

# PHOTOCOUPLER DC92021 2

# PS8302L,PS8302L2

# 1 Mbps, HIGH CMR, ANALOG OUTPUT TYPE, 8 mm CREEPAGE 6-PIN SDIP PHOTOCOUPLER -NEPOC Series-

#### **DESCRIPTION**

The PS8302L and PS8302L2 are optical coupled isolators containing a GaAlAs LED on the input side and a PIN photodiode and a high-speed amplifier transistor on the output side on one chip.

The PS8302L and PS8302L2 are designed specifically for high supply voltage and high common mode transient immunity (CMR).

The PS8302L and PS8302L2 are in 6-pin plastic SDIP (Shrink Dual In-line Package). The PS8302L2 has 8 mm creepage distance and is half size of 8-pin DIP.

The PS8302L is lead bending type (Gull-wing) for surface mounting.

The PS8302L2 is lead bending type for long creepage distance (Gull-wing) for surface mount.

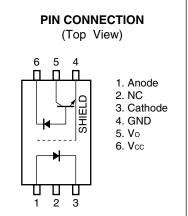
#### **FEATURES**

- High common mode transient immunity (CMH, CML =  $\pm 15 \text{ kV}/\mu \text{s MIN.}$ )
- · Half size of 8-pin DIP
- Long creepage distance (8 mm MIN. : PS8302L2)
- High supply voltage (Vcc = 35 V)
- High isolation voltage (BV = 5 000 Vr.m.s.)
- High-speed response (tphl = 0.8  $\mu$ s MAX., tplh = 0.8  $\mu$ s MAX.)
- Pb-Free product
- · Safety standards
  - UL approved: No. E72422
  - CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
  - DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40024069 (Option)

### **APPLICATIONS**

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- · Computer and peripheral manufactures
- · General purpose inverter
- · Substitutions for relays and pulse transformers
- Power supply

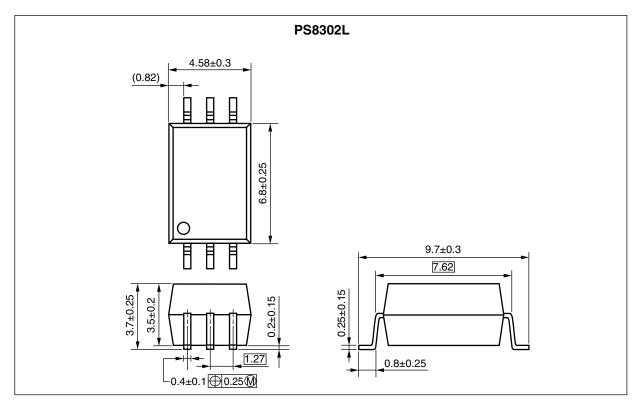


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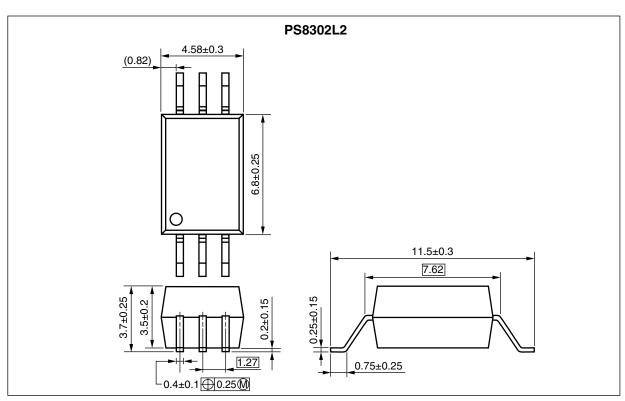
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## PACKAGE DIMENSIONS (UNIT: mm)

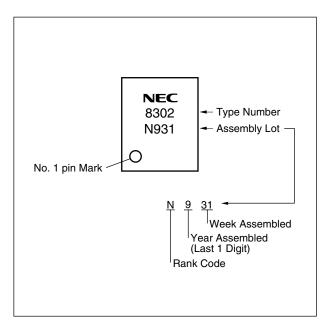
## Lead Bending Type (Gull-wing) For Surface Mount



## Lead Bending Type For Long Creepage Distance (Gull-wing) For Surface Mount



#### <R> MARKING EXAMPLE



#### PHOTOCOUPLER CONSTRUCTION

Parameter	PS8302L	PS8302L2
Air Distance (MIN.)	7 mm	8 mm
Outer Creepage Distance (MIN.)	7 mm	8 mm
Isolation Distance (MIN.)	0.4 mm	0.4 mm

