

30V 100mA Low DropOut Voltage Regulator

General Description

The QN78L05 three terminal positive regulators available with 5V fixed output voltage, making it useful in a wide range of applications. Used as a Zener-diode and resistor combination replacement, the QN78L05 usually provides an effective output impedance improvement of orders of magnitude and lower quiescent current. These regulators can provide local, on-card regulation, eliminating distribution problems associated with single-point regulation. The available voltages allow the QN78L05 to be used in logic systems, instrumentation, HiFi, and other solid-state electronic equipment.

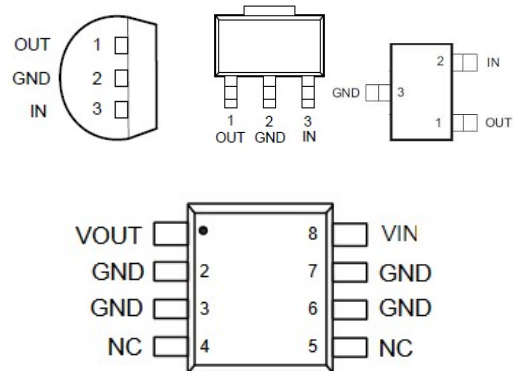
The QN78L05 is available in the plastic TO-92 package, SOT89-3 package, SOT23-3 package, and SOP8 package. With adequate heat sinking, the regulator can deliver 100-mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors is provided to limit internal power dissipation. If internal power dissipation is too high for the heat sinking provided, the thermal shutdown circuit prevents the IC from overheating.

- Output Current of 100 mA
- Output Transistor Safe Area Protection is
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Available in TO-92, SOT-893, SOT23-3, SOP8 Low Profile Packages

Applications two

- Battery Chargers
- Portable Instrumentation
- LED Lighting
- Low Wattage Power Supplies

Pin Configuration



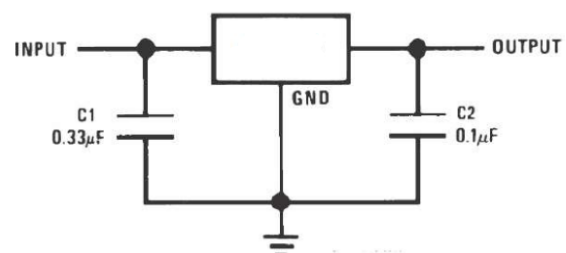
Ordering Information

Part Number	Package	Body Size
QN78L33	TO-92	
QN78L05	SOT89-3	
	SOT23-3	
	SOP8	

Features

- V_{IN} Range up to 30V
- Output Voltage Tolerances of $\pm 5\%$ Over the Temperature Range

