GJ2138

1.5A CMOS Low Dropout Voltage Regulator

Description

The GJ2138 series of positive, linear regulators feature low quiescent current (45µA typ.) with low dropout voltage, making them ideal for battery applications.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

The GJ2138 is stable with an output capacitance of 4.7µF or greater.

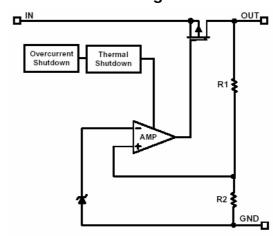
Features

- Very Low Dropout Voltage
- Guaranteed 1.5A output
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Highly Accurate ± 1.5%
- Low Temperature Coefficient

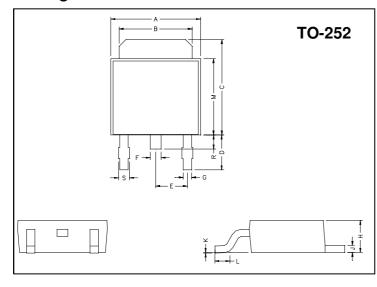
Applications

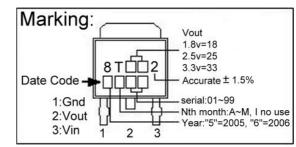
- Battery Powered Widgets
- Instrumentation
- Wireless Devices
- PC Peripherals
- Portable Electronics

Functional Block Diagram



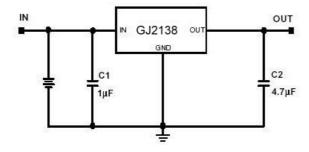
Package Dimensions





REF.	Millimeter		REF.	Millimeter		
	Min.	Max.	nLI.	Min.	Max.	
Α	6.40	6.80	G	0.50	0.70	
В	5.20	5.50	Н	2.20	2.40	
С	6.80	7.20	J	0.45	0.55	
D	2.40	3.00	K	0	0.15	
E	2.30 REF.		L	0.90	1.50	
F	0.70	0.90	М	5.40	5.80	
S	0.60	0.90	R	0.80	1.20	

Typical Application Circuit



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Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	
Input Max Voltage	VIN	8	V	
Output Current	Іоит	PD/(VIN- VO)	Α	
Output Voltage	Vout	1.5~5.0	V	
Operating Ambient Temperature	Topr	-40 ~ +85	$^{\circ}\!\mathbb{C}$	
Junction Temperature	Tj	-40 ~ +125	$^{\circ}\!\mathbb{C}$	
Maximum Junction Temperature	Tj Max	150	$^{\circ}\!\mathbb{C}$	
Thermal Resistance	θjc (Non-Conductive Epoxy)*	30	°C/W	
Themai nesistance	θја	140	°C/W	
Internal Power Dissipation	PD	1	W	
EDS Classification		В		

^{*}Measure θ jc on backside center of tab.

Electrical Characteristics VIN=VOUT(T)+2V, Ta=25°C unless otherwise noted

Parameter	Symbol	Condition		Min	TYP	Max	Unit
Output Voltage	Vout(E) (Note1)	Io=1mA		-1.5%	Vour(T) (Note2)	1.5%	V
Output Current	Io	Vo>1.2V		1.5	-	-	Α
Current Limit	ILIM	Vo>1.2V		1.5	2.0	-	Α
Load Regulation	REGLOAD	VIN=VOUT(T)+2V, Io=1mA to 1.5A		-1	0.2	1	%
	VDROPOUT	Io=1.5А Vo=Vo∪т(E)-2%	1.4V <vout(t)≤2.0v< td=""><td>-</td><td>-</td><td>1300</td><td rowspan="3">mV</td></vout(t)≤2.0v<>	-	-	1300	mV
Dropout Voltage			2.0V <vout(t)≤2.8v< td=""><td>-</td><td>-</td><td>800</td></vout(t)≤2.8v<>	-	-	800	
		VO= VOO1(L) 270	2.8V <vоuт(t)< td=""><td>-</td><td>-</td><td>600</td></vоuт(t)<>	-	-	600	
Quiescent Current	IQ	VIN= VOUT(T)+2V, IO=0mA		-	45	70	μA
Ground Pin Current	Ignd	VIN= VOUT(T)+2V, IO=1mA~1.5A		-	45	-	μA
	REGLINE	Io=1mA VIN=VOUT(T)+1 to VOUT(T)+2	Vоит(T)<2.0V	-0.15	-	0.15	%
Line Regulation			2.0V≤Vo∪т(T)<4.0V	-0.1	0.02	0.1	
			4.0V≤Vо∪т(Т)	-0.4	-	0.4	
Input Voltage	VIN			Note3	-	7	V
Over Temperature Shutdown	OTS			-	150	-	°C
Over Temperature Hysterisis	OTH			-	30	-	°C
Output Voltage Temperature Coefficient	TC			-	30	-	ppm/°C
Short Circuit Current	Isc	VIN=VOUT(T)+1V, VOUT<0.4V		-	750	-	mA
	ply Rejection PSRR	Io=100mA	f=100Hz	-	70	-	dB
Power Supply Rejection		10=100mA Co=4.7µF	f=1kHz	-	50	-	
		··· p··	f=10kHz	-	20	-	
Output Voltage Noise	Output Voltage Noise eN f=10Hz~100kHz, Io=10mA, Co=4.7µF		-	30	-	μVrms	

Note 1: Vout (E) = Effective Output Voltage (i.e. the output voltage when "Vout (T) + 2.0V" is provided at the Vin pin while maintaining a certain IouT value).

