

100V 50mA Very High Voltage LDO

General Description

The GM7A4001 device is a very high voltage-tolerant linear regulator that offers the benefits of a thermally-enhanced package, and is able to withstand continuous DC or transient input voltages of up to 100 V. The GM7A4001 device is stable with output capacitance greater than 2.2 μ F and any input capacitance greater than 0.47 μ F. Therefore, implementations of this device require minimal board space because of its miniaturized packaging (MSOP8-EP) and a potentially small output capacitor. In addition, the GM7A4001 device offers an enable pin (EN) compatible with standard CMOS logic to enable a low-current shutdown mode.

The GM7A4001 device has an internal thermal shutdown and current limiting to protect the system during fault conditions. The SOP8-EP and MSOP8-EP packages have an operating temperature range of $T_J = -40^{\circ}\text{C}$ to 125°C . In addition, the GM7A4001 device is ideal for generating a low-voltage supply from intermediate voltage rails in telecom and industrial applications; not only can it supply a well-regulated voltage rail, but it can also withstand and maintain regulation during very high and fast voltage transients. These features translate to simpler and more cost-effective electrical surge-protection circuitry for a wide range of applications, including PoE, bias supply, and LED lighting.

Features

- VIN Range 7V to 100V
- Output Voltage Tolerances of $\pm 1.5\%$
- Output Current of 50 mA
- Low Quiescent Current 23 μ A
- Quiescent Current at Shutdown 8 μ A
- Dropout Voltage 2.8V at $I_{OUT}=50\text{mA}$
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Adjustable Output Voltage form 1.2 to 90V

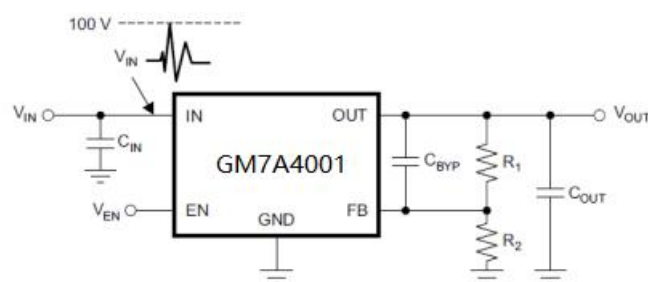
Applications

- Microprocessors, Microcontrollers Powered by Industrial Busses with High Voltage Transients
- Industrial Automation
- Telecom Infrastructure
- Automotive
- Power over Ethernet(PoE)
- LED Lighting

