



**ANALOG
PRODUCTS**

**MC33099
FACT SHEET**

33099 ADAPTIVE ALTERNATOR VOLTAGE REGULATOR

The 33099 is designed to regulate the output voltage in diode-rectified alternator-charging systems common to automotive applications.

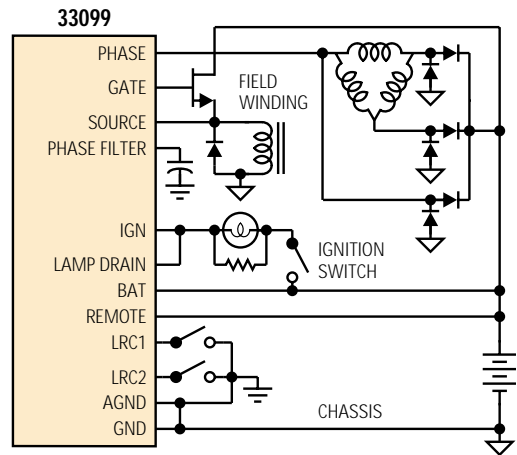
The 33099 provides either an analog or a digital fixed frequency duty cycle (ON/OFF ratio) control of an alternator's field current. Load Response Control (LRC) of the alternator field current is accomplished by selecting the duty cycle for prevailing engine conditions to eliminate engine speed hunting and vibrations caused by abrupt torque loading of the engine due to sudden electrical loads being applied to the system at low engine RPM. Four LRC rates are selectable by connecting Pins 7 and 8 to ground.

The 33099 uses a feedback voltage to establish an alternator field current that is in harmony with system load currents. The output voltage is monitored by an internal voltage divider scheme and compared to an internal voltage ramp referenced to a bandgap voltage. This approach provides precision output voltage control over a wide range of temperature, electrical loads, and engine RPM.

APPLICATIONS

- Automotive Systems
- Aircraft Electrical Systems
- Powered Farm Equipment
- Tachograph
- Industrial Generators and Equipment
- Marine Power Plants

Simplified Application Diagram



CUSTOMER BENEFITS

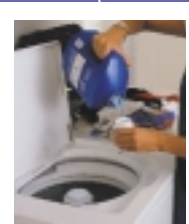
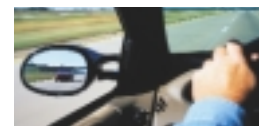
- Low system cost, minimal components, and simple hook-up to system
- Smoother idling where engine is subjected to torque changes caused by abrupt electrical loads
- Robustness with a proven under-the-hood automotive track record
- Alternator field shorts-to-ground protected
- Numerous operating safety enhancement features adding to system robustness

Performance	Typical Values
Outputs	1
Regulation	± 0.1 V
Operating Voltage	14.8 V nominal
Min. Duty Cycle	3.10 %
Adjustable LRC	1.8 to 7.4 sec
PWM Frequency	395 Hz
Operating Temp	-40°C ≤ T _A ≤ 125°C

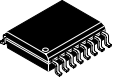
**SPECIAL FUNCTION
ALTERNATOR REGULATOR**

FEATURES

- External high-side MOSFET control of a ground-referenced field winding
- LRC active during initial start
- ± 0.1 V at a 14.8 V regulation voltage @ 25°C
- < 0.1 V variation over engine speeds of 2,000 to 10,000 RPM
- < 0.2 V variation over 10% to 95% of maximum field current
- Gate control for external MOSFET
- Protected lamp drain output
- < 1.5 mA standby current from battery @ 25°C
- Loss of remote sense backup protection
- Additional devices available for comparison in Analog Selector Guide SG1002/D



Protection	Detect	Limiting	Auto Retry	Status Reporting	Field Short to GND	Lamp Driver
Over Voltage	•		•			
Under Voltage	•			•		
Over Current/SC	•	•		•	•	•
Over Temperature	•	•	•			
Lamp Driver				•		

Ordering Information	Package	Ship Method	Motorola Part Number
	16 SOICW	Rail T/R	**33099DW **33099DWR2
Data Sheet Order Number			MC33099/D
Contact Sales for Evaluation Kit Availability			
**Prefix Index: PC = Eng Samples; XC = In Qual; MC = Production			

QUESTIONS

- Do you need an alternator voltage regulator for 12 V electrical systems?
- Do you need a regulator for a GM-9SI type alternator application?
- Does your alternator regulator design need to compensate for abrupt electrical system loads to prevent engine idle loping?
- Do you need a highly accurate alternator regulator to cover a wide range of operating conditions?
- Do you need a regulator with programmable load response rates?

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MC33099FS/D
Rev. 1

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