



# Ignition Controller

## Description

The CS290/291 are integrated circuits to be used in the automotive ignition system. The application diagram shown below highlights the CS290. The CS291 is identical with the differential input replaced

by a single-ended input. The part is capable of withstanding 90V load dump transients in the circuit shown below. The part is also reverse battery protected.

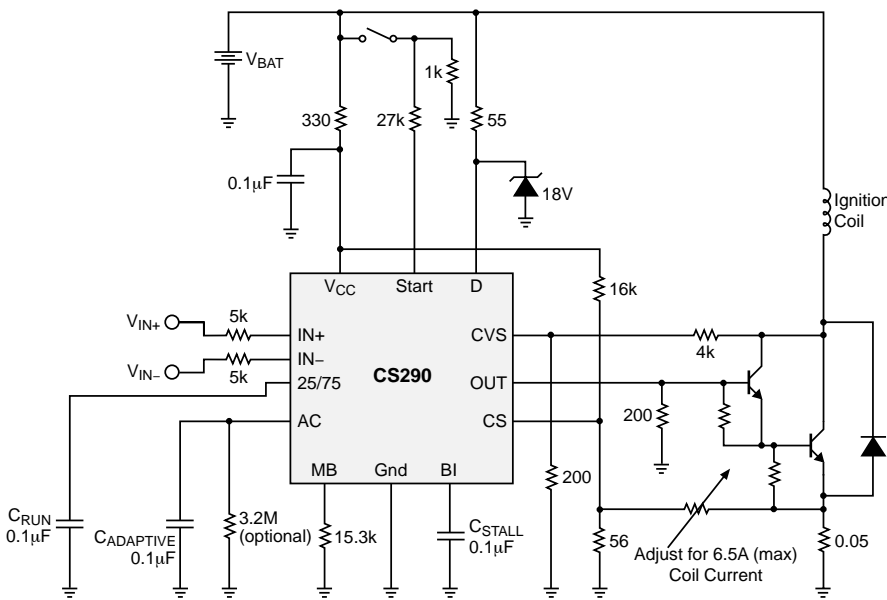
## Features

- 40mA Driver
- Stall Timing
- Output Current Control
- Output Clamp
- Overvoltage Shutdown

## Absolute Maximum Ratings

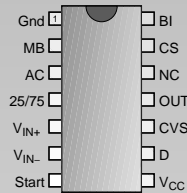
Power supply voltage,  $V_{BAT}$  ..... -0.3V to 22V  
 Peak Transient Voltage (Load Dump 76V @ 14V  $V_{BAT}$ ) ..... 90V  
 Storage Temperature ..... -55°C to 165°C  
 Operating Junction Temperature,  $T_j$  ..... 150°C  
 Lead Temperature Soldering  
 Wave Solder (through hole styles only) ..... 10 sec. max, 260°C peak  
 Reflow (SMD styles only) ..... 60 sec. max above 183°C, 230°C peak

## Application Diagram

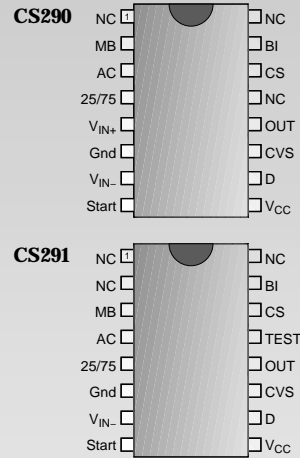


## Package Options

### 14 Lead PDIP



### 16 Lead SO Wide



Consult Factory for Flip Chip



Electrical Characteristics:  $6V < V_B < 16V$ ,  $-30^{\circ}C < T_A < 125^{\circ}C$ 

