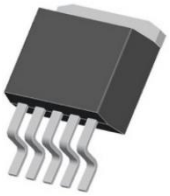
HX29302-TP/HX29302-TS Low Voltage Difference High Current Voltage Regulator

HX29302-TP/HX29302-TS is a low dropout, high current, and high-precision voltage regulator. It utilizes PNP transistors from the ultra β PNP process as regulating components. At full load (3A), the input-output voltage drop is just 370mV (typical), with a ground current of only 37mA (typical). This device is also ideal for low current, extremely low loss power systems.

HX29302-TP/HX29302-TS has overcurrent protection, reverse input voltage protection, over temperature protection, and transient voltage spike protection functions. By setting the logic potential of the enable terminal, the operation or sleep state of the device can be controlled. In sleep mode, the power consumption of the device is extremely low. The enable terminal can also be directly connected to the input power supply to keep the device in working condition.

TO-220



TO263-5

Device information	
Part number	**Encapsulation**
HX29302-TP	TO-220
HX29302-TS	TO-263-5

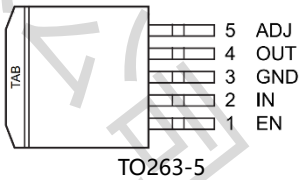
Characteristic

- High current output capability
- Low pressure difference (small input/output pressure drop)
- The ground current is relatively small
- high-precision
- fast transient response
- Equipped with battery reverse connection and overload protection function
- Support zero current shutdown mode

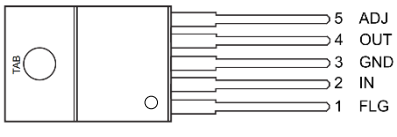
Application

- Suitable for power equipment
- Can be used for efficient 'green' computer systems
- Suitable for automated electronic applications
- Can be used for efficient linear power supply
- Can be used for efficient unregulated switching power supply systems

Pin Function Description		
ID	**Pin symbol**	**Pin function**
1	EN	Enable terminal, compatible with CMOS logic level. When EN=H, the device works; When EN=L, the device goes into sleep mode
2	IN	Input, input voltage
3	GND	Ground end, the frame substrate is also connected to the device ground end
4	OUT	Output terminal
5	ADJ	Adjust the feedback terminal and connect it to a resistor voltage divider network (RVDN) at the output and ground to set the output voltage.



TO263-5



TO-220

limit parameter①	
Input voltage V_{IN}①	-20V~+60V
Enabling voltage V_{EN}	-0.3V~VIN
Welding temperature (5S)	260℃
power consumption	internal restrictions
Storage temperature	-65℃~150℃
Electrostatic sensitive limit	②

Working limit condition③	
Working junction temperature	-40℃~125℃
Maximum input voltage	26V
Thermal resistance	2℃/W

Electrical parameter④

Parameter name	Test conditions		MIN	TYP	MAX	UNIT
Device population						
Output voltage	I_{OUT} = 10mA		-1		1	%
	10mA≤I_{OUT} ≤IFL, (V_{OUT}+1V) ≤V_{IN}≤26V		-2		2	%
Line Regulation	I_{OUT} =10mA, (V_{OUT} +1V) ≤V_{IN}≤26V			0.06	0.5	%
Load Regulation	V_{IN} = V_{OUT} +1V, 10mA≤I_{OUT}≤1.5A			0.2	1	%
Temperature coefficient of output voltage	⑤			20	100	ppm/℃
Input/output pressure difference	△VOUT =-1%⑥	I_{OUT}=100mA		80	175	mV
		I_{OUT}=1.5A		250		mV
		I_{OUT}=3A		370	600	mV
Ground current	V_{IN} = V_{OUT} +1V, I_{OUT}=1.5A			10	35	mA
	V_{IN} = V_{OUT} +1V, I_{OUT}=3A			37		mA
Output limiting current	V_{OUT} =0V⑦			4.5	5	A
Output noise voltage*	I_{OUT}=100mA, C_L=10μF			400		μV(rms)
	I_{OUT}=100mA, C_L=33μF			260		μV(rms)
Reference part						
reference voltage			1.228	1.240	1.252	V
Adjust the end bias current				40	80	nA
Reference voltage temperature coefficient				20		ppm/℃
Adjust the end bias current temperature system				0.1		nA/℃
Enable part						
Enable low level (off)					0.8	
Enable high (on)			2.4			
Enable the input current	V_{EN}=26V			100	600	μA
	V_{EN}=0.8V		0.7		2	μA
Turn off the output current	⑧			10	500	μA

Notes

① When applying the positive power supply voltage, the conditions should be met: the application time is less than 100ms, and the duty cycle is less than 1%. The maximum continuous power supply voltage of the device is 26V. Exceeding these limit conditions may result in device damage.

