

#### Characteristics

The Series 92 with its short stroke pushbuttons, making it especially suited for:

PCB mounting

This series can be used to replace a membrane keypad if only a few buttons are needed.

#### Functions

The Series 92 incorporates the following functions:

- Indicator
- Pushbutton
- Illuminated pushbutton

#### Market segments

The EAO Series 92 is especially suited for applications in the segments:

- Machinery and Automation
- Medicinal technology
- Laboratory and measuring equipment

Please refer to the EAO website to obtain detailed information regarding this series **www.products.eao.com** Configure a product to your exact needs and request a quotation.



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# Indicator



Product can differ from the current configuration.

#### Additional Information

- Transparent lens and pressure plate
- IP 67 version without bezel



Dimensions



Equipment coust of (schematic overview)Image: Colspan="2">LensImage: Colspan="2">ActuatorImage: Colspan="2">BezelImage: Colspan="2">Fixing nutImage: Colspan="2">Actuator overview)Image: Colspan="2">ActuatorImage: Colspan="2">Ac

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.

Mounting cut-outs

Front protection	Front	Pressure plate	Lens	Part No.	Weight
	ator actuator, Front dim	ension 18.8 x 18.8 mm			
P 67	Plastic white	Plastic red		92-043.200	0.003 k
		Plastic orange		92-043.300	0.003 kg
		Plastic yellow		92-043.400	0.003 kę
		Plastic green		92-043.500	0.003 kg
		Plastic blue		92-043.600	0.003 kg
		Plastic colourless		92-043.700	0.003 kg
	Plastic black	Plastic red		92-143.200	0.003 kę
		Plastic orange		92-143.300	0.003 kç
		Plastic yellow		92-143.400	0.003 kg
		Plastic green		92-143.500	0.003 kg
		Plastic blue		92-143.600	0.003 kg
		Plastic colourless		92-143.700	0.003 kç
Indic:	ator actuator, Front dim	ension 18.4 x 18.4 mm			
IP 40	Plastic white		Plastic smoked	92-058.100	0.003 kg
			Plastic red	92-058.200	0.003 kg
			Plastic orange	92-058.300	0.003 kg
			Plastic yellow	92-058.400	0.003 kg
			Plastic green	92-058.500	0.003 kg
			Plastic blue	92-058.600	0.003 kg
			Plastic colourless	92-058.700	0.003 kg

Front protection	Front	Pressure plate	Lens	Part No.	Weight
IP 40	Plastic black		Plastic smoked	92-158.100	0.003 kg
			Plastic red	92-158.200	0.003 kg
			Plastic orange	92-158.300	0.003 kg
			Plastic yellow	92-158.400	0.003 kg
			Plastic green	92-158.500	0.003 kg
			Plastic blue	92-158.600	0.003 kg
			Plastic colourless	92-158.700	0.003 kg

# Pushbutton



Product can differ from the current configuration.

#### Additional Information

- Lens opaque
- IP 67 version without bezel



Dimensions





Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.

Mounting	cut-outs
mounting	our ouro

Front protection	Front	Pressure plate	Lens	Switching action	Part No.	Wiring diagram	Weight
Pu Pu	shbutton actuato	or, Front dimension 1	8.8 x 18.8 mm				
IP 67	Plastic white	Plastic black		В	92-341.000	1	0.002 kg
		Plastic grey		В	92-341.800	1	0.002 kg
	Plastic black	Plastic black		В	92-441.000	1	0.002 kg
		Plastic grey		В	92-441.800	1	0.002 kg
		or, Front dimension 1					
IP 40	Plastic white		Plastic black	B	92-356.000	1	
							0.002 kg
			Plastic grey	B	92-356.800	1	0.002 kg 0.002 kg
			Plastic grey Plastic white		92-356.800 92-356.900		-
	Plastic black			В		1	0.002 kg
	Plastic black		Plastic white	B B	92-356.900	1	0.002 kg

Switching action: B = Momentary

E----Wiring diagram 1

# Illuminated pushbutton





#### Dimensions

Mounting cut-outs





Product can differ from the current configuration.