Pin Configuration



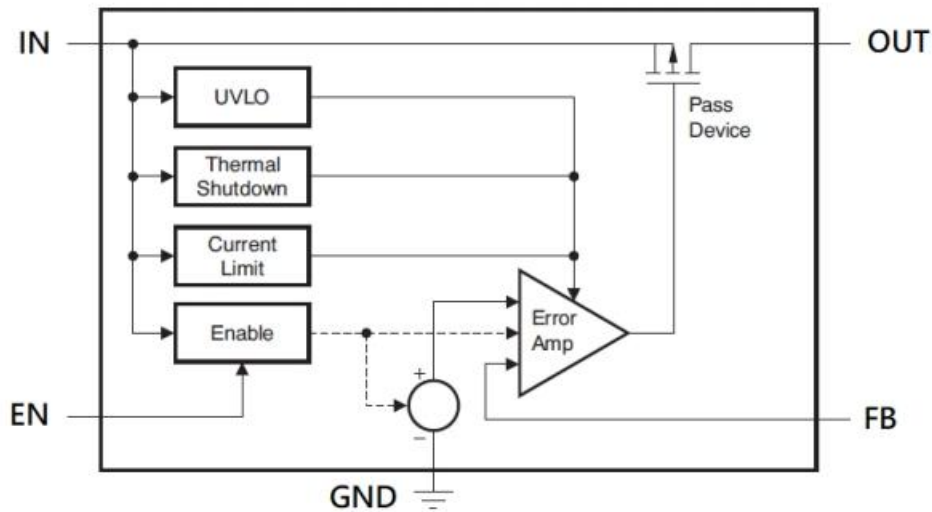
Typical Application Circuit



Pin Assignment

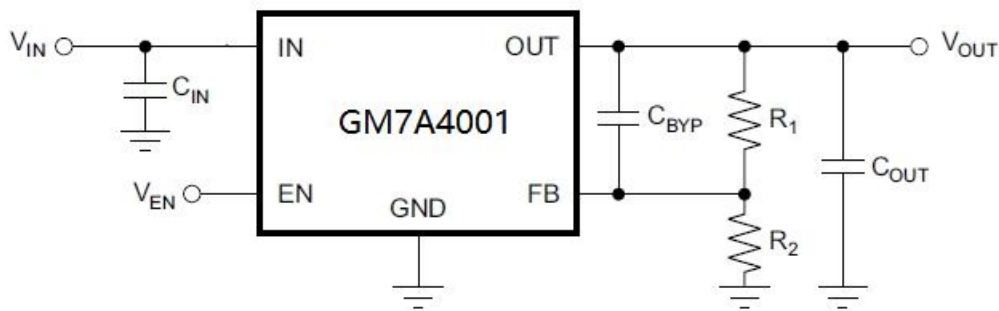
Pin Name	Pin No. MSOP8-EP	Pin No. SOP8-EP	Pin Function
OUT	1	1	Output Voltage Pin
FB	2	2	Feedback
NC	3,6,7	3,6,7	Non Connect
GND	4,EP	4,EP	Ground
EN	5	5	Enable
IN	8	8	Input Voltage

Function Block Diagram



Design Parameters

Vout (V)	Cin (uF)	Cout(uF)	Cbypass(nF)	R1 (Kohm)	R2 (Kohm)
12	10	10	10	698	49.9
5	10	10	10	262	49.9
3.3	10	10	10	156	49.9
1.8	10	10	10	62.5	49.9



- $V_{out} = 0.8V * (R1+R2) / R2$
- $10\mu A < V_{out} / (R1+R2) < 30\mu A$

Absolute Maximum Ratings (Note1)

- V_{IN} ----- -0.3V to +110V
- V_{OUT} ----- -0.3V to +110V
- FB ----- -0.3V to +5.5V
- EN ----- -0.3V to +110V
- 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 +100V
- Output Voltage, V_{OUT} ----- +1.2V to +90V
- Enable Voltage, V_{EN} ----- 0V to +100V
- Output Current, I_{OUT} ----- 0mA to +50mA
- Junction Temperature ----- -40°C to 125°C

Electrical Characteristics

$V_{IN}=V_{OUT}+3V$ or $V_{IN} \geq 7V$, $I_{OUT}=100\mu A$, $C_{IN}=1\mu F$, $C_{OUT}=4.7\mu F$, $T_J=25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Voltage	V_{IN}		7		100	V
Internal Reference	V_{REF}		0.788	0.8	0.812	V
Line Regulation	ΔV_{LINE}	$V_{IN}=7V$ to 100V,		3	20	mV
Load Regulation	ΔV_{LOAD}	$100\mu A < I_{OUT} < 50mA$		20	50	mV
Dropout Voltage	V_{DROP}	$I_{OUT}=20mA$		1000		mV
		$I_{OUT}=50mA$		2800		mV
Quiescent Current	I_Q	$I_{OUT} = 0mA$		23	40	μA
Shutdown Current	I_{SD}	$V_{EN} = 0V$		8	15	μA
Current Limit	I_{CL}	$V_{OUT} = 90\% V_{OUT(NOM)}$	55	120	200	mA
Enable High Low Level	V_{ENHI}		1.0		V_{IN}	V
	V_{ENLO}		0		0.4	V
Enable Pin Current	I_{EN}	$7V < V_{IN} < 100V$, $V_{IN}=V_{EN}$		0.02	1	μA
Feedback Pin Current	I_{FB}			0.01	0.11	μA
Thermal Shutdown	T_{SD}	Shutdown, temperature increasing		160		$^\circ C$
		Reset, temperature decreasing		140		$^\circ C$

Typical Characteristics

$V_{IN}=12V$, $I_{OUT}=1mA$, $V_{OUT}=5V$, $C_{IN}=0.47\mu F$, $C_{OUT}=2.2\mu F$, $T_J=25^{\circ}C$, unless otherwise specified

