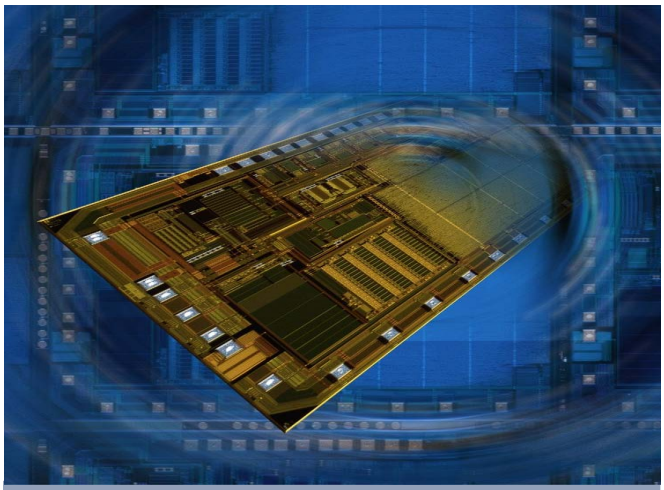
Automotive Electronics

Product Information CJ110



Integrated circuit for continuous lambda regulation

Customer benefits:

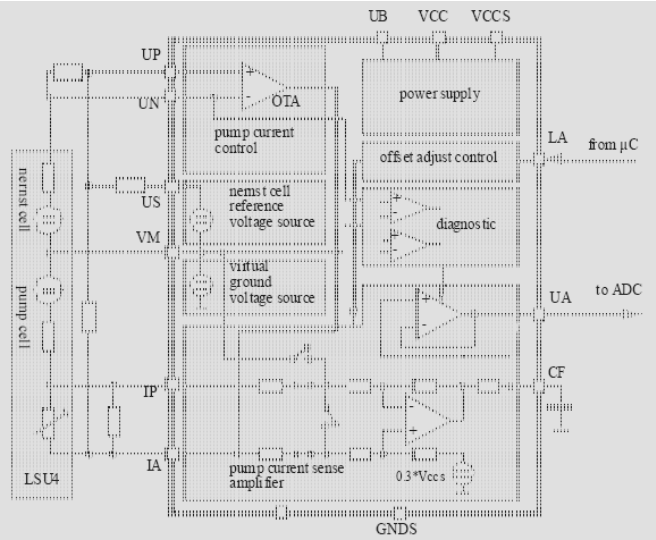
- Excellent system know-how
- Smart concepts for system safety
- Secured supply
- Long- term availability of manufacturing processes and products
- QS9000 and ISO/TS16949 certified

The integrated circuit CJ110 is a control and amplifier circuit for the wide range lambda sensor LSU4.

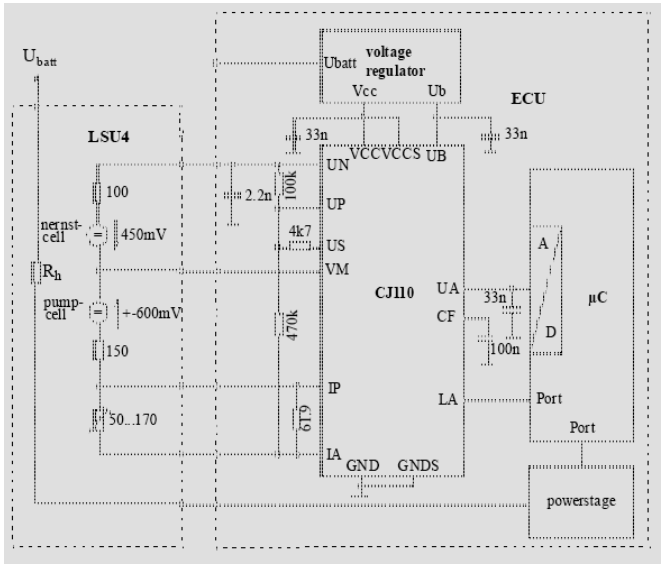
Features

- Pump current control for regulation of nernst cell at 450mV
- Pump current sense amplifier with fixed amplification
- Virtual ground voltage source
- Nernst cell reference voltage source (450mV, reference to virtual ground)
- Offset adjust control
- Diagnostic circuit

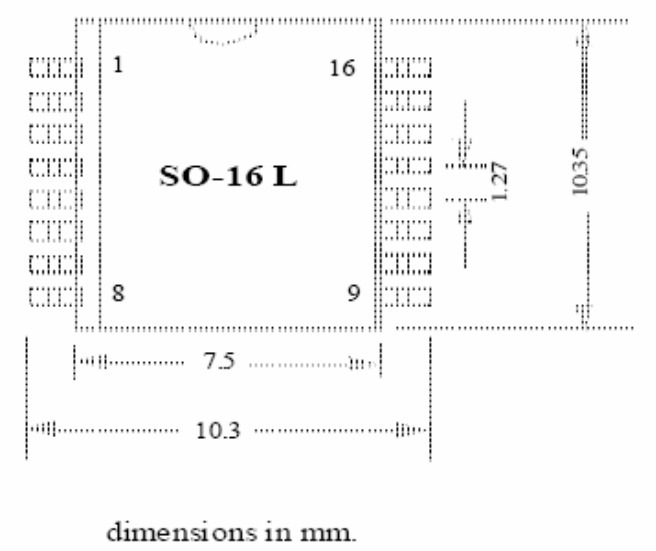
Block diagram



Application example



PIN configuration



Pin description

Pin	Name	Function
1	UB	power supply input (14V)
9	VCC	power supply input (5V)
8	VCCS	reference voltage input (5V)
16	GND	Ground
5	GNDS	reference ground
11	US	nearest cell reference voltage
10	VM	virtual ground output
13	UA	lambda signal and diagnostic output
4	IA	pump current control output
3	IP	pump current shunt input
14	CF	filter capacitor input
7	LA	offset adjust control input
12	UP	non inverting input of pump current control
2	UN	inverting input of pump current control
6 and 15	n.c.	

