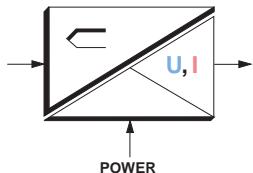


Configurable Temperature Measuring Transducers for Thermocouple Type J,K MCR-TE-JK-...

- Temperature range can be set using DIP switches
- ZERO/SPAN adjustment
- Open circuit detection
- Available with electrically isolated input



1. Description

MCR-TE temperature measuring transducers convert thermocouple signals (IEC 584-1/EN 60 584-1), types J (Fe-CuNi) and K (NiCr-Ni), into electrically standardized analog signals.

Cold junction compensated connection terminals are available for the accurate detection of sensor signals. The switchable cold junction enables external cold junction or differential temperature detection. Standardized voltage and current signals are available on the output side. An additional service is provided by the thermal open circuit indication via LEDs. The output circuit provides a corresponding analog signal.

Devices with current or voltage output and with an electrically isolated input are available.

Temperature measuring transducers for thermocouple type K and J, current output 0...20 or 4...20 mA or voltage output 0...10 V.

The various temperature ranges 0...400°C (32...752°F), 0...800°C (32...1472°F), 0...1000°C (32...1832°F), 0...1200 °C (32...2192°F) can be set using DIP switches.

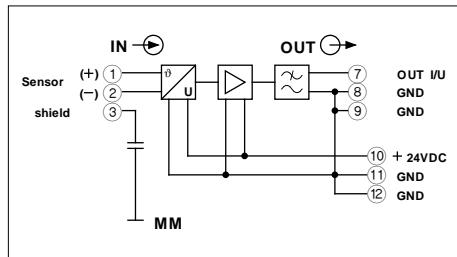
The devices are configured as desired and are always adjusted upon delivery. In addition, the adjustment potentiometers, which can be accessed on the front, offer the option of carrying out a measured distance adjustment (ZERO/SPAN) of $\pm 5\%$. If no

specification has been made in the order key on the last page, the devices are delivered with the default setting (type K, 0...1000°C (32...1832°F) and 0...10 V or 4...20 mA).

To remove disturbing pulses, the functional earth contact, integrated in the housing, connects the signal ground of the module electronics to the DIN rail, which is at ground potential. This means that the shield can be easily installed on the module and the use of an additional earth terminal is no longer required.

Modules are connected to symmetrical EN 50 022 DIN rails using plug-in COMBICON connectors.

2. Technical Data



	M 3	8
	fixed [mm ²]	flexible AWG
Connection data	0.2-2.5	0.2-2.5 24-14

MCR-TE-JK...
with signal conversion: Thermocouple type J, K;
0...400°C/0...800°C/0...1000°C/0...1200°C
(32...752°F/32...1472°F/32...1832°F/32...2192°F)
0...10 V, 0...20 mA or 4...20 mA

Housing width 17.5 mm (0.689 in.)



Description	Output signal U_A/I_A
MCR temperature measuring transducer, for thermocouple type J, K; Input:0-400°C (32-725°F), 0-800°C (32-1472°F), 0-1000°C (32-1832°F), 0-1200°C (32-2192°F)	0...10 V 0(4)...20 mA

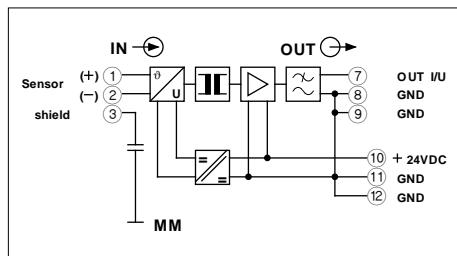
Type	Order No.	Pcs./Pkt.
MCR-TE-JK-U ¹⁾	28 10 53 1	1
MCR-TE-JK-I ¹⁾	28 10 54 4	1

¹⁾ Specify configuration (see order key on the last page)

