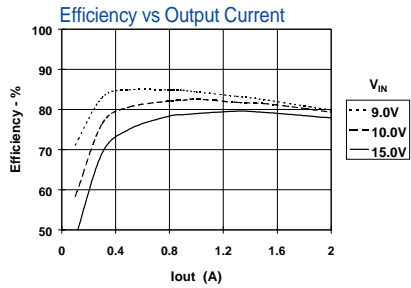
Notes: (1) The PT78HT200 Series requires a 100 μ F electrolytic or tantalum output capacitor for proper operation in all applications.

(2) ISR will operate down to no load with reduced specifications.

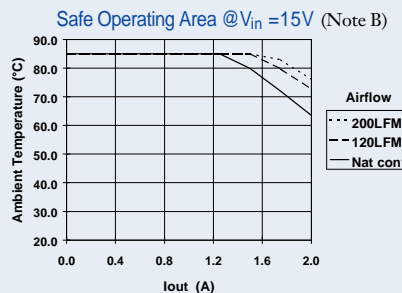
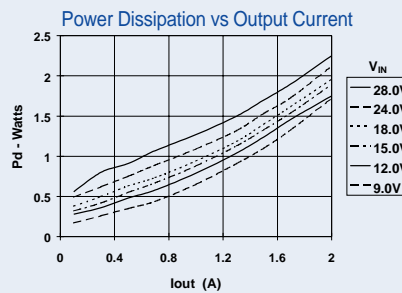
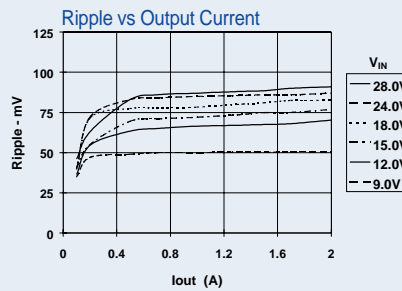
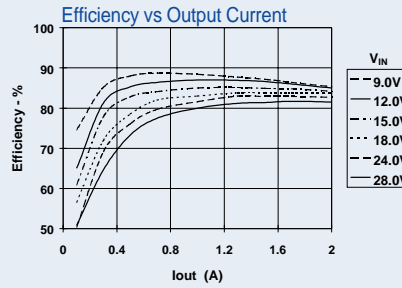
(3) See Safe Operating Area curves for derating

2 Amp Positive Step-Down
Integrated Switching Regulator

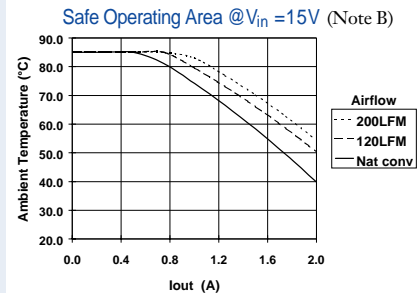
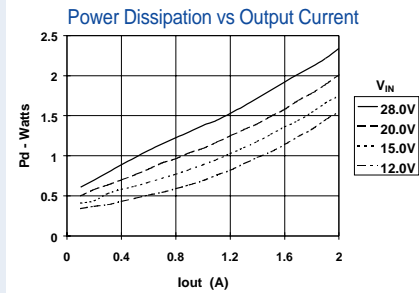
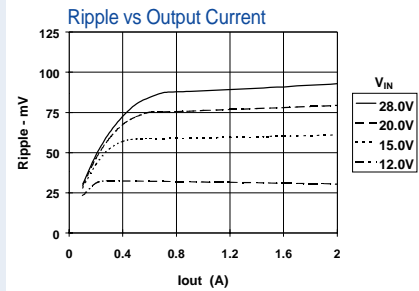
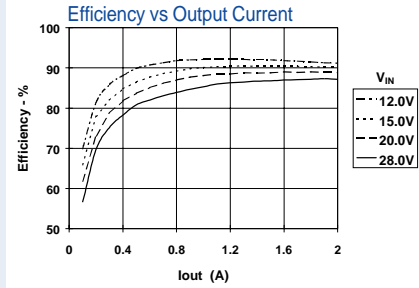
PT78HT233 3.3 VDC (See Note A)



PT78HT205 5.0 VDC (See Note A)



PT78HT208 8.0 VDC (See Note A)



Note A: All characteristic data has been developed from actual products tested at 25°C. This data is considered typical data for the ISR.

Note B: SOA curves represent operating conditions at which internal components are at or below manufacturer's maximum rated operating temperatures.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
PT78HT205H	ACTIVE	SIP MOD ULE	EFA	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT205S	ACTIVE	SIP MOD ULE	EFC	3	25	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT78HT205ST	ACTIVE	SIP MOD ULE	EFC	3	200	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT78HT205V	ACTIVE	SIP MOD ULE	EFD	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT208H	ACTIVE	SIP MOD ULE	EFA	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT208S	ACTIVE	SIP MOD ULE	EFC	3	25	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT78HT233H	ACTIVE	SIP MOD ULE	EFA	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT233S	ACTIVE	SIP MOD ULE	EFC	3	25	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT78HT233V	ACTIVE	SIP MOD ULE	EFD	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT253H	ACTIVE	SIP MOD ULE	EFA	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT253S	ACTIVE	SIP MOD ULE	EFC	3	25	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT78HT253V	ACTIVE	SIP MOD ULE	EFD	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT265H	ACTIVE	SIP MOD ULE	EFA	3	25	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT78HT265S	ACTIVE	SIP MOD ULE	EFC	3	25	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT78HT265V	ACTIVE	SIP MOD ULE	EFD	3	25	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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