#### Additional Information

- Transparent lens and pressure plate •
- IP 67 version without bezel •

Each Part Number listed below includes all the black	
components shown in the 3D-drawing.	

To obtain a complete unit, please select the red components from the pages shown.

Front protection	Front	Pressure plate	Lens	Switching action	Part No.	Wiring diagram	Weight
	minated pushbut	tton actuator, Front c	limension 18.8 )	< 18.8 mm			
P 67	Plastic white	Plastic red		В	92-343.200	1	0.003 k
		Plastic orange		В	92-343.300	1	0.003 k
		Plastic yellow		В	92-343.400	1	0.003 k
		Plastic green		В	92-343.500	1	0.003 k
		Plastic blue		В	92-343.600	1	0.003 k
		Plastic colourless		В	92-343.700	1	0.003 k
	Plastic black	Plastic red		В	92-443.200	1	0.003 k
		Plastic orange		В	92-443.300	1	0.003 k
		Plastic yellow		В	92-443.400	1	0.003 k
		Plastic green		В	92-443.500	1	0.003 k
		Plastic blue		В	92-443.600	1	0.003 k
		Plastic colourless		В	92-443.700	1	0.003 k



Illuminated pushbutton actuator, Front dimension 18.4 x 18.4 mm
---

IP 40	Plastic white	Plastic smoked	В	92-358.100	1	0.003 kg
		Plastic red	В	92-358.200	1	0.003 kg
		Plastic orange	В	92-358.300	1	0.003 kg
		Plastic yellow	В	92-358.400	1	0.003 kg
		Plastic green	В	92-358.500	1	0.003 kg
		Plastic blue	В	92-358.600	1	0.003 kg
		Plastic colourless	В	92-358.700	1	0.003 kg

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Front protection	Front	Pressure plate	Lens	Switching action	Part No.	Wiring diagram	Weight
IP 40	Plastic black		Plastic smoked	В	92-458.100	1	0.003 kg
			Plastic red	В	92-458.200	1	0.003 kg
			Plastic orange	В	92-458.300	1	0.003 kg
			Plastic yellow	В	92-458.400	1	0.003 kg
			Plastic green	В	92-458.500	1	0.003 kg
			Plastic blue	В	92-458.600	1	0.003 kg
			Plastic colourless	В	92-458.700	1	0.003 kg

Switching action: B = Momentary



## Indicator actuator IP 67





#### Dimensions

Mounting cut-outs



Product can differ from the current configuration.

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.

Front		Part No.	Weight
	Indicator actuator IP 67, Front dimension 18.8 x 18.8 mm		
Plastic black		92-140.000	0.003 kg

# **Pushbutton actuator IP 40**



Product can differ from the current configuration.



Dimensions



Equipment consisting of (schematic overview) page 14 Lens Actuator Bezel page 15 Fixing nut Mounting flange page 19 Switching elepage 16 ment

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.

Mounting cut-outs

Front	Switching action	Part No.	Wiring diagram	Weight
-				
Pushbutton ad	ctuator IP 40, Front dimension 18.4 x 18.4 mm			
Plastic white	ctuator IP 40, Front dimension 18.4 x 18.4 mm	92-350.000	1	0.003 kg

Switching action: B = Momentary



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# **Pushbutton actuator IP 67**



To obtain a complete unit, please select the red com-

ponents from the pages shown.

4 max. 3.4 IP 40 4 IP 67 V 12 3.6

Dimensions



Product can differ from the current configuration.