Technical Data	
Input	
Input	
Temperature range	
Connection method	
Output	
Output signal	0...10 V
Maximum output signal	0(4)...20 mA
Load	$\geq 10 \text{ k}\Omega$
Output signal on open circuit	$> 11 \text{ V}$
General Data	
Supply voltage	18...30 V DC
Maximum current consumption	20 mA
Transmission error:	$\leq 1.2\%$ of the final value
	$\leq 2.0\%$ of the final value
	(At 0...400°C and 0...800°C [32...752°F and 32...1472°F])
	$< 2.5\%$ of the final value
	(At 0...1000°C and 0...1200°C [32...1832°F and 32...2192°F])
	$\leq 0.02\%/\text{K}$
	$\pm 2.5^\circ\text{C}$ (36.5°F) typical, 4.0°C (39.2°F)
	maximum
	$\pm 60 \text{ K}$
	$\pm 5\%$ F.S.
Adjustment:	ZERO
	SPAN
Limit frequency	30 Hz
Step-response (10-90%)	11.5 ms
Test voltage:	–
Ambient temperature range	–
	-20°C to +65°C (-4°F to 149°F)

MCR-TE-JK-U	MCR-TE-JK-I
Thermocouple type J, K; 0...400°C, 0...800°C, 0...1000°C and 0...1200°C (32...752°F, 32...1472°F, 32...1832°F and 32...2192°F)	Plug-in screw-clamp connection
0...10 V	0(4)...20 mA
15 V	30 mA
$\geq 10 \text{ k}\Omega$	$\leq 500 \text{ }\Omega$
$> 11 \text{ V}$	$> 22 \text{ mA}$
18...30 V DC	18...30 V DC
20 mA	50 mA
$\leq 1.2\%$ of the final value	
$\leq 2.0\%$ of the final value	
(At 0...400°C and 0...800°C [32...752°F and 32...1472°F])	
$< 2.5\%$ of the final value	
(At 0...1000°C and 0...1200°C [32...1832°F and 32...2192°F])	
$\leq 0.02\%/\text{K}$	
$\pm 2.5^\circ\text{C}$ (36.5°F) typical, 4.0°C (39.2°F)	
maximum	
$\pm 60 \text{ K}$	
$\pm 5\%$ F.S.	
30 Hz	
11.5 ms	
–	
–	
-20°C to +65°C (-4°F to 149°F)	

Configurable Temperature Measuring Transducers for Thermocouple Type J,K – MCR-TE-JK...



	fixed [mm ²]	flexible AWG
Connection data	0.2-2.5	0.2-2.5 24-14

Housing width 17.5 mm (0.689 in.)



MCR-TE-JK-...-E

with signal conversion: Thermocouple type J, K;
0...400°C/0...800°C/0...1000°C/0...1200°C
(32...752°F/32...1472°F/32...1832°F/32...2192°F)
0...10 V, 0...20 mA or 4...20 mA

Description	Output signal U_A/I_A
MCR temperature measuring transducer, As above. Input electrically isolated	0...10 V 0(4)...20 mA

Type	Order No.	Pcs. Pkt.
MCR-TE-JK-U-E ¹⁾	28 10 51 5	1
MCR-TE-JK-I-E ¹⁾	28 10 52 8	1

¹⁾ Specify configuration (see order key on the last page)

Technical Data

Input	
Input	
Temperature range	
Connection method	
Output	
Output signal	
Maximum output signal	
Load	
Output signal on open circuit	
General Data	
Supply voltage	18...30 V DC
Maximum current consumption	20 mA
Transmission error:	
	Type K
	Type J
Temperature coefficient	
Cold junction error	
Adjustment:	ZERO SPAN
Limit frequency	
Step-response (10-90%)	
Test voltage:	
Ambient temperature range	

MCR-TE-JK-U-E

Thermocouple type J, K;
0...400°C, 0...800°C, 0...1000°C and 0...1200°C
(32...752°F, 32...1472°F, 32...1832°F and 32...2192°F)
Plug-in screw-clamp connection

0...10 V	0(4)...20 mA
15 V	30 mA
$\geq 10 \text{ k}\Omega$	$\leq 500 \Omega$
$> 11 \text{ V}$	$> 22 \text{ mA}$