## **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style Safety Standard Approval		Application Part Number
PS8302L	PS8302L-AX	Pb-Free	20 pcs (Tape 20 pcs cut)	Standard products	PS8302L
PS8302L-E3	PS8302L-E3-AX	(Ni/Pd/Au)	Embossed Tape 2 000 pcs/reel	(UL, CSA approved)	
PS8302L2	PS8302L2-AX		20 pcs (Tape 20 pcs cut)		PS8302L2
PS8302L2-E3	PS8302L2-E3-AX		Embossed Tape 2 000 pcs/reel		
PS8302L-V	PS8302L-V-AX		20 pcs (Tape 20 pcs cut)	DIN EN60747-5-2	PS8302L
PS8302L-V-E3	PS8302L-V-E3-AX		Embossed Tape 2 000 pcs/reel	(VDE0884 Part2)	
PS8302L2-V	PS8302L2-V-AX		20 pcs (Tape 20 pcs cut)	Approved (Option)	PS8302L2
PS8302L2-V-E3	PS8302L2-V-E3-AX		Embossed Tape 2 000 pcs/reel		

<sup>\*1</sup> For the application of the Safety Standard, following part number should be used.

## ABSOLUTE MAXIMUM RATINGS (TA = 25°C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current <sup>1</sup>	lF	25	mA
	Reverse Voltage	VR	5	V
Detector	Supply Voltage	Vcc	35	V
	Output Voltage	Vo	35	V
	Output Current	lo	8	mA
	Power Dissipation <sup>2</sup>	Pc	100	mW
Isolation V	oltage <sup>*3</sup>	BV	5 000	Vr.m.s.
Operating Ambient Temperature		TA	-55 to +110	°C
Storage Temperature		Tstg	-55 to +125	°C

<sup>\*1</sup> Reduced to 0.3 mA/ $^{\circ}$ C at T<sub>A</sub> = 70 $^{\circ}$ C or more.

<sup>\*2</sup> Reduced to 2.0 mW/ $^{\circ}$ C at T<sub>A</sub> = 75 $^{\circ}$ C or more.

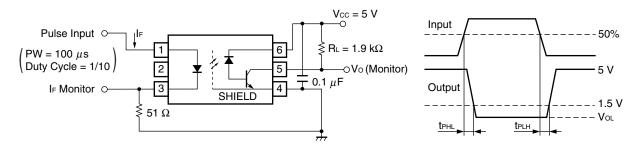
<sup>\*3</sup> AC voltage for 1 minute at  $T_A = 25^{\circ}$ C, RH = 60% between input and output. Pins 1-3 shorted together, 4-6 shorted together.



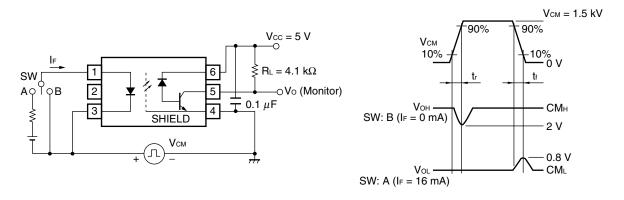
## <R> ELECTRICAL CHARACTERISTICS (Ta = 25°C, unless otherwise specified)

	Parameter	Symbol	Conditions	MIN.	TYP. <sup>*1</sup>	MAX.	Unit
Diode	Forward Voltage	VF	IF = 16 mA		1.6	2.0	٧
	Reverse Current	lR	V <sub>R</sub> = 3 V			10	μΑ
	Forward Voltage Temperature Coefficient	Δ <b>V</b> F/Δ <b>T</b> A	I <sub>F</sub> = 16 mA		-2.1		mV/°C
	Terminal Capacitance	Ct	V = 0 V, f = 1 MHz		30		pF
Detector	High Level Output Current	Іон (1)	IF = 0 mA, Vcc = Vo = 5.5 V		3	500	nA
	High Level Output Current	Іон (2)	IF = 0 mA, Vcc = Vo = 35 V			100	μΑ
	Low Level Output Voltage	Vol	IF = 16 mA, Vcc = 4.5 V, Io = 2.4 mA		0.15	0.4	٧
	High Level Supply Current	Іссн	IF = 0 mA, Vo = open, Vcc = 35 V		0.01	1	μΑ
	Low Level Supply Current	Iccl	IF = 16 mA, Vo = open, Vcc = 35 V		150		
Coupled	Current Transfer Ratio	CTR	IF = 16 mA, Vcc = 4.5 V, Vo = 0.4 V	15			%
	Input-Output Isolation Resistance	Ri-o	V⊦o = 1 kVpc	1011			Ω
	Input-Output Isolation Capacitance	Cı-o	V = 0 V, f = 1 MHz		0.7		pF
	Propagation Delay Time (H → L)*²	tрнL	IF = 16 mA, $V_{CC}$ = 5 V, $R_L$ = 1.9 $k\Omega$		0.3	0.8	μs
	Propagation Delay Time (L → H) '2	tрLH			0.33	0.8	
	Common Mode Transient Immunity at High Level Output <sup>3</sup>	СМн	IF = 0 mA, Vcc = 5 V, RL = 4.1 k $\Omega$ , VcM = 1.5 kV	15			kV/μs
	Common Mode Transient Immunity at Low Level Output <sup>3</sup>	CML	$I_F = 16 \text{ mA}, \text{ Vcc} = 5 \text{ V}, \text{ RL} = 4.1 \text{ k}\Omega,$ $\text{VcM} = 1.5 \text{ kV}$	-15			

