

DSCIA47

Linearized Thermocouple Input Signal Conditioners

Description

DSCIA47 Thermocouple input module is single channel thermocouple input, which is filtered, isolated, amplified & converted to standard level output. A five-pole filter is provided with signal filtering which provides up to 85dB NMR at 60Hz and 80dB 50Hz. The input signal is chopped by a proprietary converter circuit. After initial filter stage isolation is provided by transformer coupling which eliminates common mode spikes and surges.

The DSCIA47 can interface to eight industry standard thermocouple types: J,K,T,E,R,S,B and N. Each module has cold junction compensation to correct for parasitic thermocouples formed by the thermocouple wire and input screw terminals on the module. Upscale open thermocouple detection is provided by internal circuitry. Downscale indication can be implemented by installing a 47MΩ, ±20% resistor between screw terminals 6 and 8 on the input terminal block.

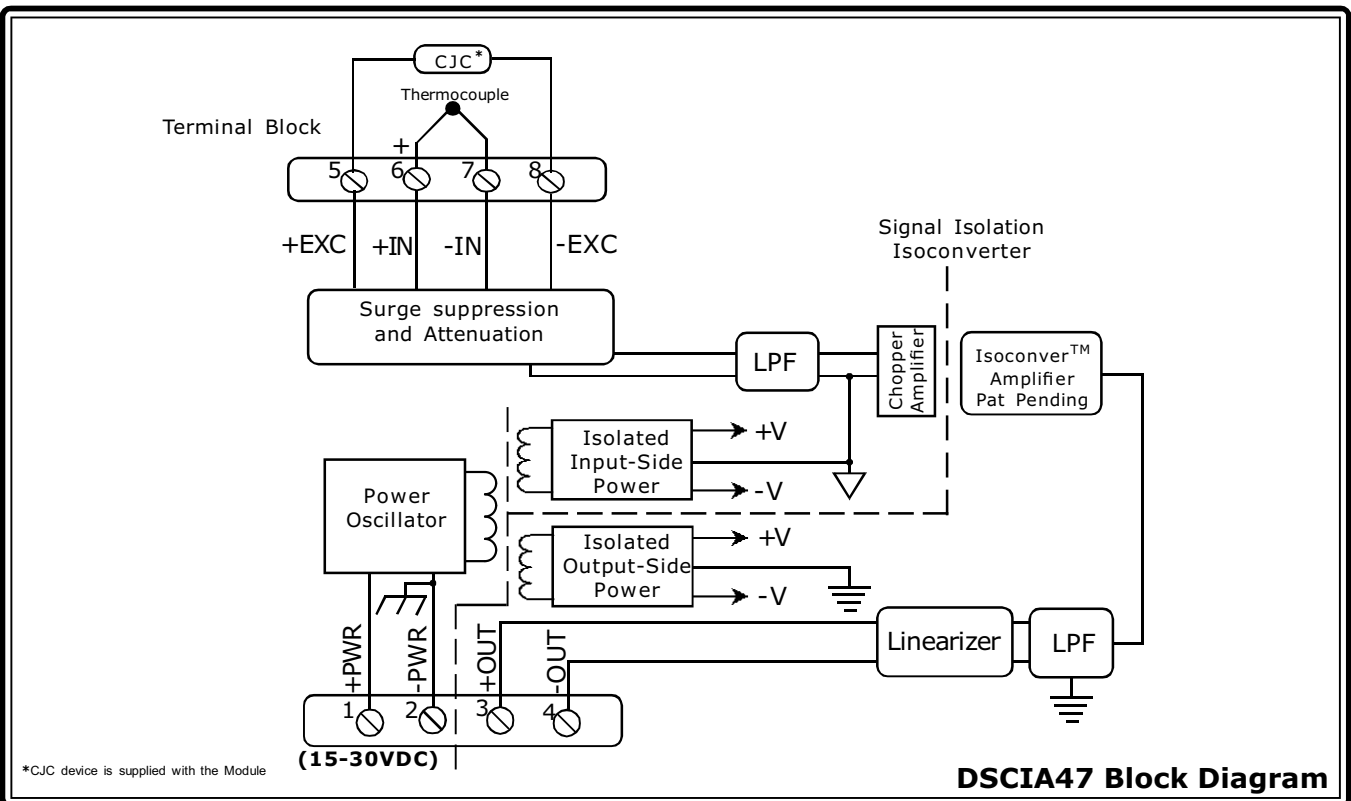
The output of this module is either voltage or current. In the case of current module a dedicated loop supply is provided at the output side. The output signal is isolated from power and input signal, hence it can be either floating or grounded.