18...30 V DC	18...30 V DC
20 mA	50 mA
$\leq 1.2\%$ of the final value	
$< 2.0\%$ of the final value	
(At 0...400°C and 0...800°C (32...752°F and 32...1472°F))	
$< 2.5\%$ of the final value	
(At 0...1000°C and 0...1200°C (32...1832°F and 32...2192°F))	
$\leq 0.02\%/\text{K}$	
$\pm 2.5^\circ\text{C}$ (36.5°F) typical, 4.0°C (39.2°F)	
maximum	
$\pm 60 \text{ K}$	
$\pm 5\%$ F.S.	
30 Hz	
11.5 ms	
1.5 kV, 50 Hz, 1 minute	
1.5 kV, 50 Hz, 1 minute	
-20°C to +65°C (-4°F to 149°F)	

CE

Conforms to the EMC Directive 89/336/EEC and the
Low Voltage Directive 73/23/EEC

EMC (electromagnetic compatibility)

Noise immunity in accordance with 50082-2

- Electrostatic discharge (ESD)

EN 61000-4-2

8 kV air discharge²⁾

- Electromagnetic HF field

Amplitude modulation
Pulse modulation

ENV 50140
ENV 50140

3 V/m³⁾
3 V/m³⁾

- Fast transients (burst)

EN 61000-4-4

Input/output/supply:
2 kV/5 kHz²⁾

- Surge current load (surge)

ENV 50142

Input/output: 2 kV/42 Ω²⁾

- Conducted interference

ENV 50141

Input/output/supply:
10 V¹⁾

Noise emission in accordance with EN 50081-2

EN 55011

Class A

EN 61000 corresponds to IEC 1000/

EN 55011 corresponds to CISPR11

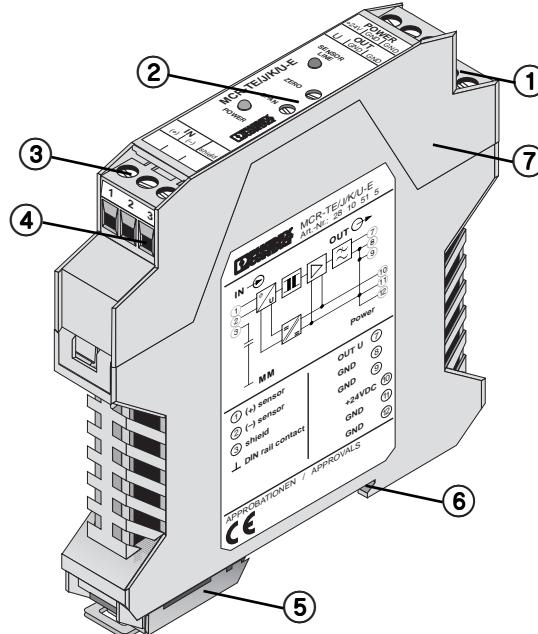
¹⁾Criterion A: normal operating characteristics within the specified limits.

²⁾Criterion B: temporary adverse effects on the operating characteristics, which the device corrects itself.

Class A: industrial application without special installation measures

MCR-TE-JK... – Configurable Temperature Measuring Transducer for Thermocouple Type J,K

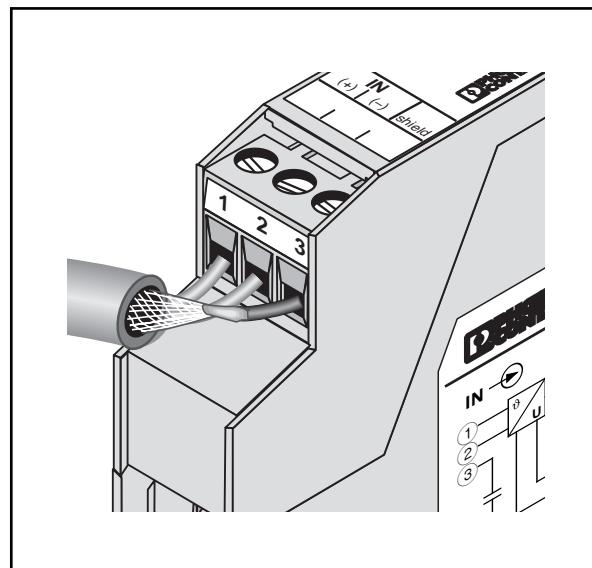
- ① Plug-in screw-clamp terminals (COMBICON)
- ② Zero/span potentiometer
- ③ Plug-in screw-clamp terminals (COMBICON)
- ④ Shield connection (on terminal 3)
- ⑤ Metal lock for fastening on the DIN rail
- ⑥ Functional earth contact
- ⑦ Housing cover, can be removed for DIP switch setting