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>■ Input</b>					
Positive Threshold				66	$\%V_{BAT}$
Negative Threshold	$V_{BAT} = 16V$ $V_{BAT} = 6V$	29 29			$\%V_{BAT}$
Hysteresis		9			$\%V_{BAT}$
Input Impedance	Input = $100\mu A$	70		325	$k\Omega$
$V_{CC}$ Negative Edge Filter	$V_{BAT} = 16V$ $V_{BAT} = 6V$	18 4		1100 1100	$\mu s$
<b>■ Output Stage</b>					
Negative Edge Delay (Start Mode)	$V_{BAT} = 6V$	1.1		3.1	ms
Positive Edge Delay (Start Mode)	$V_{BAT} = 5V$	1.06		1.80	ms
Delay Time (Start High to Output Low)	$V_{BAT} = 14V$	0		16	$\mu s$
Output Current	$V_{BAT} = 6V$	40		65	mA
Output SOA	$V_{BAT} = 22V$	40		65	mA
Output Leakage	$V_{BAT} = 18V$	0		100	$\mu A$
Output Clamp Voltage	Output = 10mA	13.7		17	V
Output Clamp Impedance (Refers to Collector Sense Voltage pin)	Output = 10mA	10		80	$\Omega$
High Frequency On Time	$V_{BAT} = 14V$	70		80	%
<b>■ General</b>					
$I_{CC}$	$V_{BAT} = 6V$ $V_{BAT} = 16V$	1.4 5		4.6 19	mA
AC Gain Adaptive Cap Gain	$V_{BAT} = 14V$	0.8		1.2	V/V
$V_{CS}$ Regulation	$V_{BAT} = 6V$	140		210	mV
High Voltage Shutdown		24.3		31	V
<b>■ Stall</b>					
$V_{STALL}$ Soft Shutdown Voltage	$V_{CS} = 6V$	0		11	mV
Soft Shutdown Frequency	$V_{BAT} = 14V$	1.0		2.6	Hz
Soft Shutdown Time	$V_{BAT} = 6V$	13.1		27	ms
Stall to Spark Output Delay	$V_{BAT} = 14V$	4.5		8.9	ms
Battery Interrupt Time	$V_{BAT} = 14V$	25		750	ms
Battery Interrupt Recovery Time	(200 Hz)	0		800	ms
<b>■ Dwell</b>					
Dwell @ 10Hz (Start Mode)	$V_{BAT} = 5V$	46		54	%
Start to Output Disable Time	$V_{BAT} = 14V$	65		135	ms
Excess Dwell @ 20Hz (Run Mode)	$V_{BAT} = 14V$	14		20.8	%

**Electrical Characteristics:  $6V < V_B < 16V$ ,  $-30^{\circ}C < T_A < 125^{\circ}C$**

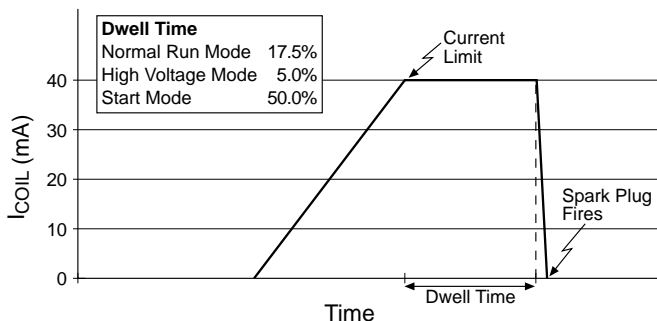
PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>■ Dwell: continued</b>					
Excess Dwell @ 200Hz (Run Mode)	$V_{BAT} = 14V$	14		20.8	%
Reduced Dwell Threshold		16.6		21.0	V
Reduced Dwell Hysteresis		200		800	mV
Reduced Dwell	$V_{BAT} = 20V$	4.0		6.0	%

**Package Pin Description**

PACKAGE PIN #	16 lead SO wide		PIN SYMBOL	FUNCTION
14 lead PDIP	CS290	CS291		
1	6	6	Gnd	Signal Ground.
2	2	3	MB	Master Bias. Sets up operating currents on the IC with external resistor.
3	3	4	AC	Adaptive Capacitor. Follows the 25/75 capacitor. Voltage trip points control the Output for setting dwell.
4	4	5	25/75	Run Capacitor. Provides 25%/75% charge and discharge current to an external capacitor for setting dwell.
5	5	NC	$V_{IN+}$	Input pin +.
6	7	7	$V_{IN-}$	Input pin -.
7	8	8	Start	Input pin to put device in the "start mode".
8	9	9	$V_{CC}$	Supply input voltage.
9	10	10	D	Supply current to output pin.
10	11	11	CVS	Collector Voltage Sense. Input for flyback detect.
11	12	12	OUT	Output. Driver for external darlington.
12	1,13,16	1,2,16	NC	No connection.
13	14	14	CS	Current Sense. Feedback for max coil current.
14	15	15	BI	Battery Int. Input for "stall mode" of operation
NC	NC	13	Test	Factory test pin. Pin should be grounded in customer application.