② The device is sensitive to static electricity. Esd preventive measures are recommended.

③ Use of the device beyond the limit application conditions is not permitted.

④ The parameter definition applies to the finished device. In a dual power supply system, connect the regulator's load to the negative power supply and clamp the output voltage to ground with a diode.

⑤ The output voltage temperature coefficient is defined as the worst-case ratio of Δoutput voltage to Δtemperature range.

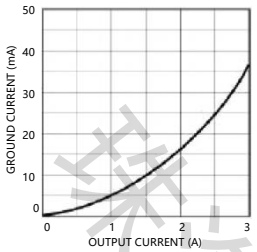
⑥ The input-output voltage difference is defined as the voltage gap between VIN and VOUT when VIN is 99% of normal while VOUT+1V is applied to VIN.

⑦ Under the condition of setting VIN=VOUT+1V, the output current is tested by pulse.

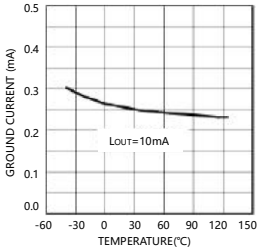
⑧ When VEN≤0.8V and VIN≤26V, the output voltage is 0V.

Typical characteristic curve

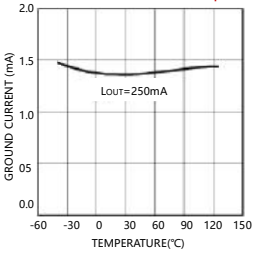
Ground current - Output current



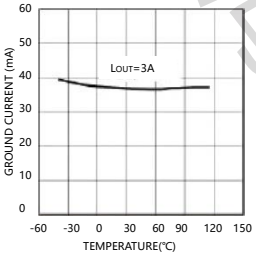
Ground current - temperature



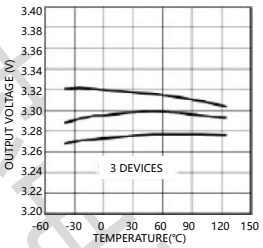
Ground current - temperature



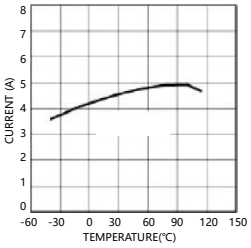
Ground current - temperature



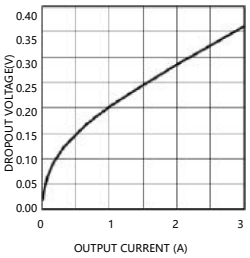
Ground current - temperature



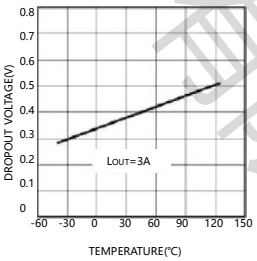
Ground current - temperature



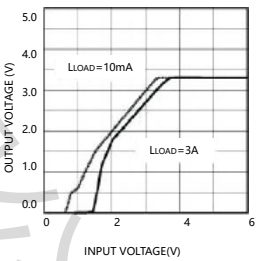
Input/output differential pressure - Output current



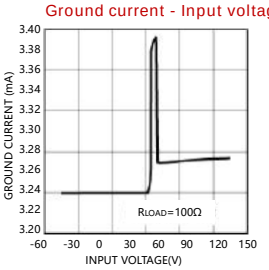
Input/output pressure difference - temperature



Input-output differential pressure characteristics



Ground current - Input voltage



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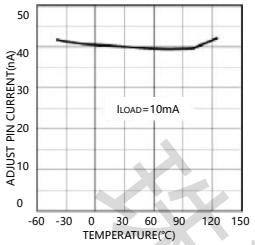
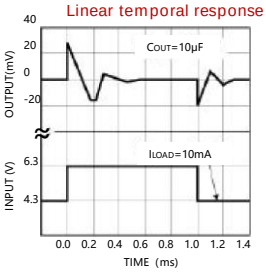
Typical characteristic curve (continued)