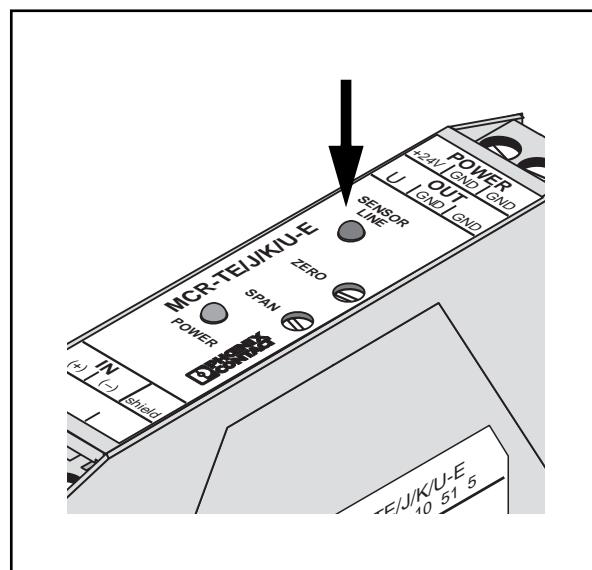
3. Connection and Operating Instructions

Sensor Type	Temperature Range
Type K (NiCr/Ni)	0 ... 400°C (32...752°F)
Type J (Fe/CuNi)	0 ... 800°C (0...1472°F)
	0 ... 1000°C (0...1832°F)
	0 ... 1200°C (32...2192°F)

Shield clamp "3" is connected with a capacitor using the function earth contact to the **DIN rail, which is at ground potential**. Any disturbing pulses that occur are diverted.

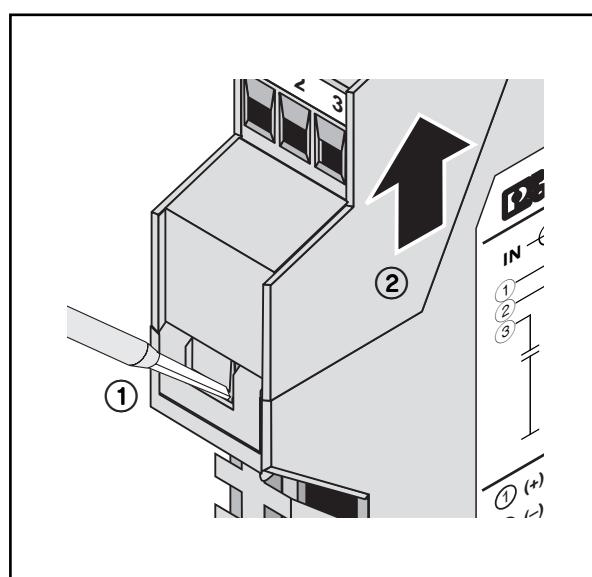


If an **open circuit** occurs, the output is overridden and the red "Sensor Line" LED lights up.



Opening the Device

The locked housing cover is released on both sides using a screwdriver①. The housing cover and electronics can only be pulled out about 3 cm (1.181 in.) ②.



4. Configuration

The basic settings of your device (sensor type, temperature range, cold junction) can be set using a labeled DIP switch inside the housing corresponding to the configuration table.

Note: Zero/span adjustment must be carried out after every input, temperature range or output change.

4.1. Zero/Span Adjustment

Required device:

Calibration source volt or amp meter

- Connect a 24 V supply voltage to terminals "10" and "11". The "Power" and "Sensor Line" LEDs must light up.



Allow the module to warm up for 12 minutes before starting the adjustment procedure.

- Connect the calibration source to the input terminals IN+ "1" and IN- "2" and specify a voltage of 0 mV. The "Sensor Line" LED should no longer be lit.
- Two potentiometers are available on the front side of the module for adjustment:
ZERO: zero point adjustment
SPAN: final value adjustment

d) Zero point adjustment:

- Specify a default value depending on the sensor type using the calibration source (see table: Zero point adjustment).
- Set the output signal value (U_{OUT} or I_{OUT}) using the zero potentiometer.

e) Final value adjustment

- Specify a default value depending on the sensor type and temperature range using the calibration source (see table: Final value adjustment).
- Set the output signal value (U_{OUT} or I_{OUT}) using the span potentiometer.