Mounting cut-outs

Front	Switching action	Part No.	Wiring diagram	Weight
Pushbutton	actuator IP 67, square 18.8 x 18.8 mm			
Plastic white	actuator IP 67, square 18.8 x 18.8 mm	92-340.000	1	0.003 kg

Switching action: B = Momentary



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# Illuminated pushbutton actuator IP 40







Dimensions



Equipment consisting of (schematic overview)					
Lens	page 14				
Actuator					
Bezel	page 15				
Fixing nut					
Mounting flange	page 19				
LED	page 18				
Switching ele- ment	page 16				
	Lens Actuator Bezel Fixing nut Mounting flange LED Switching ele-				

Each Part Number listed below includes all the black components shown in the 3D-drawing.

Mounting cut-outs

To obtain a complete unit, please select the red components from the pages shown.

Front	Switching action	Part No.	Wiring diagram	Weight
Illuminated pu	ushbutton actuator IP 40, Front dimension 18.4 x 18.4 mm			
Plastic white	ushbutton actuator IP 40, Front dimension 18.4 x 18.4 mm	92-350.000	1	0.003 kg

Switching action: B = Momentary



# Illuminated pushbutton actuator IP 67





#### Dimensions

Mounting cut-outs



Product can differ from the current configuration.

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.

Front	Switching action	Part No.	Wiring diagram	Weight
5				
Illuminated	pushbutton actuator IP 40, square 18.8 x 18.8 mm			
Plastic white	pushbutton actuator IP 40, square 18.8 x 18.8 mm	92-340.000	1	0.003 kg

Switching action: B = Momentary



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# 92 Accessories

# Front

# Lens plate IP 67

- Additional Information
- Material plastic

Product attribute	Dimension	Pressure plate	Part No.	Weight
Lens plate for	pushbutton and indicator IP 67		92-941.000	0.001 kg
non-murninative	12 X 12 MM	black opaque	92-941.000	0.001 kg
		grey opaque		
illuminative	12 x 12 mm	red transparent	92-941.200	0.001 kg
		orange transparent	92-941.300	0.001 kg
		yellow transparent	92-941.400	0.001 kg
		green transparent	92-941.500	0.001 kg
		blue transparent	92-941.600	0.001 kg

# Lens IP 40

#### Additional Information

- Material plastic
- With white marking plate

Product attribute	Dimension	Lens	Part No.	Weight
Lens for pushb	utton and indicator IP 40			
non-illuminative	13.2 x 13.2 mm	black opaque	92-956.000	0.001 kg
		grey opaque	92-956.800	0.001 kg
		white opaque	92-956.900	0.001 kg
lluminative	13.2 x 13.2 mm	red translucent	92-956.200	0.001 kg
		orange translucent	92-956.300	0.001 kg
		yellow translucent	92-956.400	0.001 kg
		green translucent	92-956.500	0.001 kg
		blue translucent	92-956.600	0.001 kg
		smoked transparent	92-958.100	0.001 kg
		red transparent	92-958.200	0.001 kg
		orange transparent	92-958.300	0.001 kg
		yellow transparent	92-958.400	0.001 kg
		green transparent	92-958.500	0.001 kg
		blue transparent	92-958.600	0.001 kg
		colourless transparent	92-958.700	0.001 kg

# Bezel IP 40

Material	Colour	Part No.	Weight
Front bezel for pushbutton and indicator IP 4	10		
Plastic	black	92-912.0	0.001 kg
	white	92-912.9	0.001 kg

# Blind plug



Mounting cut-outs

Dimension	Material	Colour	Part No.	Weight
Blind plug				
18 x 18 mm	Plastic	black	51-948.0	0.003 kg



# Rear side

## **Illumination element PCB**

#### Additional Information

• The customer has to decide what series resistor shall be used to the LED



Dimensions

Terminal		Part No.	Compo- nent layout	Weight
	Illumination element PCB mounting			
PCB		92-800.042	1	0.001 kg

