# GJ2148

**1.5A CMOS Low Dropout Voltage Regulator**

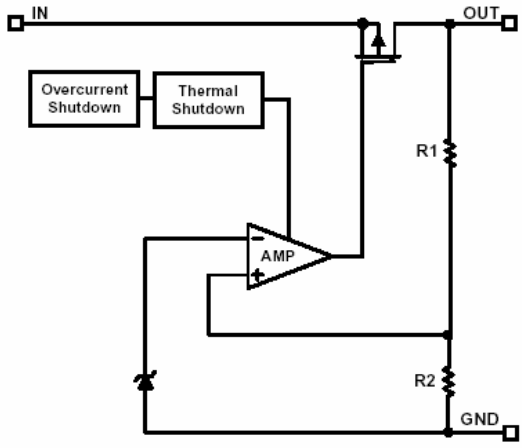
## Description

The GJ2148 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 GJ2148 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

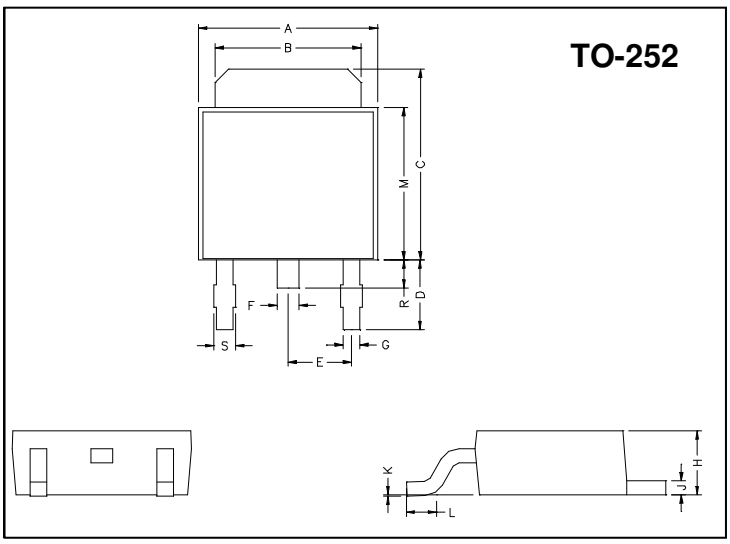
## Functional Block Diagram

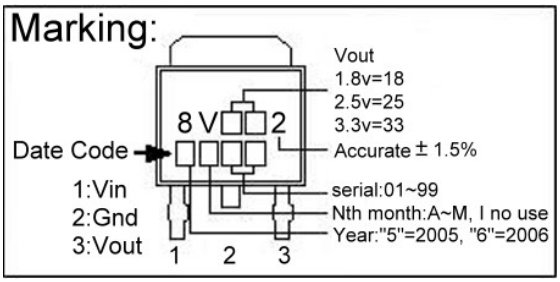



## Applications

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

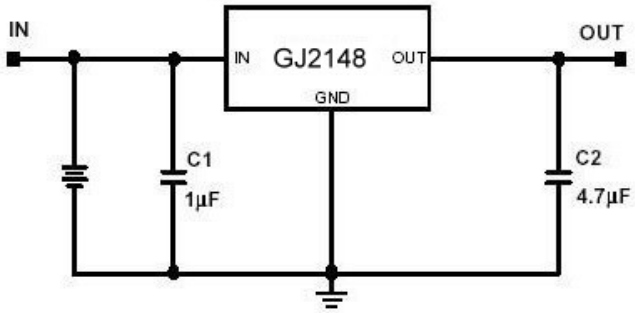
## Package Dimensions




| REF. | Millimeter | | REF. | Millimeter | |
|---|---|---|---|---|---|
| | Min. | Max. | | Min. | Max. |
| A | 6.40 | 6.80 | G | 0.50 | 0.70 |
| B | 5.20 | 5.50 | H | 2.20 | 2.40 |
| C | 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 | M | 5.40 | 5.80 |
| S | 0.60 | 0.90 | R | 0.80 | 1.20 |