- \*1 Typical values at T<sub>A</sub> = 25°C
- \*2 Test circuit for propagation delay time



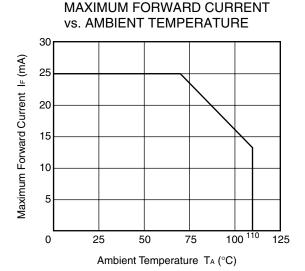
\*3 Test circuit for common mode transient immunity



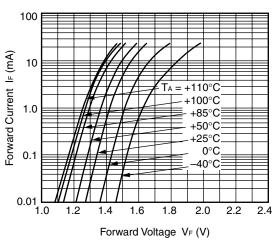
#### **USAGE CAUTIONS**

- 1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
- 2. By-pass capacitor of 0.1  $\mu$ F is used between Vcc and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.
- 3. Pin 2 (which is an NC<sup>-1</sup> pin) can either be connected directly to the GND pin on the LED side or left open. Unconnected pins should not be used as a bypass for signals or for any other similar purpose because this may degrade the internal noise environment of the device.
  - \*1 NC: Not connected (No connection)
- 4. Avoid storage at a high temperature and high humidity.

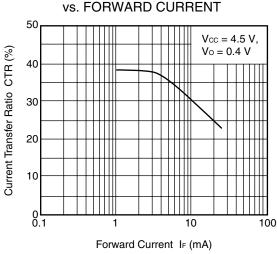
### <R> TYPICAL CHARACTERISTICS (TA = 25°C, unless otherwise specified)



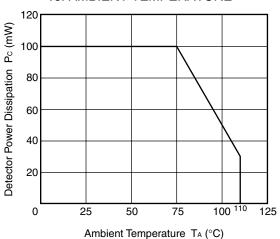
# FORWARD CURRENT vs. FORWARD VOLTAGE



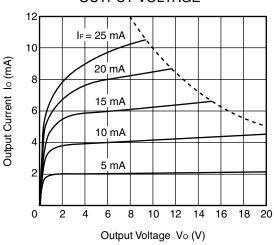
CURRENT TRANSFER RATIO



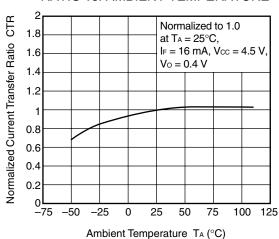
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



OUTPUT CURRENT vs.
OUTPUT VOLTAGE

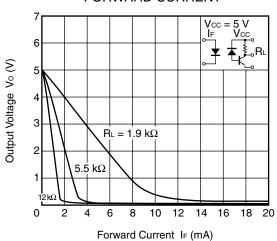


NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE

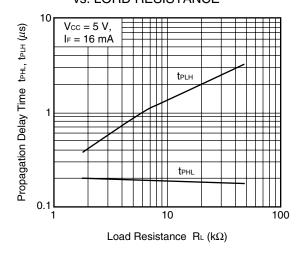


**Remark** The graphs indicate nominal characteristics.

# OUTPUT VOLTAGE vs. FORWARD CURRENT

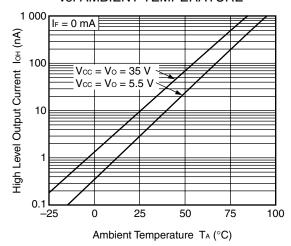


## PROPAGATION DELAY TIME, vs. LORD RESISTANCE

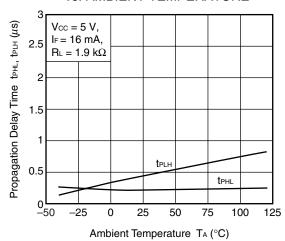


Remark The graphs indicate nominal characteristics.