Note: Repeat points d) and e).

Zero/span adjustment is completed.

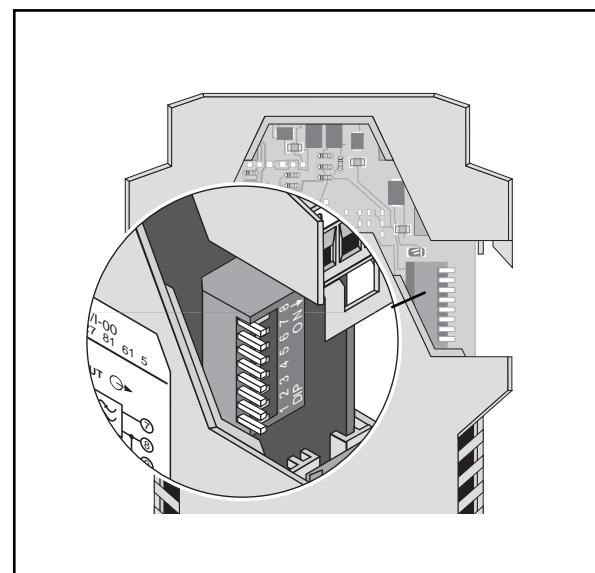


Table: Configuration

DIP Switch	S1	S2	S3	S4	S5	S6	S7	S8
Input	Type K OFF							
	Type J ON							
Temperature Range	0 ... 400°C (32...752°F)	OFF	OFF	OFF				
	0 ... 800°C (32...1472°F)	ON	OFF	OFF				
	0 ... 1000°C (32...1832°F)	ON	OFF	ON				
	0 ... 1200°C (32...2192°F)	ON	ON	OFF				
Cold Junction								
Output	0 ... 10 V							
	0 ... 20 mA						OFF	ON
	4 ... 20 mA						ON	OFF

Table: Zero point adjustment

Sensor Type	Temperature Range	Default Value	Output Range		
			0 ... 10 V	0 ... 20 mA	4 ... 20 mA
Type K	0...400°C (32...752°F) 0...800°C (32...1472°F) 0...1000°C (32...1832°F) 0...1200°C (32...2192°F)	39 µV	25 mV 12 mV 10 mV 8 mV	50 µA 25 µA 20 µA 17 µA	4040 µA 4020 µA 4016 µA 4013 µA
Type J	0...400°C (32...752°F) 0...800°C (32...1472°F) 0...1000°C (32...1832°F) 0...1200°C (32...2192°F)	50 µV	25 mV 12 mV 10 mV 8 mV	50 µA 25 µA 20 µA 17 µA	4040 µA 4020 µA 4016 µA 4013 µA

Table: Final value adjustment

Sensor Type	Temperature Range	Default Value	Output Range	
			0 ... 10 V	0 (4)... 20 mA
Type K	0...400°C (32...752°F) 0...800°C (32...1472°F) 0...1000°C (32...1832°F) 0...1200°C (32...2192°F)	16.34 mV 33.07 mV 41.35 mV 49.28 mV	10000 V	20000 mA
Type J	0...400°C (32...752°F) 0...800°C (32...1472°F) 0...1000°C (32...1832°F) 0...1200°C (32...2192°F)	21.69 mV 44.84 mV 56.85 mV 68.39 mV	10000 V	20000 mA

4.2. Cold Junction Adjustment

If you have ordered a device with an activated cold junction, it is already adjusted. Evaluation of differential temperatures: the cold junction adjustment is not required, since the cold junction must be switched off. Detection of absolute temperatures: the cold junction must be switched on and is adjusted as follows:

- Put DIP switches S5 and S6 into the ON position.
- Measure the temperature T_{clamp} [$^{\circ}\text{C}$] in the clamping part of input signal terminal "3".
- Calculate the measured temperature T_{clamp} according to the calculation instructions in the output value (U_{off} , or I_{off}) (see equations: output range 0...10 V or 0...20 mA).