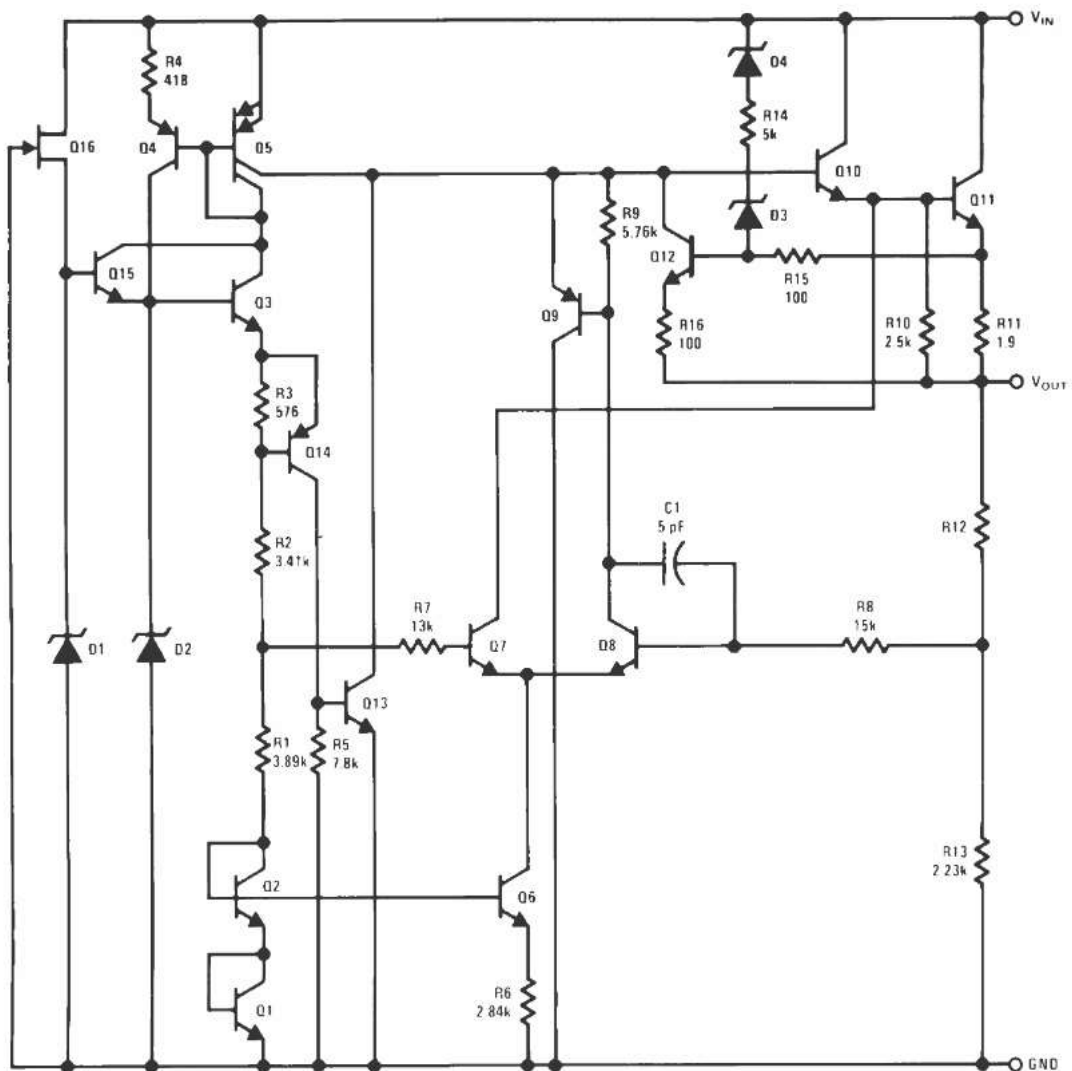
Typical Application Circuit



Pin Assignment

Pin Name	Pin No. TO92	Pin No. SOT89	Pin No. SOT23	Pin No. SOP8	Pin Function
VOUT	1	1	1	1	Output Voltage Pin
GND	2	2	3	2,3,6,7	Ground
VIN	3	3	2	8	Input Voltage pin.

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ----- -0.3V to +35V
- Junction Temperature----- 125°C
- Lead Temperature (Soldering, 10 sec.)----- 300°C
- Storage Temperature ----- -65°C to 150°C

Recommended Operating Conditions

- Input Voltage, V_{IN} ----- +7V to +30V
- Junction Temperature ----- -40°C to 125°C

Electrical Characteristics

$V_{IN}=10V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $T_J=25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage (QN78L33)	V_{OUT}	$T_J = 25^\circ C$	3.168	3.3	3.432	V
		$V_{IN} = 7 \text{ to } 20V$, $I_{OUT} = 1mA \text{ to } 40mA$ $T_J = 0^\circ C \text{ to } 125^\circ C$	3.135		3.465	
		$I_{OUT} = 1mA \text{ to } 70mA$ $T_J = 0^\circ C \text{ to } 125^\circ C$	3.135		3.465	
Output Voltage (QN78L05)	V_{OUT}	$T_J = 25^\circ C$	4.8	5	5.2	V
		$V_{IN} = 7 \text{ to } 20V$, $I_{OUT} = 1mA \text{ to } 40mA$ $T_J = 0^\circ C \text{ to } 125^\circ C$	4.75		5.25	
		$I_{OUT} = 1mA \text{ to } 70mA$ $T_J = 0^\circ C \text{ to } 125^\circ C$	4.75		5.25	
Line Regulation	ΔV_{LINE}	$V_{IN} = 7 \text{ to } 20V$,		12	30	mV
		$V_{IN} = 8 \text{ to } 20V$,		10	25	
Load Regulation	ΔV_{LOAD}	$I_{OUT} = 1mA \text{ to } 100mA$		20	50	mV
		$I_{OUT} = 1mA \text{ to } 40mA$		10	25	
Quiescent Current	I_Q	$T_J = 25^\circ C$		0.3		mA
		$T_J = 125^\circ C$			1	
Quiescent Current Change	ΔI_Q	$V_{IN} = 8 \text{ to } 20V$, $T_J = 0^\circ C \text{ to } 125^\circ C$			0.2	mA
		$I_{OUT} = 1mA \text{ to } 40mA$ $T_J = 0^\circ C \text{ to } 125^\circ C$			0.1	
Ripple Rejection	PSRR	$f = 120Hz$, $V_{IN} = 8V \text{ to } 20V$, $T_J = 25^\circ C$	75	84		dB
Output Noise Voltage	V_N	$f = 10Hz \text{ to } 100KHz$		32		μV
Dropout Voltage	V_{DROP}			0.8		V
V_{OUT} Temp. Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 5mA$		0.2	0.5	$mV/^\circ C$
Peak Output Current	I_{PK}			170		mA