The component layouts you will find from page {\$I=BR92\_KAZE\_Zeichnung}

# Switching element PCB illuminative

#### Additional Information

 The customer has to decide what series resistor shall be used to the LED



Dimensions



The component layouts you will find from page {\$I=BR92\_KAZE\_Zeichnung}



## Spacer

#### Additional Information

- Adjustable for front plate thickness of 2/2.5/3/3.5/4 mm
- When fitting, ensure that back of panel is free of grease and dirt

Part No.	Weight
Spa	acer
92-965.0	0.003 kg

## **PCB** assembled

#### Additional Information

 For discrete switching applications including switching element and mounting flange, soldering terminal (assembled PCB incl. series resistor and LED on request)





# Illumination

# Single-LED, T1 Bi-Pin

#### Additional Information

- The customer has to decide what series resistor shall be used to the LED
- Luminosity and wave length scattering caused by LED manufacturing processes may cause slight variations in the illumination

LED colour	Forward voltage typ.	Lumi. intensity	Dom. wavelength	Part No.	Weight	
Single-LED						
•		200 mcd	625 nm	10-2602 32021	0.001 kg	
Single-LED red	2.1 VDC @ 20 mA	200 mcd	625 nm	10-2602.3202L	0.001 kg	
•		200 mcd 220 mcd	625 nm 590 nm	10-2602.3202L 10-2602.3203L	0.001 kg 0.001 kg	
Single-LED red	2.1 VDC @ 20 mA				Ŭ	
Single-LED red Single-LED orange	2.1 VDC @ 20 mA 2.1 VDC @ 20 mA	220 mcd	590 nm	10-2602.3203L	0.001 kg	
Single-LED red Single-LED orange Single-LED yellow	2.1 VDC @ 20 mA 2.1 VDC @ 20 mA 3.3 VDC @ 20 mA	220 mcd 500 mcd	590 nm 570 nm	10-2602.3203L 10-2602.3204L	0.001 kg 0.001 kg	

# Mounting

# Anti-twist ring

# Additional Information

• For front panel thickness max. 2 mm



# Mounting flange



Dimensions



## Lens remover

#### Additional Information

• For lens IP 40 only

Part No.		Weight
	ens remover	
18-910		0.002 kg

# 92 Accessories

# **Mounting tool**

### Additional Information

• For tightening or loosening of the fixing nut

Part No.	Weight
Mounting tool	
01-907	0.020 kg

## **Dismantling tool**

#### Additional Information

• For actuator dismantling of switching element, illumination element and mounting flange



# Drawings



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# 92 Technical data

## Pushbutton and Illuminated pushbutton

#### Switching system

Short-travel switching system with 2 independent contact points and tactile operation. Guarantees reliable switching even of very light loads. Fitted with 1 normally open contact.

## Material

Lens Polycarbonate (PC)

Front bezel Thermoplastic Elastomer (TPE)

Frame Thermoplastic Polyester (PBT)

Material of contact Gold (Au)

Switching element Thermoplastic Polyester (PET, PBT) and Polyacetale (POM)

Actuator housing Thermoplastic Polyester (PBT)

### **Mechanical characteristics**

**Tightening torque** Fixing screw 40 Ncm recommended Fixing nut max. 50 Ncm

Actuating force 2.7 N ±1 N measured at the switching element 5 N measured at the lens

Actuating travel Switching element 0.4 mm

**Rebound time** ≤ 1 ms

**Resistance to heat of soldering** 250 °C, 3 s (PCB assembly) 320 °C, 3 s (when using a soldering iron)

Mechanical lifetime ≥ 1 Million operations as per IEC 60512-5-9a

### **Electrical characteristics**

Contact resistance Starting value (initial)  $\leq 100 \text{ m}\Omega$  as per IEC 60512-2-2b

EAO reserves the right to alter specifications without further notice.

### Isolation resistance

 $\geq 10^{9}\Omega$  between all terminals at 100 VDC, as per IEC 60512-2-3a

#### **Electrical life**

 $\geq$  500 000 operations at 42 VDC, 50 mA as per IEC 60512-5-9c. When attention is paid to the direction of current flow from terminal 3/4 to 1/2 the electrical life can be prolonged.