The application circuit of the CJ110 consists of the following parts:

- Capacitor between [VCC] and [GND] to stabilize the supply voltage VCC
- Capacitor between [UB] and [GND] to stabilize the supply voltage UB
- Capacitor between [CF] and [GND] to filter the lambda signal
- Capacitor between [UA] and [GND] to stabilize lambda signal output
- Capacitor between [UN] and [GND] to stabilize nearest signal
- Shunt between [IA] and [IP] for pump current sensing
- Resistor between [IA] and [UP] to compensate parasitic effects of the lambda sensor
- Resistor between [US] and [UP] to feed the nernst cell reference voltage into the pump current control circuit
- Resistor between [UP] and [UN] for leakage detection

Maximum ratings

Parameter	Conditions	Symbol	Min	Max	Unit
Supply voltage UB		V_{UB}	-0.3	35	V
Supply voltage V_{CC}		V_{VCC}	-0.3	5.5	V
Temperature	junction storage ambient	T_J T_{ST} T_A	-0.3	6	V
Maximum allowed voltages		V_{LA} V_{UA} V_{US} V_{UP} V_{CR} V_{CF}	-0.3	6	V
Maximum allowed voltages, no destruction when ISO-pulses 3a,b are applied		V_{UN} V_{IA} V_{IP} V_{VM}	-0.3 -0.3	28 18	V
Offset between GND and GNDS		ΔV_{GND}	-0.1	0.1	V
Offset between V_{CC} and V_{CCS}		ΔV_{VCC}	-0.1	0.1	V
	Human Body Model R=1.5KΩ C=100pF		-2000	2000	V

Electrical characteristics

Parameter	Conditions	Symbol	Min	Max	Unit
1. Power supply					
Power supply Operating range	$V_{GND} = V_{GNDS}$ $V_{VCC} = V_{VCCS}$	V_{UB} V_{VCC}	9 4.75	18 5.25	V V
Current consumption		I_{VCC}		40	mA
2. Pump current control					
Offset voltage		V_{off}	-10	10	mV
Input current	-40°C < T_j < 80°C 80°C <T_j < 150°C	I_{UP} I_{UN} I_{UP} I_{UN}	-500 -1	500 1	nA µA
Input offset current	-40°C < T_j < 80°C 80°C < T_j < 150°C	I_{off} I_{off}	-500 -1	500 1	nA µA
Output current Source condition	$V_{UN} < V_{UP}$ 0.5V < VIA < V_{CC}-0	$-I_{IA}$	6		mA
Output current Sink condition	$V_{UP} < V_{UN}$ 0.6V < V_{IA} < V_{CC}-0.5V	I_{IA}	3		mA
3. Pump current sense amplifier					
Input current	-40°C < T_j < 80°C 80°C < T_j < 150°C	I_{IP} I_{IP}	-500 -1	500 1	nA µA
Amplification		A0	16.7	17.37	
Common mode Rejection ratio	$CMRR^{-1} = \Delta V_{UA} / \Delta V_{IP}$ $V_{IP}=V_{IA}$=1...4V 0.5V < V_{UA} < V_{CC}-0.5V | I_{UA} | < 10µA	$CMRR^{-1}$		7	mV/V
Output voltage swing	| I_{UA} | < 10µA + Diagnostic see 7.	V_{UA}	0.24		mA
Output error Offset adjust	$\Delta V_{UA}=V_{UA}$(LA=HIGH) - V_{UA}(LA=LOW) $V_{IP}=V_{IA}=V_{VM}$ | I_{UA} | < 10µA	ΔV_{UA}	-3	3	mV

Parameter	Conditions	Symbol	Min	Max	Unit
4. Virtual ground voltage source					
Output current Operating range		I_{VM}	$-I_{IA}$ -1	$-I_{IA}$ +1	mA
Output voltage ratio	$-I_{IA}$-1mA < I_{VM} < < $-I_{IA}$ +1mA	V_{VM}/V_{VCC}	0.48	0.52	
5. Nernst cell reference voltage source					
Output current Operating range		I_{US}	-0.4	0.4	mA
Open loop Output voltage	V_{SollI}= V_{US} - V_{VM} I_{US} = 0	V_{SollI}	430	470	mV
6. Offset adjust control					
Pull down sink	0.5V < V_{LA} < V_{CC}	I_{LA}	20	60	µA
Measurement mode	LA =low or LA = open	V_{LA}	-0.3	$V_{CC}/2$ – 0.75	V
Adjustment mode	LA = high	V_{LA}	$V_{CC}/2$ +1.1	V_{CC} +0.3	V
7. Diagnostic					
Logic Diagnostic output level	error flag set, if V_{VM} < 0.35 . V_{CC} or V_{VM} > 0.65 . V_{CC} or V_{UN} < 0.3 . V_{CC} or V_{UN} > 0.88 . V_{CC} or V_{IA} > 7 V The diagnostic thresh old must be in any case lower than V_{VCC} - 0.175V	V_{UA}	V_{CC} -0.175	V_{CC}	V

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