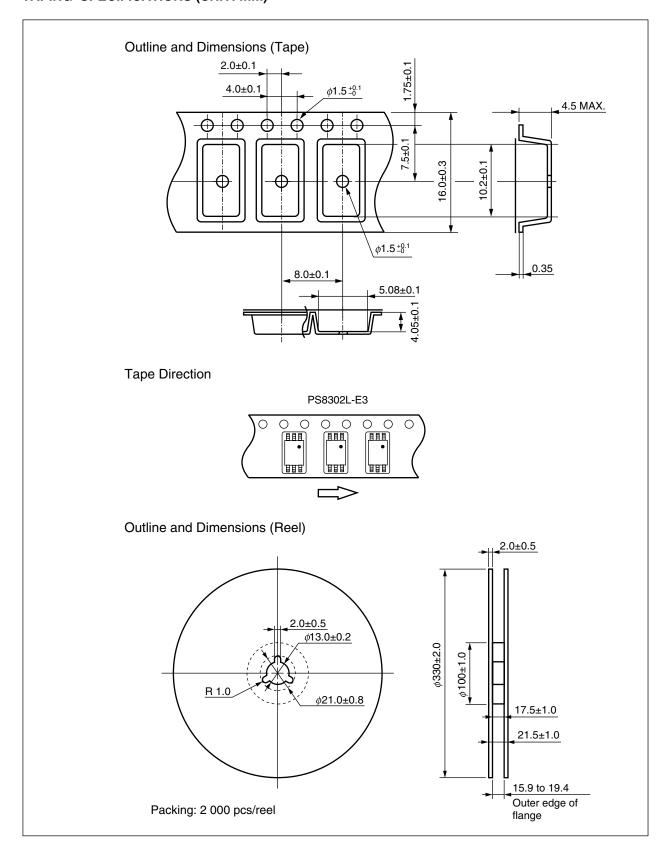
# HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE

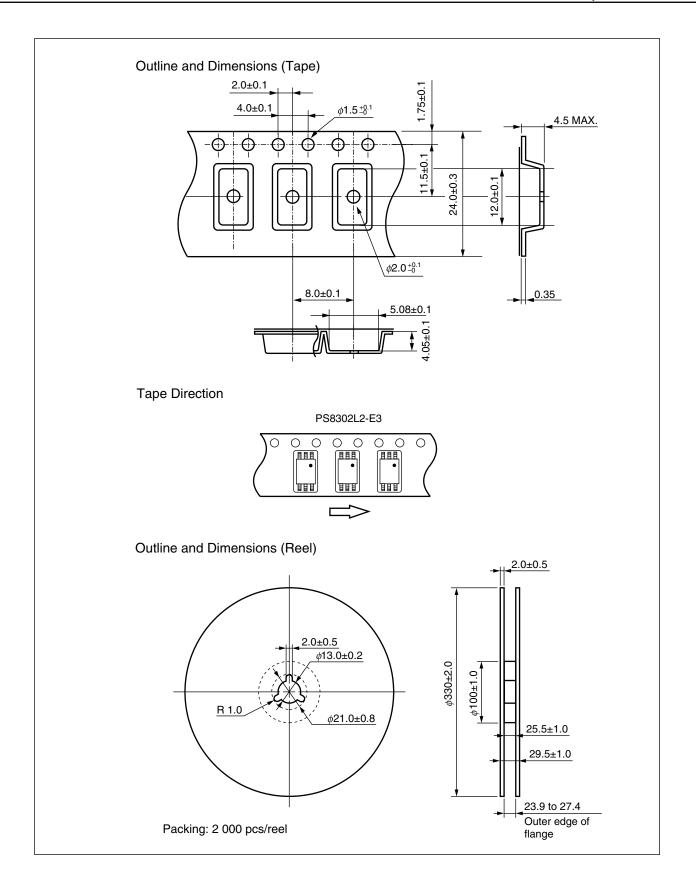


# PROPAGATION DELAY TIME, vs. AMBIENT TEMPERATURE



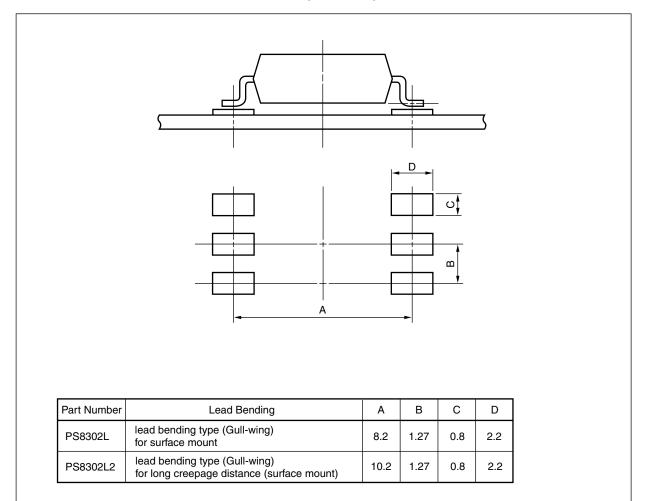
## <R> TAPING SPECIFICATIONS (UNIT: mm)







## <R> RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



#### **NOTES ON HANDLING** <R>

#### 1. Recommended soldering conditions

#### (1) Infrared reflow soldering

• Peak reflow temperature 260°C or below (package surface temperature)

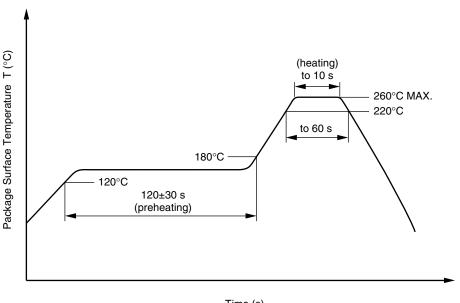
• Time of peak reflow temperature 10 seconds or less • Time of temperature higher than 220°C 60 seconds or less

• Time to preheat temperature from 120 to 180°C 120±30 s Number of reflows Three

• Flux Rosin flux containing small amount of chlorine (The flux with a

maximum chlorine content of 0.2 Wt% is recommended.)

### Recommended Temperature Profile of Infrared Reflow



Time (s)

#### (2) Wave soldering

 Temperature 260°C or below (molten solder temperature)

• Time 10 seconds or less

· Preheating conditions 120°C or below (package surface temperature)

· Number of times One (Allowed to be dipped in solder including plastic mold portion.)

• Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine

content of 0.2 Wt% is recommended.)

#### (3) Soldering by soldering iron

• Peak temperature (lead part temperature) 350°C or below • Time (each pins) 3 seconds or less

• Flux Rosin flux containing small amount of chlorine (The flux with a

maximum chlorine content of 0.2 Wt% is recommended.)

(a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead.

(b) Please be sure that the temperature of the package would not be heated over 100°C.

#### (4) Cautions

Fluxes

Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

#### 2. Cautions regarding noise

Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.



## <R> SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/110/21	
Dielectric strength			
maximum operating isolation voltage	UIORM	1 130	$V_{peak}$
Test voltage (partial discharge test, procedure a for type test and random test)	$U_pr$	1 695	$V_{peak}$
$U_{pr} = 1.5 \times U_{IORM}, P_d < 5 pC$			
Test voltage (partial discharge test, procedure b for all devices)	$U_pr$	2 119	$V_{\text{peak}}$
$U_{pr} = 1.875 \times U_{IORM}, P_d < 5 pC$			
Highest permissible overvoltage	Utr	8 000	V <sub>peak</sub>
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11))	CTI	175	
Material group (DIN EN 60664-1 VDE0110 Part 1)		III a	
Storage temperature range	T <sub>stg</sub>	-55 to +125	°C
Operating temperature range	TA	-55 to +110	°C
Isolation resistance, minimum value			
V <sub>IO</sub> = 500 V dc at T <sub>A</sub> = 25°C	Ris MIN.	10 <sup>12</sup>	Ω
V <sub>IO</sub> = 500 V dc at T <sub>A</sub> MAX. at least 100°C	Ris MIN.	10 <sup>11</sup>	Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal			
derating curve)			
Package temperature	Tsi	175	°C
Current (input current IF, Psi = 0)	Isi	400	mA
Power (output or total power dissipation)	Psi	700	mW
Isolation resistance			
$V_{IO} = 500 \text{ V dc at } T_A = T_{SI}$	Ris MIN.	10°	Ω

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M8E0904E

#### Caution

GaAs Products

This product uses gallium arsenide (GaAs).

GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.

- Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.
  - Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.
- 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.
- Do not burn, destroy, cut, crush, or chemically dissolve the product.
- Do not lick the product or i any way allow it to enter the mouth.

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April 1<sup>st</sup>, 2010 Renesas Electronics Corporation

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- Техническая поддержка проекта, помощь 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 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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