## Electrostatic discharge (ESD)

15kV

## Switch rating

Switching voltage min. 50 mV AC/DC max. 42 V AC/DC Switching current min. 10 µA AC/DC max. 100 mA AC/DC Power rating max. 2W

Electric strength 500 VAC, 50 Hz, 1 min, as per IEC 60512-2-4a

### **Environmental conditions**

#### **Storage temperature** -40 °C ... +80 °C

**Operating temperature** -25 °C ... +70 °C

Front protection Switching element IP 40 (fluxproof to DIN 41640 Part 84) front IP 67 or IP 40

## Shock resistance

(semi-sinusoidal) max. 500 m/s<sup>2</sup>, pulse width 11 ms, 3-axis, as per EN IEC 60068-2-27

**Vibration resistance** (sinusoidal) max. 100 m/s<sup>2</sup> at 10 Hz ... 500 Hz, 10 cycles, 3-axis, as per EN IEC 60068-2-6

### **Approvals**

Declaration of conformity CE

## **General notes**

If desired, the actuators of the series 92 can be supplied ready marked. With your order please enclose a list of the desired markings or a drawing, showing the type or size of script or the symbols desired.

### 1. Laser engraving (Fig. 1)

In addition to the most commonly used world languages, in DIN1451-3 close spacing, other typefaces are available as Scandinavian, Slavic, Greek, Russian and Polish. Red, blue and black lenses are filled with white colour. Other colour lenses are filled in black. Standard height of letters is 2 mm. If the height is not specified, we will supply 2 mm engraved letters.

#### 2. Hot stamping (Fig. 1)

For larger series it is worth considering markings by means of hot stamping. We will pleased to advise you. For letters and figures, typefaces with 2.5 mm, 3 mm and 4 mm are available.

### 3. Film inserts (Fig. 2)

Instead of using engraving, the actuator can be fitted with transparent film inserts. However, for this purpose the use of transparent lens caps is recommended. If smoked lens caps are used the lettering does not become visible until the LED is alight. Max. size of film insert  $11.4 \times 11.4 \text{ mm}$  for IP 40 10.4 x 10.4 mm for IP 67 Film thickness 0.2 mm.

All dimensions in mm

Height of letters h	Number of lines	Number of capital letters per line (target value)	Number of small letters per line (target value)
3	2	5-6	6
4	2	4	4
5	1	3	3-4
6	1	2-3	3
8	1	2	2

Fig. 1

Fig. 2







## **Suppressor circuits**

When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

Fig. 1 shows an inductive load with a free-wheeling diode connected in parallel. This free-wheeling diode provides a path for the inductor current to flow when the current is interrupted by the switch. Without this free-wheeling diode, the voltage across the coil will be limited only by dielectric breakdown voltages of the circuit or parasitic elements of the coil. This voltage can be kilovolts in amplitude even when nominal circuit voltages are low (e.g. 12 VDC) see Fig. 2.

The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current flowing through the load.

To get an efficient protection, the free-wheeling diode must be connected as close as possible to the inductive load!



### Note for soldering

### Process parameter for wave soldering

Basic specification for wave soldering J-STD 75 W4C

Maximum temperature on the component side of the pcb (Temperature must not exceed during the entire processing)	120 °C
Preheating phase (t1 t2) Ramp up	70 120 sec typ. + 1°C/sec
Ramp up to maximum temperature (t2 t3)	not defined
Maximum temperature on the soldering side (Temp 3) Maximum time of soldering process (t3 t4)	250 °C 3 sec
Ramp down at 170 °C:	typ. –2 °C/sec

#### Temperature curve wave soldering



# Iron soldering

Basic specification for iron soldering IEC 60068-2-20

Maximum	temperature at tip of iron:	320 °C
Maximum	soldering time:	3 sec

#### **Cleaning/Lacquering**

The switching elements are not sealed. Cleaning up the PCB may damage the contacts in the switching elements. For this reason, the following points should be noted:

- When soldering make sure that the flux does not pass on the upper side of the PCB.
- When cleaning the PCB with detergents ensure that no dust or other debris may get inside of the switching elements.
- Ensure that no lacquer penetrates into the interior of the switching element when lacquering the PCB.