Typical Characteristics

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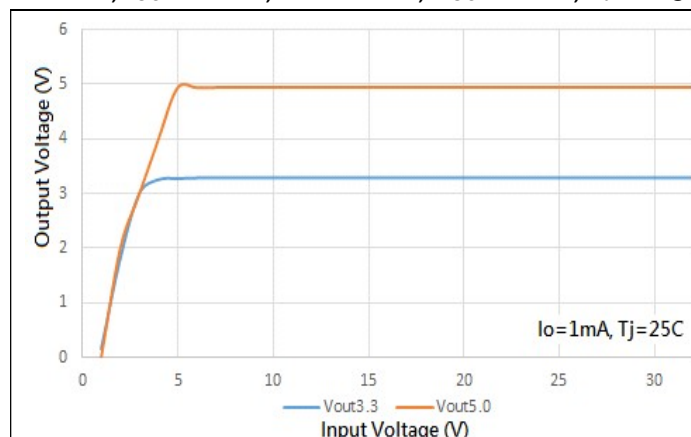


Fig 1. Output Voltage vs Input Voltage

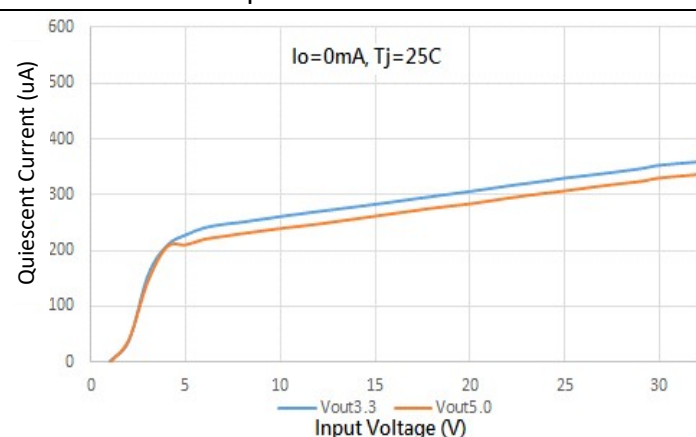


Fig 2. Quiescent Current vs Input Voltage

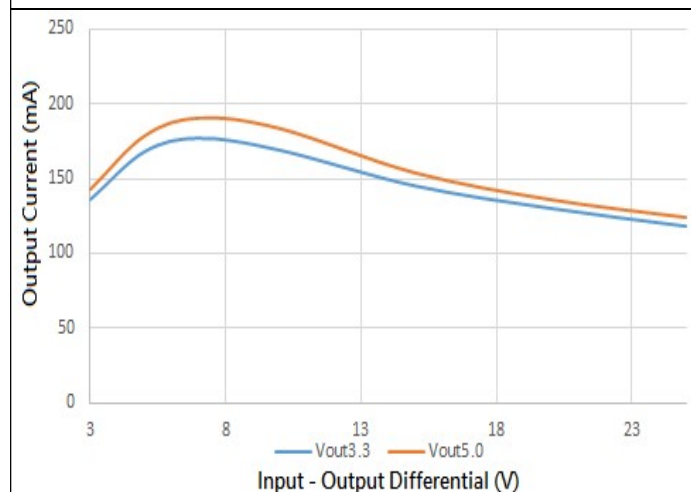


