



Alternator Voltage Regulator FET Driver

Description

The CS3361 integral alternator regulator integrated circuit provides the voltage regulation for automotive, 3-phase alternators.

It drives an external logic level N channel enhancement power FET for control of the alternator field current. In the event of a charge

fault, a lamp output pin is provided to drive an external darlington transistor capable of switching on a fault indicator lamp. An overvoltage or no Stator signal condition activates the lamp output.

The CS3361 is available in a 14 lead SO package.

Features

- Drives Logic Level Power NFET
- 80V Load Dump
- Temperature Compensated Regulation Voltage
- Shorted Field Protection Duty Cycle, Self Clearing

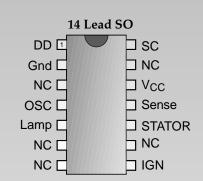
Absolute Maximum Ratings

Storage Temperature Range	55°C to +165°C
Junction Temperature Range	
Continuous Supply	
I _{CC} Load Dump	
Lead Temperature Soldering	
Reflow (SMD styles only)60 sec. max	above 183°C, 230°C peak

Block Diagram Vcc Load Dump ENABLE Detection and Series IGN Protection Regulator VSUP OSC osc VSUP Lamp Indicato RS Flop Set Sense Dominate Device 15 Driver Q **†**R VREG ÷ DELAY VHV Ŷ SC ENABLE STATOR Power Up LAMP STATOR Timer STATOR VSUP ⊥_ Gnd



Package Options



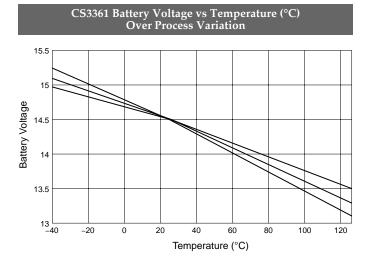
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Supply - 10 Supply Current Enabled - 10 Supply Current Disabled - 50 Driver Stage - 50 Output High Voltage 5.5 12 Output High Current Vpp = 1.2V -10 -6 -4 Output High Current Vpp = 1.2V -10 -6 -4 Output High Current Vpp = 0.022 μF 200 - - Minimum ON Time Cosc = 0.022 μF 200 - - Short Circuit Duty Cycle 1 5 5 - Field Switch Tum On Rise Time 15 75 - Fall Time 15 75 - - Input High Voltage 10 - - 6 Stator 10 - - 50 Output High Voltage Ir_c > 10A - 0.35 Imput Low Voltage Ir_c > 10A - 0.35 Input High Voltage Ir_c > 10A -	
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Proportional Control 0.10 0.25 High Voltage V _{High Voltage} @ Lamp On 1.083 1.190	μ.
High VoltageV High Voltage @ Lamp On1.0831.190	V
	V
Threshold Ratio V _{Regulation} @ 50% Duty Cycle High Voltage Hysteresis 0.020	

	Package Pin Description		
PACKAGE PIN #	PIN SYMBOL	rge Pin Description C33 FUNCTION 61	
14 Lead SO			
1	Driver	Output driver for external power switch.	
2	Gnd	Ground.	
3, 6, 7, 9, 13	NC	No connection.	
4	OSC	Timing capacitor for oscillator.	
5	Lamp	Base driver for lamp driver indicates no stator signal or over- voltage condition.	
8	IGN	Switched ignition power up.	
10	Stator	Stator signal input for stator timer.	
11	Sense	Battery sense voltage regulator comparator input and protection.	
12	V _{CC}	Supply for IC.	
14	SC	Short circuit sensing.	

Typical Performance Characteristics



The CS3361 is designed for use in an alternator charging system.

In a standard alternator design (Figure 1), the rotor carries the field winding. An alternator rotor usually has several N and S poles. The magnetic field for the rotor is produced by forcing current through a field or rotor winding. The Stator windings are formed into a number of coils spaced around a cylindrical core. The number of coils equals the number of pairs of N and S poles on the rotor. The alternating current in the Stator windings is rectified by the diodes and applied to the regulator. By controlling the amount of field current, the magnetic field strength is controlled and hence the output voltage of the alternator.