### Storage of components

To obtain the optimum solderability of the components, the following points should be noted during storage:

- Do not store components in locations with high temperature or humidity.
- Do not expose components to corrosive gases.
- Avoid direct sunlight for a long period.

# 92 Application guidelines

## Arrangement mounting flange



The arrangement of the mounting flanges and their number is determined by the size of the front panel or PCB. To ensure uniform, tactile switching, we recommend a layout of the flanges as per adjacent sketch.

For large PCBs with several switching elements we recommend the following procedure:

- 1. Fit the actuator to the front panel.
- 2. Clip the mounting flange to the rear of the intended actuator.
- 3. Screw the PCB with the components soldered to it to the assembled mounting flange.

This arrangement applies to PCBs 1.6 mm thick.

### **Dismantling mounting flange**



The tool Part No. 92-971.0 must be used for removing the mounting flange from the actuator. Before removing the flange, the PCB fixing screws must be loosened.

If the number of actuators is insufficient, use the spacer Part. No. 92-965.0 which can be attached to the front panel.

The spacer can be adjusted to the following front panel thicknesses: 1.5/2/2.2/3/3.5/4 mm and can be stuck to the back of the panel free of dirt and grease.

## Index from Part No.

Index from	n Part N	0.	
Part No.	Page	Part No.	Page
01-907	20	92-458.200	o
10-2602.3202L		92-458.300	
10-2602.3203L		92-458.400	
10-2602.3204L		92-458.500	
10-2602.3205L		92-458.600	
10-2602.3206L		92-458.700	
10-2602.3200L		92-800.042	
10-2603.3209L		92-851.342	
10-2603.320AL		92-912.0	
18-910		92-912.9	
51-910		92-941.000	
51-948.0		92-941.200	
92-043.200		92-941.300	
92-043.300		92-941.400	
92-043.400		92-941.500	
92-043.500		92-941.600	
92-043.600		92-941.700	
92-043.700		92-941.800	
92-058.100		92-956.000	
92-058.200		92-956.200	
92-058.300		92-956.300	
92-058.400		92-956.400	
92-058.500		92-956.500	
92-058.600		92-956.600	
92-058.700		92-956.800	
92-140.000		92-956.900	
92-143.200		92-958.100	
92-143.300		92-958.200	
92-143.400		92-958.300	
92-143.500		92-958.400	
92-143.600		92-958.500	
92-143.700		92-958.600	
92-158.100		92-958.700	
92-158.200		92-960.0	
92-158.300		92-965.0	
92-158.400		92-971.0	
92-158.500		92-981.0	
92-158.600			
92-158.700	5		
92-340.000			
92-340.000	13		
92-341.000	6		
92-341.800	6		
92-343.200	7		
92-343.300	7		
92-343.400	7		
92-343.500	7		
92-343.600	7		
92-343.700	7		
92-350.000	10		
92-350.000	12		
92-356.000			
92-356.800			
92-356.900			
92-358.100			
92-358.200			
92-358.300			
92-358.400			
92-358.500			
92-358.600			
92-358.700			
92-440.000			
92-440.000			
92-441.000			
92-441.800			
92-443.200			
92-443.300			
92-443.400			
92-443.500			
92-443.600			
92-443.700			
92-450.000			
92-450.000			
92-456.000 92-456.800			
92-456.800			
92-458.100			
JC-4JU.100	0		



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

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- 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;
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- 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 помощь 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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