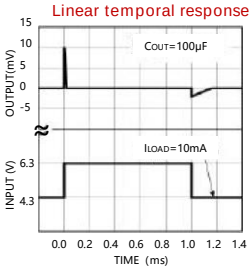
Adjust the end current-temperature



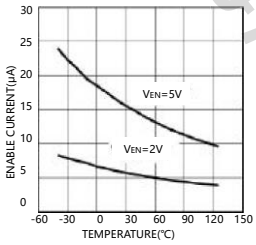
Linear temporal response



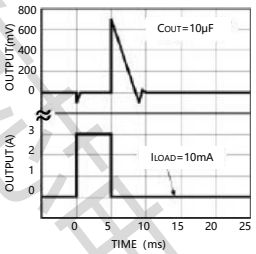
Linear temporal response



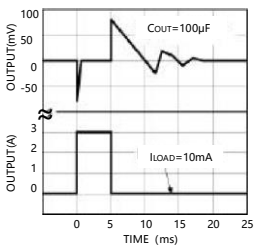
Performance end current - temperature



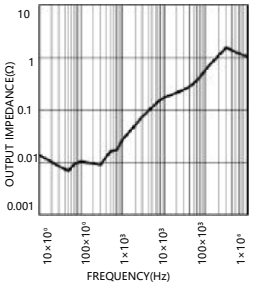
Load temporal response

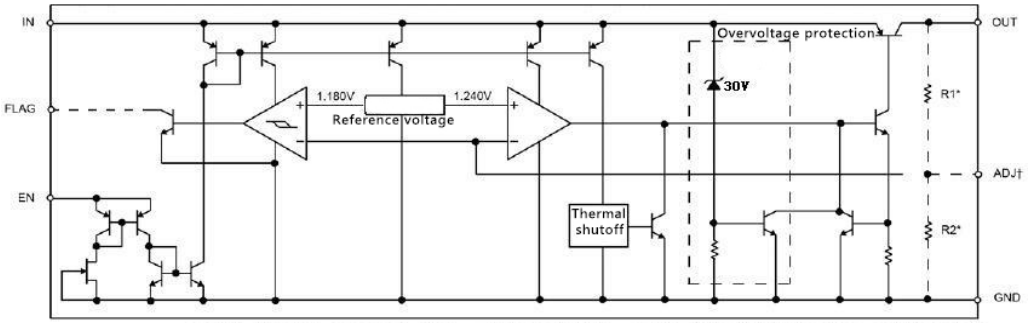


Load temporal response



Output impedance - frequency





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Application guide

Protection function

-HX29302-TP/HX29302-TS has linear current limiting function, the output current is sustained during overload.

- When the temperature exceeds the device's maximum safe operating temperature of 150 ° C, the thermal shut down function is activated, effectively shutting down the output.
- Linear transient protection enables the device to withstand input voltage spikes from -20V to +60V.
- When the input voltage exceeds about 30V, the overvoltage detection function is activated, effectively turning off the output.
- The operation or shutdown of the device can be controlled through the logic level, and the power consumption of the device is almost 0 in the off state.

Thermal design example

- Input voltage VIN = 5V, output voltage Vout = 3.3V, load current Iout = 1A, and ambient temperature TA = 50 ° C are used as examples.
- Calculate the power consumption of the device PD = Iout·(1.01 VIN-Vout) = 1.75W.
- Calculate the working junction temperature of the device TJ = TA + PD ·θJA = 50 + 1.75·31.4 = 104.95℃.
- The result is less than the maximum junction temperature of 125℃ for normal operation of the device, which can ensure the reliable operation of the device.

Capacitance selection

- In order to reduce the output voltage noise and stabilize the output voltage, the output needs a filter capacitor.
- The choice of capacity value depends on the output current, the smaller the current, the smaller the capacity value can be selected.
- In the full load range, the selection of 10uF aluminum electrolytic capacitor can meet the application requirements.
- Tantalum capacitors are recommended for applications requiring fast transient load response.
- A 0.1uF capacitor is recommended for filtering between the input end and the ground.

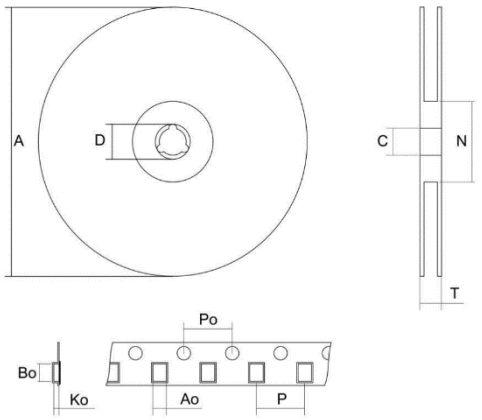
Minimum load current

- To ensure the normal operation of HX29302-TP/HX29302-TS, a minimum load current of 7mA is required.

Enable input

- Enable the input potential to be compatible with the TTL/CMOS level, and directly interface with the logic device, or directly connect the voltage below 30V.
- When the device is working normally, the enabled end current is about 20uA.

Package



Packing method	Number
Braid	500PCS/Disk

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