Fig 3. Peak Output Current vs Input-Output Differential

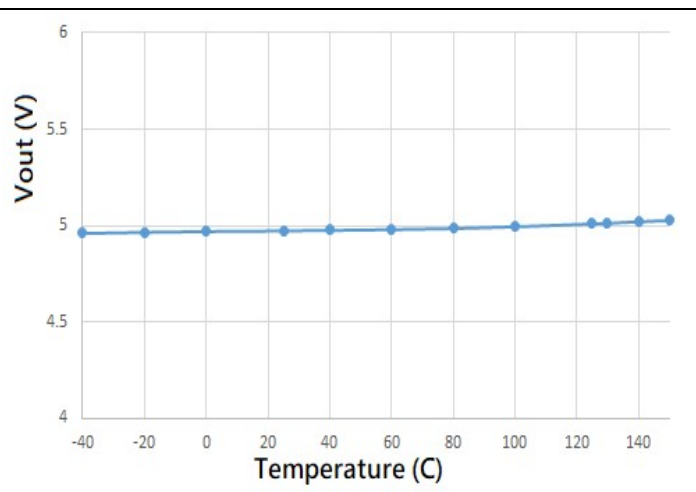


Fig 4. V_{OUT} vs Temp

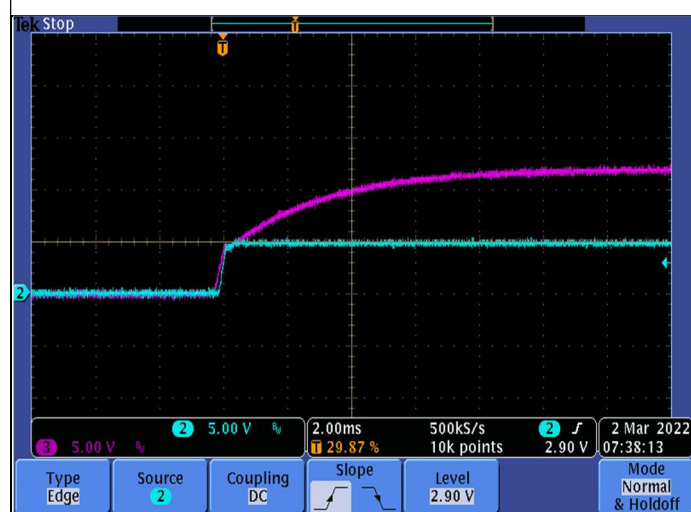


Fig 5. V_{IN} Start up

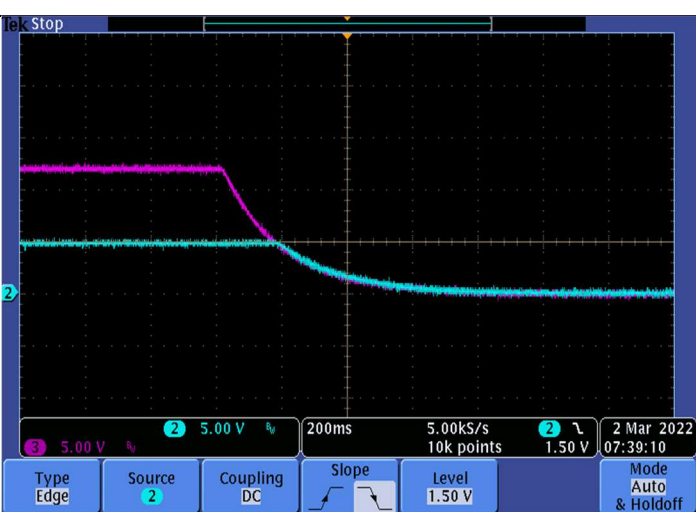


Fig 6. V_{IN} Power off

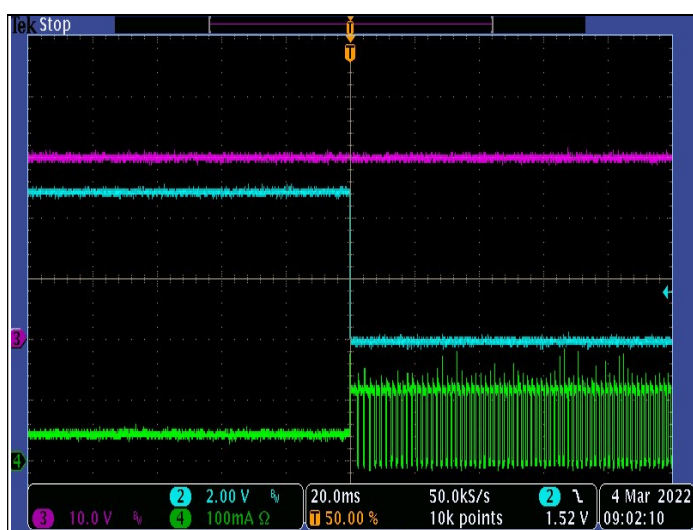