The specifications for the calculation (measuring range, $T_{\text{correction}}$) can be found in the table: Specifications for adjustment calculation.

Specifications for Adjustment Calculation			
Sensor Type	Temperature Range	Measuring Range	$T_{\text{correction}}$
Type K	0...400°C (32...752°F)	400 K	0.5 K
	0...800°C (32...1472°F)	800 K	1.0 K
	0...1000°C (32...1832°F)	1000 K	1.0 K
	0...1200°C (32...2192°F)	1200 K	0.5 K
Type J	0...400°C (32...752°F)	400 K	1.5 K
	0...800°C (32...1472°F)	800 K	2.2 K
	0...1000°C (32...1832°F)	1000 K	2.6 K
	0...1200°C (32...2192°F)	1200 K	2.7 K

- Output range 0...10 V

$$U_{\text{off}} = \frac{10 \text{ V} \cdot (T_{\text{clamp}} - T_{\text{correction}})}{\text{Measuring range}}$$

- Output range 0...20 mA

$$I_{\text{off}} = \frac{20 \text{ mA} \cdot (T_{\text{clamp}} - T_{\text{correction}})}{\text{Measuring range}}$$

- Output range 4...20 mA

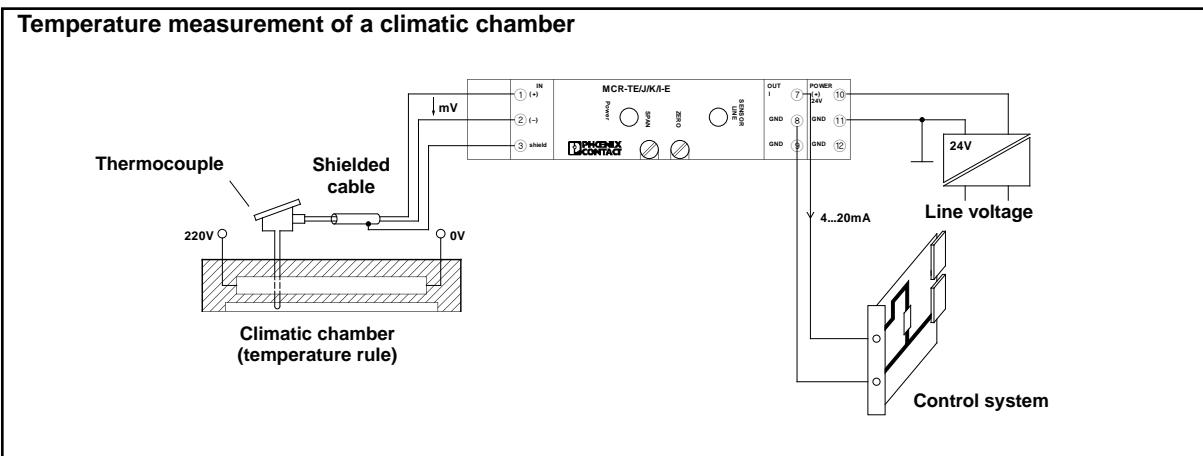
$$I_{\text{off}} = 4 \text{ mA} + \frac{16 \text{ mA} \cdot (T_{\text{clamp}} - T_{\text{correction}})}{\text{Measuring range}}$$

5. Order Key for the Configurable Thermocouple Measuring Transducers MCR-TE-JK...

Standard configuration	Sensor type ²⁾	Cold junction compensation ²⁾	Temperature range ²⁾	Output signal ²⁾
MCR-TE-JK-I	/ K	/ 1	/ 3	/ 2
MCR-TE-JK-U	J ≡ Type J	0 ≡ switched off	1 ≡ 0-400°C (32-752°F)	1 ≡ 0-20 mA
MCR-TE-JK-U-E	K ≡ Type K	1 ≡ switched on	2 ≡ 0-800°C (32-1472°F)	2 ≡ 4-20 mA
MCR-TE-JK-I			3 ≡ 0-1000°C (32-1832°F)	
MCR-TE-JK-I-E			4 ≡ 0-1200°C (32-2192°F)	

²⁾ If no specification is given, the devices are delivered with the standard configuration (type K, 0-1000°C [32-1832°F] and 0-10 V or 4-20 mA).

6. Application Example





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помошь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помошь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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