## Typical Application Circuit



## Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Input Max Voltage | $V_{IN}$ | 8 | V |
| Output Current | $I_{OUT}$ | $P_D/(V_{IN}-V_O)$ | A |
| Output Voltage | $V_{OUT}$ | 1.5~5.0 | V |
| Operating Ambient Temperature | Topr | -40 ~ +85 | ℃ |
| Junction Temperature | Tj | -40 ~ +125 | ℃ |
| Maximum Junction Temperature | Tj Max | 150 | ℃ |
| Thermal Resistance | θjc (Conductive Epoxy)* | 5 | ℃/W |
| | θja | 90 | ℃/W |
| Internal Power Dissipation | PD | 1.2 | W |
| EDS Classification | | B | |

*Measure θjc on backside center of tab.

## Electrical Characteristics $V_{IN}=V_{OUT}(T)+2V$, Ta=25℃ unless otherwise noted

| Parameter | Symbol | Condition | | Min | TYP | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}(E)$ (Note1) | $I_O$=1mA | | -1.5% | $V_{OUT}(T)$ (Note2) | 1.5% | V |
| Output Current | $I_O$ | $V_O$>1.2V | | 1.5 | - | - | A |
| Current Limit | $I_{LIM}$ | $V_O$>1.2V | | 1.5 | 2.0 | - | A |
| Load Regulation | $REG_{LOAD}$ | $V_{IN}=V_{OUT}(T)+2V$, $I_O$=1mA to 1.5A | | -1 | 0.2 | 1 | % |
| Dropout Voltage | $V_{DROPOUT}$ | $I_O$=1.5A $V_O=V_{OUT}(E)$-2% | 1.4V<$V_{OUT}(T)$≤2.0V | - | - | 1300 | mV |
| | | | 2.0V<$V_{OUT}(T)$≤2.8V | - | - | 800 | |
| | | | 2.8V<$V_{OUT}(T)$ | - | - | 600 | |
| Quiescent Current | $I_Q$ | $V_{IN}=V_{OUT}(T)+2V$, $I_O$=0mA | | - | 45 | 70 | μA |
| Ground Pin Current | $I_{GND}$ | $V_{IN}=V_{OUT}(T)+2V$, $I_O$=1mA~1.5A | | - | 45 | - | μA |
| Line Regulation | $REG_{LINE}$ | $I_O$=1mA $V_{IN}=V_{OUT}(T)+1$ to $V_{OUT}(T)+2$ | $V_{OUT}(T)$<2.0V | -0.15 | - | 0.15 | % |
| | | | 2.0V≤$V_{OUT}(T)$<4.0V | -0.1 | 0.02 | 0.1 | |
| | | | 4.0V≤$V_{OUT}(T)$ | -0.4 | - | 0.4 | |
| Input Voltage | $V_{IN}$ | | | Note3 | - | 7 | V |
| Over Temperature Shutdown | OTS | | | - | 150 | - | ℃ |
| Over Temperature Hysterisis | OTH | | | - | 30 | - | ℃ |
| Output Voltage Temperature Coefficient | TC | | | - | 30 | - | ppm/℃ |
| Short Circuit Current | $I_{SC}$ | $V_{IN}=V_{OUT}(T)+1V$, $V_{OUT}$<0.4V | | - | 750 | - | mA |
| Power Supply Rejection | PSRR | Io=100mA Co=4.7μF | f=100Hz | - | 70 | - | dB |
| | | | f=1kHz | - | 50 | - | |
| | | | f=10kHz | - | 20 | - | |
| Output Voltage Noise | eN | f=10Hz~100kHz, Io=10mA, Co=4.7μF | | - | 30 | - | μVrms |

Note 1: $V_{OUT}$ (E) =Effective Output Voltage (i.e. the output voltage when "$V_{OUT}$ (T) + 2.0V" is provided at the $V_{IN}$ pin while maintaining a certain $I_{OUT}$ value).