Signal input has a input protection for 250V AC accidental connection and transient protection as per ANSI/IEEE C37.90.1. Output is also protected against short circuit, power supply input is protected against terminal reversal and transients. The signal and power wires can be connected directly on to heavy duty screw terminals provided.

These modules are most rugged, reliable and stable over long time and do not require frequent recalibration. However ±5% zero & span adjustment provides flexibility where fine tuning is warranted.

Features

- Interfaces to Types J, K, T, E, R, S, B, and N Thermocouples
- Linearizes Thermocouple's Signal
- Standard Output of either 0 to 10V/±10V, 0 to 5V, 1 to 5V, 0 to 20mA, or 4 to 20mA
- 1.5KV Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- 250VAC Continuous Protection on Input
- True 3-Way Isolation
- Wide range of supply voltage(15 to 30V DC)
- 85dB NMR at 60Hz, 80dB at 50Hz
- 160dB CMR
- ±0.08% Accuracy
- ±0.01% NonLinearity
- Standard DIN Rail Mountable
- CSA , FM , CE and ATEX Compliant



DSCIA47 Block Diagram

Specifications Typical at $T_A=+25^{\circ}\text{C}$ and +24V supply voltage

Ordering Information

Module	DSCIA47
Input Range	Standard thermocouple
Input Bias Current	-30nA
Input Resistance	
Normal	50M Ω
Power off	65K Ω
Overload	65K Ω
Input Protection	
Continuous	250Vrms max
Transient	ANSI/IEEE C37.90.1
Cold Junction Compensation	
Accuracy, +5 $^{\circ}\text{C}$ to +45 $^{\circ}\text{C}$	$\pm 0.5^{\circ}\text{C}$
Accuracy, -40 $^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$	$\pm 1.25^{\circ}\text{C}$
Output Range	See Ordering Information
Load Resistance (I_{OUT})	600 Ω
Current Limit	8mA (V_{OUT}), 30mA (I_{OUT})
Output Protection	
Short to Ground	Continuous
Transient	ANSI/IEEE C37.90.1
CMV, I/p to O/p, I/p to power	
Continuous	1500V rms max
Transient	ANSI/IEEE C37.90.1
CMV, O/p to Power	
Continuous	50V DC max
CMR (50Hz or 60Hz)	160dB
Accuracy	See Ordering Information
Adjustability	$\pm 3\%$ Zero & Span
Stability	
Input offset	$\pm 0.5\mu\text{V}/^{\circ}\text{C}$
Output offset	$\pm 6\text{ppm}/^{\circ}\text{C}$ (V_{OUT}), $\pm 20\text{ppm}/^{\circ}\text{C}$ (I_{OUT})
Gain	$\pm 40\text{ppm}/^{\circ}\text{C}$
Output Noise, 100KHz bandwidth	250 μVrms (V_{OUT}), 1 μArms (I_{OUT})
Bandwidth, -3dB	3Hz
NMR	95dB at 60Hz, 85dB at 50Hz
Response Time, 90% span	165ms
Open Input Response	Upscale
Open Input Detection Time	<5s
Power Supply Typical Voltage	24V DC(15 to 30VDC)
Power Supply Current	25mA (V_{OUT}), 55mA (I_{OUT})
Power Supply Sensitivity	$\pm 0.0001\%/%$
Power Supply Protection	
Reverse Polarity	Continuous
Transient	ANSI/IEEE C37.90.1
Environmental	
Operating Temp. Range	-40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$
Storage Temp. Range	-40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A $\pm 0.05\%$ Span Error
ESD,EFT, Surge, Voltage Dips	Performance B
Mechanical Dimensions	2.95" x 0.89" x 4.13"
(h) (w) (d)	(75mm x 22.5mm x 105mm)
Mounting	DIN EN 50022-35x7.5 or -35x15 rail