Ordering Information (contd.)

•	•	,			
Part Number	Marking	Output Voltage	Part Number	Marking	Output Voltage
GJ2138-15	8T152 XXXX	1.5V	GJ2138-18	8T182 XXXX	1.8V
GJ2138-19	8T192 XXXX	1.9V	GJ2138-25	8T252 XXXX	2.5V
GJ2138-33	8T332 XXXX	3.3V	GJ2138-47	8T472 XXXX	4.75V
GJ2138-50	8T502 XXXX	5.0V			

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^{2:} Vout (T) = Specified Output Voltage

^{3:} VIN (MIN) = VOUT+ VDROPOUT

Detailed Description

The GJ2138 series of COMS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150°C, or the current exceeds 2.2A. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C.

The GJ2138 behaves like a current source when the load reaches 2.2A. However, if the load impedance drops below 0.3Ω , the current drops back to 600mA to prevent excessive power dissipation. Normal operation is restored when the load resistance exceeds 0.75Ω .

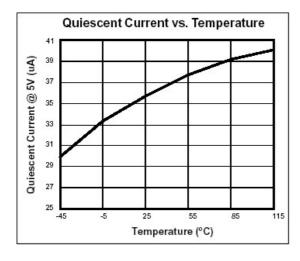
External Capacitors

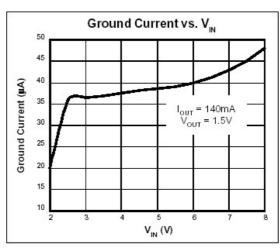
The GJ2138 is stable with an output capacitance to ground of $4.7\mu\text{F}$ or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a $0.1\mu\text{F}$ ceramic capacitor with a $10\mu\text{F}$ Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

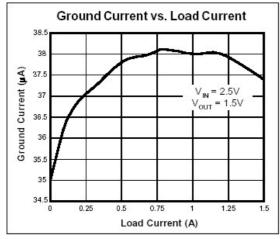
A second capacitor is recommended between the input and ground to stabilize Vin. The input capacitor should be at least 0.1µF to have a beneficial effect.

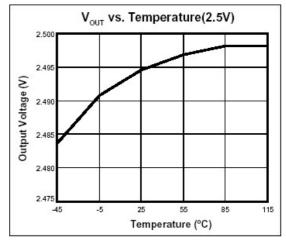
All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

Characteristics Curve

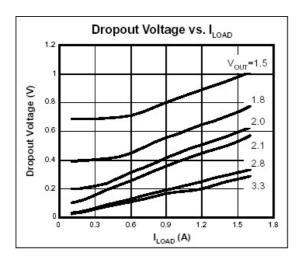


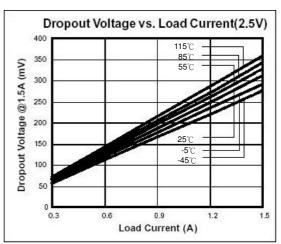


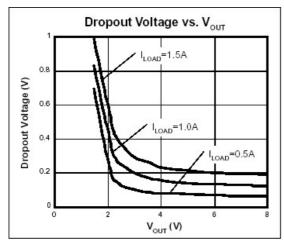


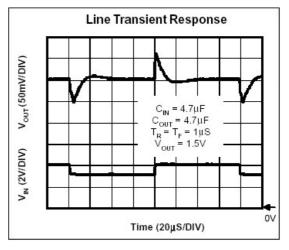


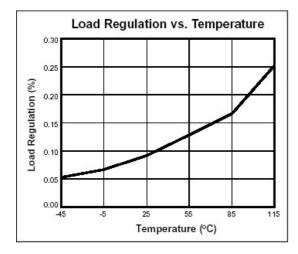
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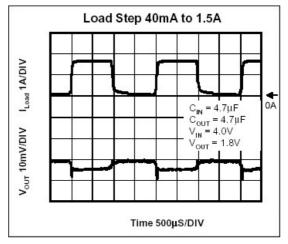




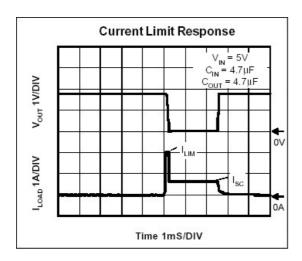


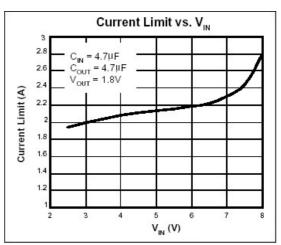


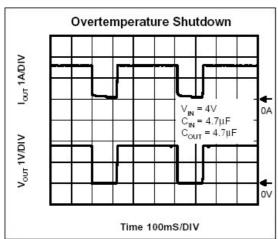


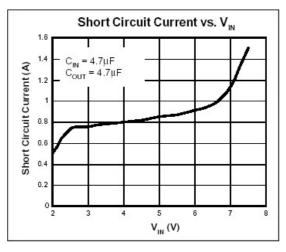


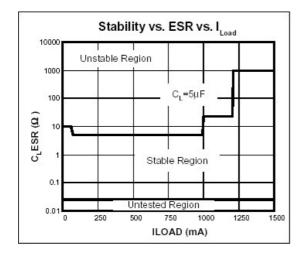
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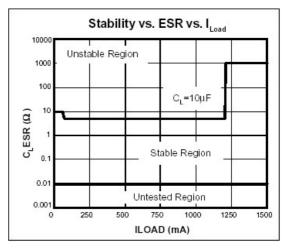












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