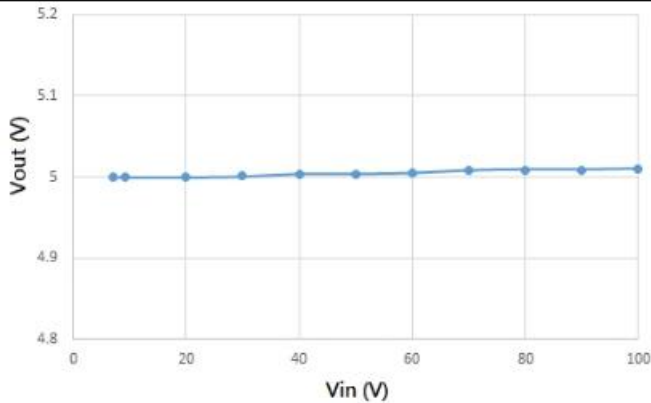


Fig1 Vout vs Vin

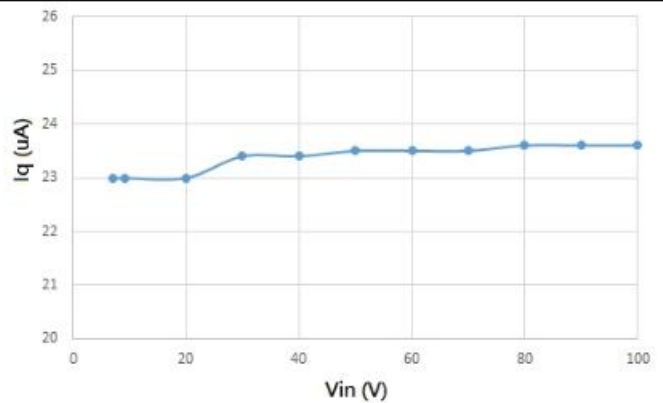


Fig2 Iq vs Vin

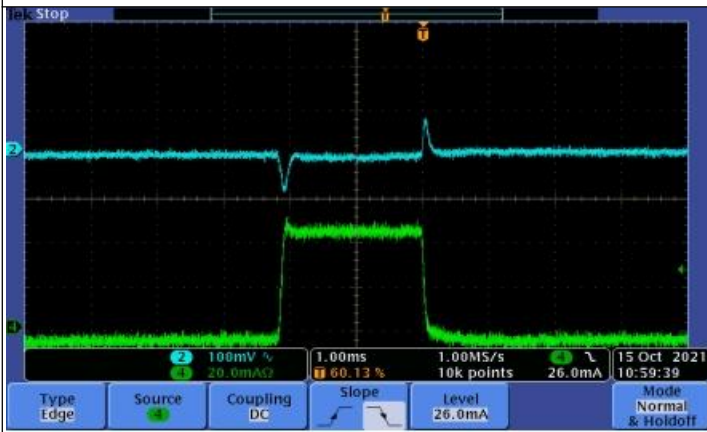


Fig3 Load transient 0 to 50mA

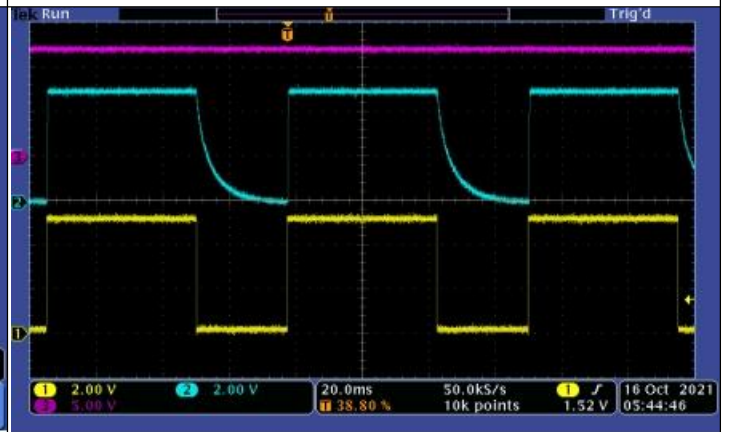


Fig4 Enable ON/OFF

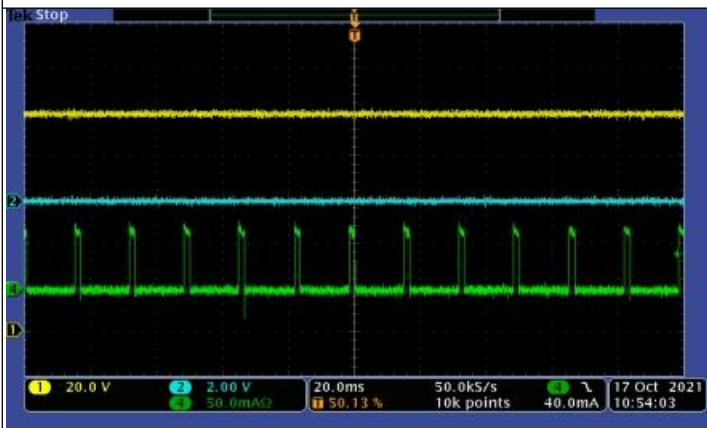


Fig5 $V_{IN}=100V$, V_{OUT} short to GND

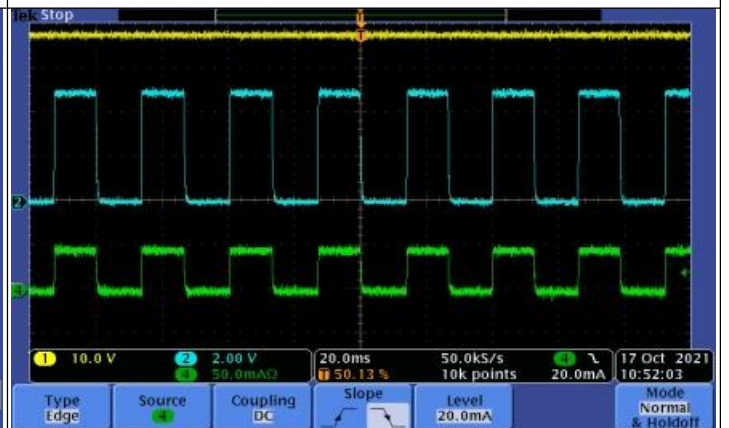
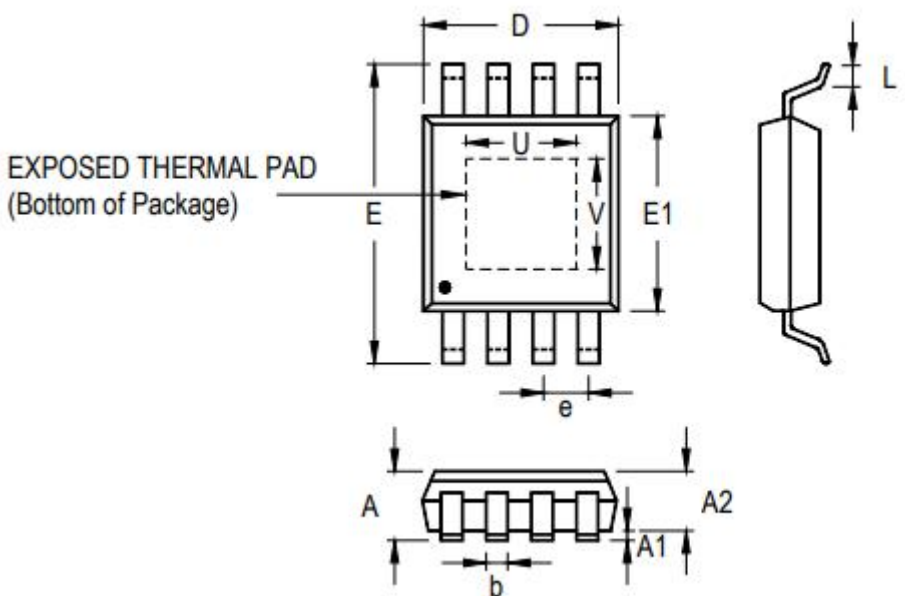


Fig6 $V_{IN}=36V$, $V_{OUT}=5V$, $R_{LOAD}=100\Omega$, thermal protect

Order Information

Order number	Package	Marking information	Operation Temperature Range	MSL Grade	Ship, Quantity	Green
GM7A4001	MSOP8-EP	QVQ	-40 to 125°C	3	T&R, 4000	Rohs

Package Information

MSOP8-EP 						
符号	毫米			英寸		
	最小值	典型值	最大值	最小值	典型值	最大值
A	0.810	-	1.100	-	-	-
A1	0.000	-	0.150	-	-	-
A2	0.750	0.850	0.950	-	-	-
b	0.220	0.350	0.380	-	-	-
D	2.900	3.000	3.100	-	-	-
e	0.650					
E	4.800	4.900	5.000	-	-	-
E1	2.900	3.000	3.100	-	-	-
L	0.400	0.600	0.800	-	-	-
U	1.300	-	1.700	-	-	-
V	1.500	-	1.900	-	-	-