NOTES:

(1) Includes conformity, hysteresis, repeatability and CJC error

Model	TC Type	Input Range	Output Range	Accuracy ¹
DSCIA47J-01	J	0 to +760 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +1400 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.08\%$ $\pm 0.61^{\circ}\text{C}$
DSCIA47J-02	J	-100 $^{\circ}\text{C}$ to +300 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +572 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.08\%$ $\pm 0.32^{\circ}\text{C}$
DSCIA47J-03	J	0 $^{\circ}\text{C}$ to +500 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +932 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.07\%$ $\pm 0.35^{\circ}\text{C}$
DSCIA47K-04	K	0 $^{\circ}\text{C}$ to +1000 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +1832 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.08\%$ $\pm 0.80^{\circ}\text{C}$
DSCIA47K-05	K	0 $^{\circ}\text{C}$ to +500 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +932 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.08\%$ $\pm 0.40^{\circ}\text{C}$
DSCIA47K-13	K	-100 $^{\circ}\text{C}$ to +1350 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +2462 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.08\%$ $\pm 1.16^{\circ}\text{C}$
DSCIA47K-14	K	0 $^{\circ}\text{C}$ to +1200 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +2192 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.08\%$ $\pm 0.96^{\circ}\text{C}$
DSCIA47T-06	T	-100 $^{\circ}\text{C}$ to +400 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +752 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.16\%$ $\pm 0.80^{\circ}\text{C}$
DSCIA47T-07	T	0 $^{\circ}\text{C}$ to +200 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +392 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.13\%$ $\pm 0.26^{\circ}\text{C}$
DSCIA47E-08	E	0 $^{\circ}\text{C}$ to +1000 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +1832 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.10\%$ $\pm 1.00^{\circ}\text{C}$
DSCIA47R-09	R	+500 $^{\circ}\text{C}$ to +1750 $^{\circ}\text{C}$ (+932 $^{\circ}\text{F}$ to +3182 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.10\%$ $\pm 1.25^{\circ}\text{C}$
DSCIA47S-10	S	+500 $^{\circ}\text{C}$ to +1750 $^{\circ}\text{C}$ (+932 $^{\circ}\text{F}$ to +3182 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.10\%$ $\pm 1.25^{\circ}\text{C}$
DSCIA47B-11	B	+500 $^{\circ}\text{C}$ to +1800 $^{\circ}\text{C}$ (+932 $^{\circ}\text{F}$ to +3272 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.15\%$ $\pm 1.95^{\circ}\text{C}$
DSCIA47N-15	N	-100 $^{\circ}\text{C}$ to +1300 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +2372 $^{\circ}\text{F}$)	2,3,4,5,7	$\pm 0.08\%$ $\pm 1.12^{\circ}\text{C}$

Output Ranges Available

Output Range	Part No. Suffix	Example
2. 0V to +10V	NONE	DSCIA47-04
3. 4 to 20mA	C	DSCIA47-04C
4. 0 to 20mA	E	DSCIA47-04E
5. 0 to 5V	A	DSCIA47-04A
7. 1 to 5V	F	DSCIA47-04F

Thermocouple Alloy Combinations

Standard DIN IEC 584, ANSIMC96-1-82, JISC-1602-1981

Type	Material
J	Iron Vs. Copper-Nickel
K	Nickel-Chromium Vs. Nickel-Aluminum
T	Copper Vs. Copper-Nickel
E	Nickel-Chromium Vs. Copper-Nickel
R	Platinum-13% Rhodium Vs. Platinum
S	Platinum-10% Rhodium Vs. Platinum
B	Platinum-30% Rhodium Vs. Platinum-6% Rhodium
N	Nickel-14.2% Chromium-1.4% Silicon Vs. Nickel-4.4% Silicon-0.1% magnesium

Dimensioned drawing