2: $V_{OUT}$ (T) =Specified Output Voltage

3: $V_{IN\ (MIN)}=V_{OUT}+V_{DROPOUT}$

## Ordering Information ( contd. )

| Part Number | Marking | Output Voltage | Part Number | Marking | Output Voltage |
|---|---|---|---|---|---|
| GJ2148-15 | 8V152<br>XXXX | 1.5V | GJ2148-18 | 8V182<br>XXXX | 1.8V |
| GJ2148-19 | 8V192<br>XXXX | 1.9V | GJ2148-25 | 8V252<br>XXXX | 2.5V |
| GJ2148-33 | 8V332<br>XXXX | 3.3V | GJ2148-47 | 8V472<br>XXXX | 4.75V |
| GJ2148-50 | 8V502<br>XXXX | 5.0V | | | |

## Detailed Description

The GJ2148 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℃, 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℃.

The GJ2148 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.

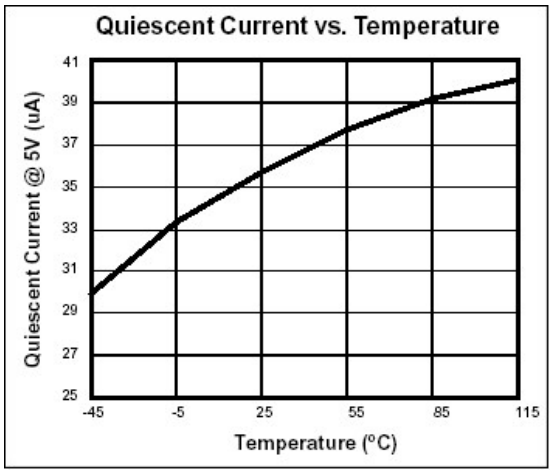
## External Capacitors

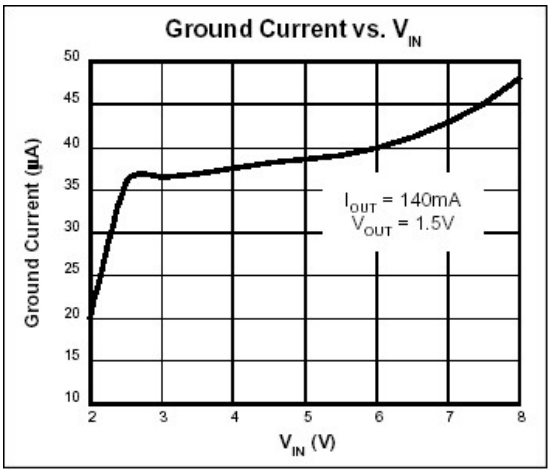
The GJ2148 is stable with an output capacitance to ground of 4.7μF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1μF ceramic capacitor with a 10μF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

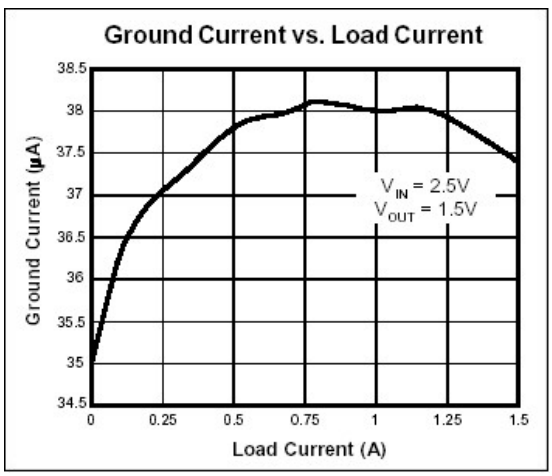
A second capacitor is recommended between the input and ground to stabilize Vin. The input capacitor should be at least 0.1μF to have a beneficial effect.

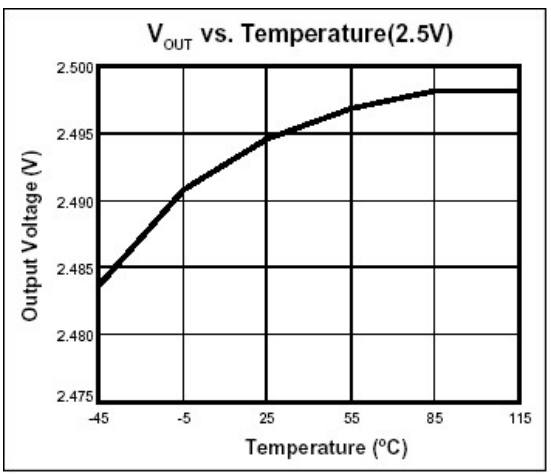
All capacitors should be placed in close proximity to the pins. A “Quiet” ground termination is desirable. This can be achieved with a “Star” connection.