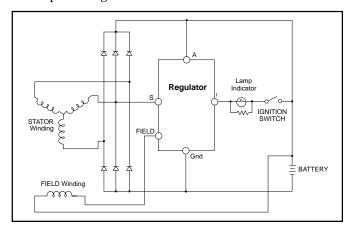


Figure 1. IAR System Block Diagram

Referring to Figure 2, a typical application diagram, the oscillator frequency is set by an external capacitor connected between OSC and ground. The sawtooth waveform ramps between 1V and 3V and provides the timing for the system. For the circuit shown the oscillator frequency is approximately 140Hz. The alternator voltage is sensed at Terminal A via the resistor divider network R1/R2 on the Sense pin of the IC. The voltage at the sense pin determines the duty cycle for the regulator. The voltage is adjusted by potentiometer R2. A relatively low voltage on the sense pin causes a long duty cycle that increases the Field current. A high voltage results in a short duty cycle.

The ignition Terminal (I) switches power to the IC through the V_{CC} pin. The Stator pin monitors the voltage from the stator and senses a stopped engine condition. It drives the Lamp pin high after the stator timeout expires. The Lamp pin also goes high when an overvoltage condition is detected on the sense pin. This causes the darlington lamp drive transistor to switch on and pull current through the lamp. If the system voltage continues to increase, the field and lamp output turn off as in an overvoltage or load dump condition.

The SC or Short Circuit pin monitors the field voltage. If the drive output and the SC voltage are simultaneously high for a predetermined period, a short circuit condition is assumed and the output is disabled. The regulator is forced to a minimum short circuit duty cycle.

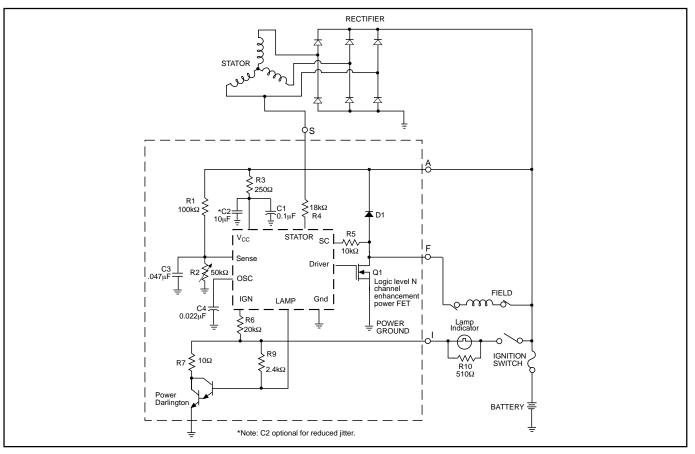


Figure 2. Typical Application Diagram

Package Specification

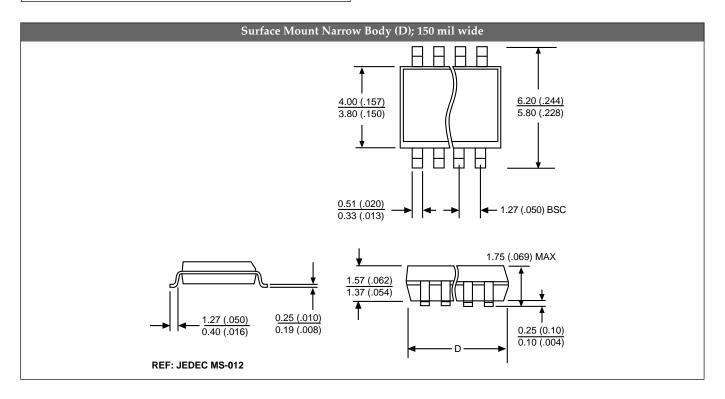
PACKAGE DIMENSIONS IN mm (INCHES)

		D		
Lead Count	Me	tric	Eng	lish
	Max	Min	Max	Min
14L SO	8.75	8.55	.344	.337

PACKAGE THERMAL DATA

CS3361

Therma	l Data	14L SO	
R _{ØJC}	typ	30	°C/W
$R_{\Theta JA}$	typ	125	°C/W



Ordering Information		
Part Number	Description	
CS3361YD14	14L SO	
CS3361YDR14	14L SO (tape & reel)	

Cherry Semiconductor Corporation reserves the right to make changes to the specifications without notice. Please contact Cherry Semiconductor Corporation for the latest available information.

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