Fig 7. V_{OUT} Short to GND

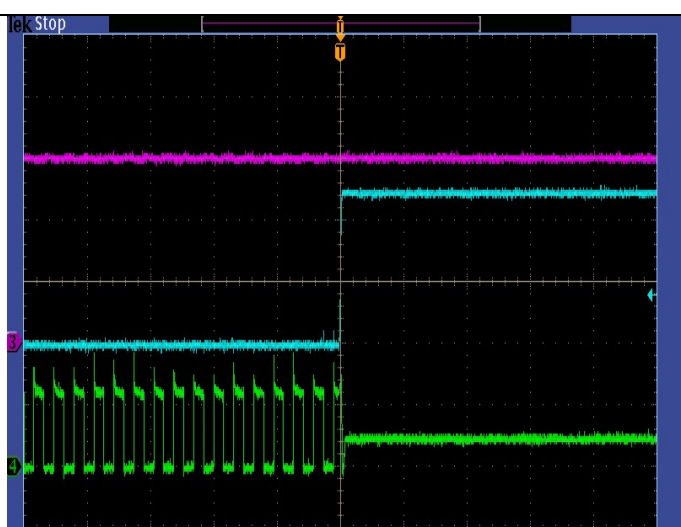


Fig 8. V_{OUT} Short and Release

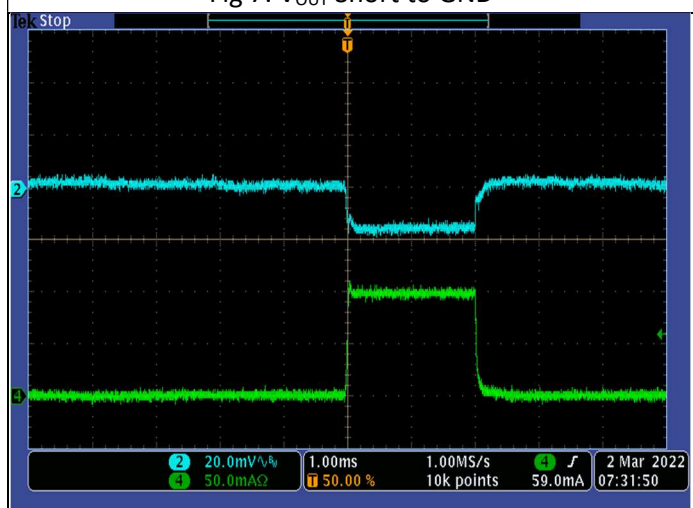


Fig 9. Load Transient

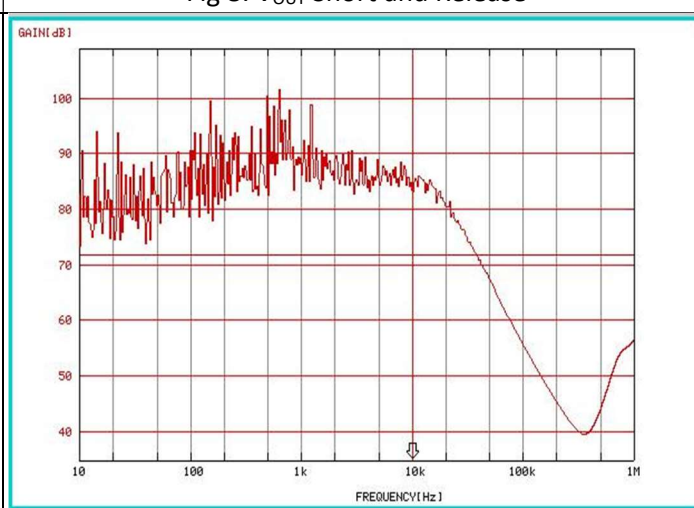


Fig 10. PSRR vs Frequency ($V_{IN} = 9V$, $V_{OUT} = 5V$)