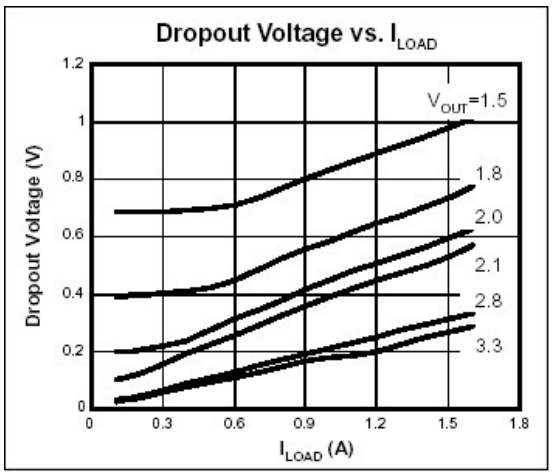
## Characteristics Curve

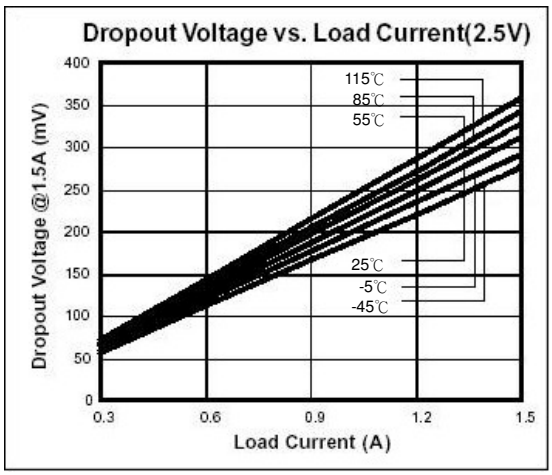


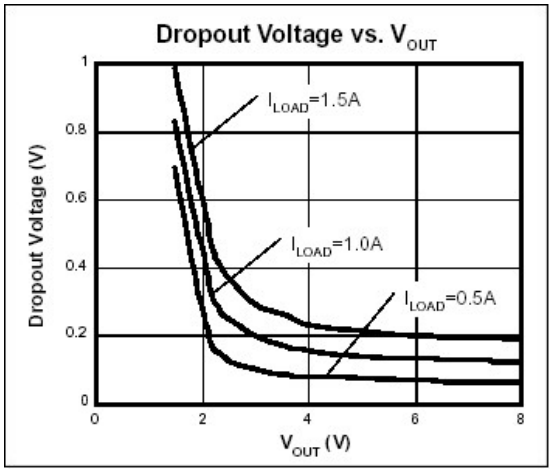



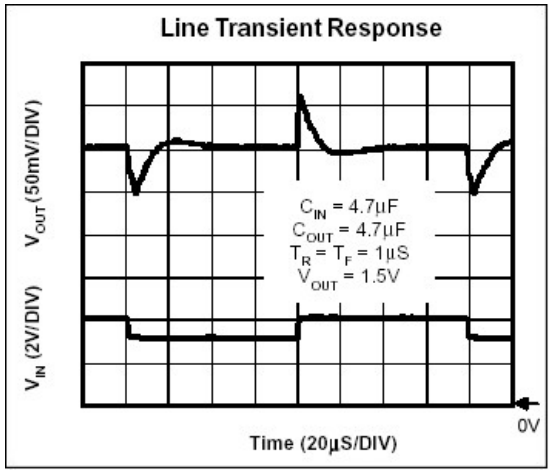



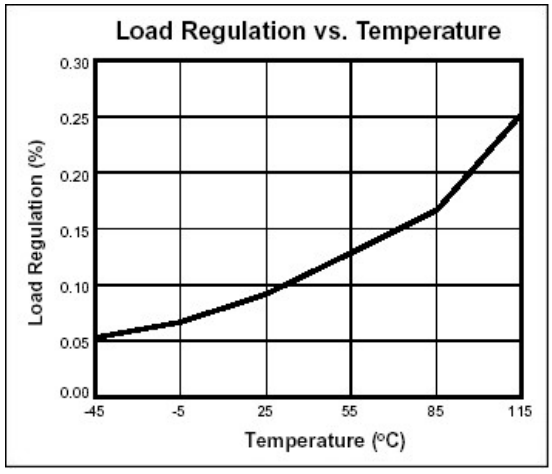



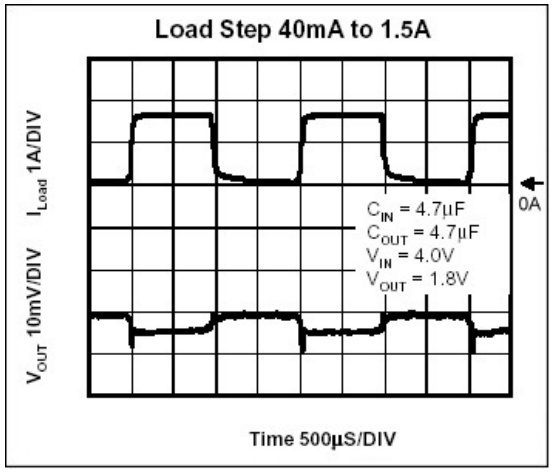

Dropout Voltage vs. $I_{LOAD}$
Dropout Voltage (V)
$I_{LOAD}$ (A)