**Typical Performance Characteristics**

**Timing Diagram,  $I_{COIL}$  vs. Time**



**Package Specification**

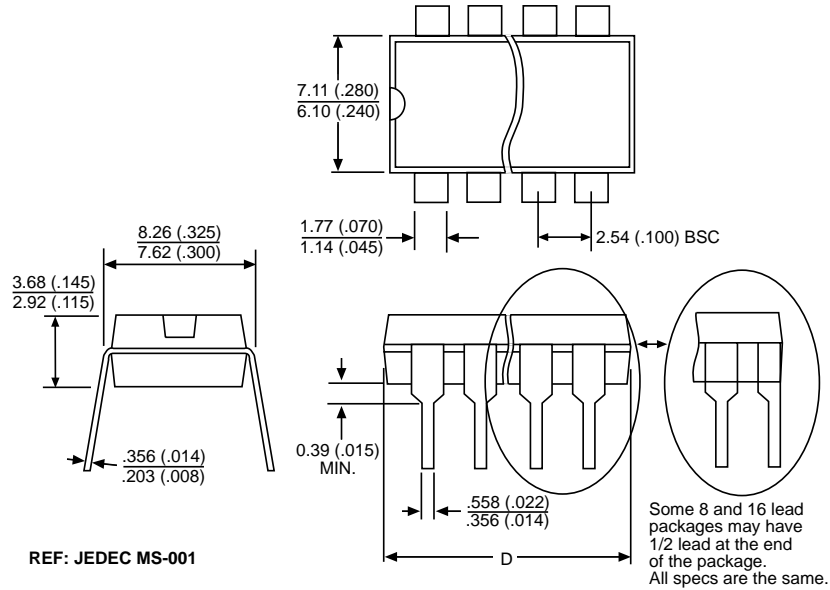
**PACKAGE DIMENSIONS IN mm (INCHES)**

Lead Count	D			
	Metric		English	
	Max	Min	Max	Min
14L PDIP	19.69	18.67	.775	.735
16L SO Wide	10.50	10.10	.413	.398

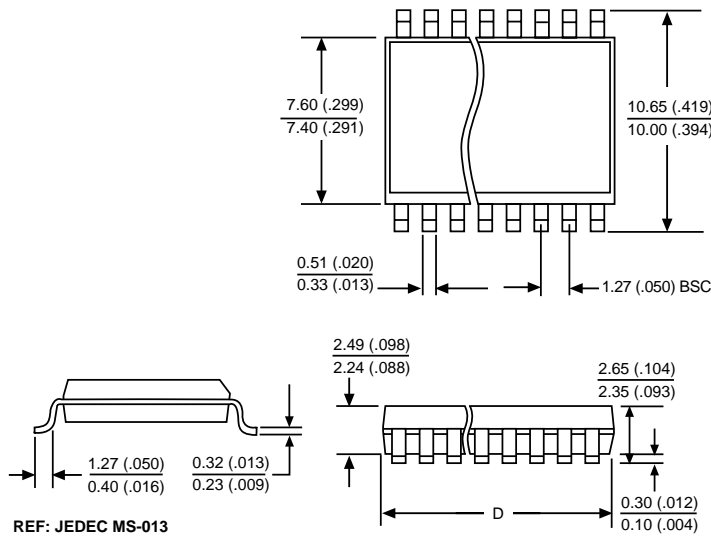
**PACKAGE THERMAL DATA**

Thermal Data		14 Lead PDIP	16 Lead SO Wide	
$R\theta_{JC}$	typ	48	23	$^{\circ}C/W$
$R\theta_{JA}$	typ	85	105	$^{\circ}C/W$

**Plastic DIP (N); 300 mil wide**



**Surface Mount Wide Body (DW); 300 mil wide**



**Ordering Information**

Part Number	Description
CS290N14	14L PDIP
CS291N14	14L PDIP
CS290DW16	16 Lead SO Wide
CS290DWR16	16 Lead SO Wide ( <i>tape &amp; reel</i> )
CS291DW16	16 Lead SO Wide
CS291DWR16	16 Lead SO Wide ( <i>tape &amp; reel</i> )

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