$V_{OUT}$=1.5
1.8
2.0
2.1
2.8
3.3

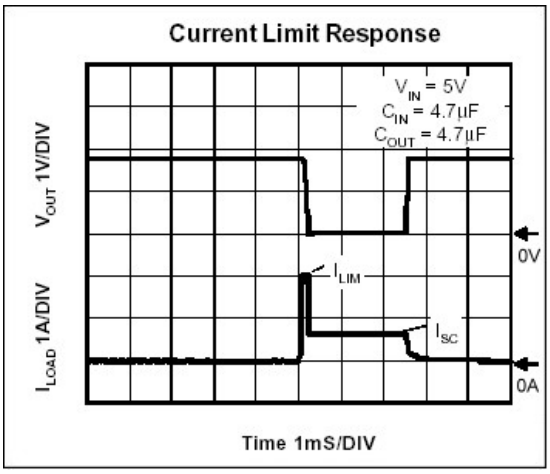

Dropout Voltage vs. Load Current(2.5V)
Dropout Voltage @1.5A (mV)
Load Current (A)
115℃
85℃
55℃
25℃
-5℃
-45℃

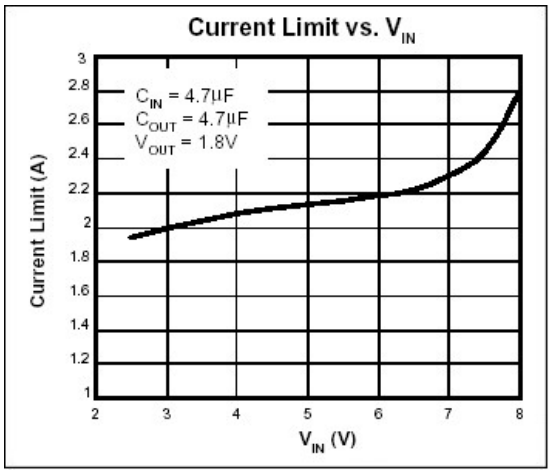

Dropout Voltage vs. $V_{OUT}$
Dropout Voltage (V)
$V_{OUT}$ (V)
$I_{LOAD}$=1.5A
$I_{LOAD}$=1.0A
$I_{LOAD}$=0.5A

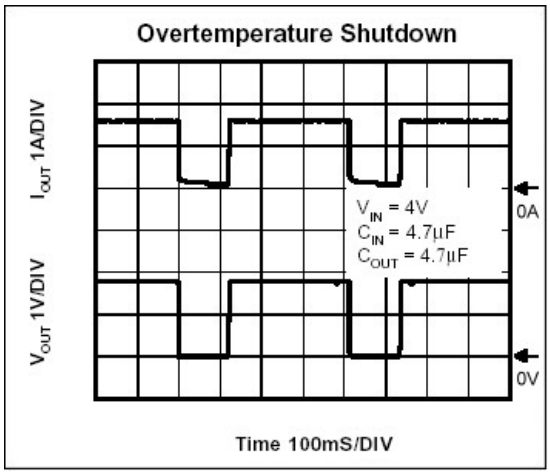

Line Transient Response
$V_{OUT}$(50mV/DIV)
$V_{IN}$ (2V/DIV)
$C_{IN}$ = 4.7µF
$C_{OUT}$ = 4.7µF
$T_R$ = $T_F$ = 1µS
$V_{OUT}$ = 1.5V
0V
Time (20µS/DIV)

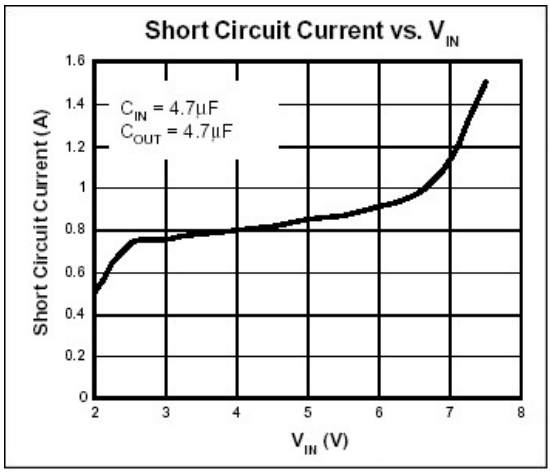

Load Regulation vs. Temperature
Load Regulation (%)
Temperature (°C)

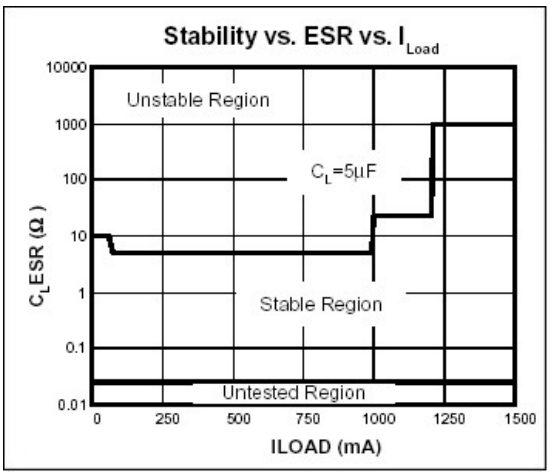

Load Step 40mA to 1.5A
$I_{Load}$ 1A/DIV
$V_{OUT}$ 10mV/DIV
$C_{IN}$ = 4.7µF
$C_{OUT}$ = 4.7µF
$V_{IN}$ = 4.0V
$V_{OUT}$ = 1.8V
0A
Time 500µS/DIV

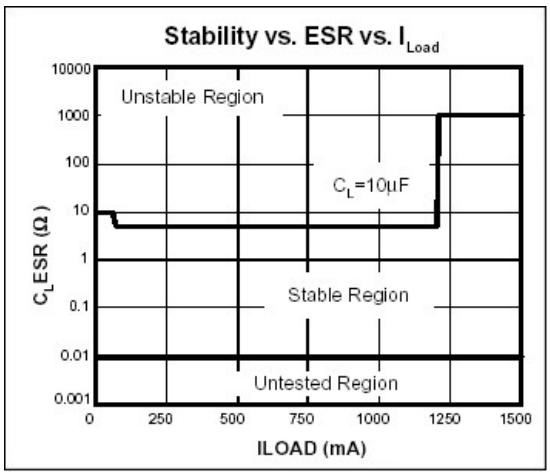



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