

## FEATURES

- 3.3V/0.5A, 5V/0.5A or 12V/0.4A outputs; Pin and size-compatible with LM7805 & LM7812 regulators
- Up to 95% efficiency – no heat sinks or thermal derating required
- Two SIP-packages fit existing TO-220 footprints:
  - Vertical-pin models occupy less than 0.1 square in.
  - Optional horizontal pins provide 0.350 in. installed height
- +7.5–36Vdc operating input range; Low 3mA quiescent current
- Built-in filter capacitors – no external components required
- –40 to +70°C operation at full load; Short-circuit protection
- Excellent load ( $\pm 0.2\%$ ) and line ( $\pm 0.3\%$ ) regulation
- Ideal for powering instrumentation from 9V/12V/24V/28V supplies or batteries
- Can be used with unregulated dc supplies

Murata Power Solutions' 7805SR-C (5V output), 7812SR-C (12V output) and 7803SR-C (3.3V output) step-down switching regulators are modern drop-in replacements for older, inefficient, LM7805 and LM7812 linear regulators. The 78XXSR's are pin- and size-compatible with industry-standard TO-220 SIP packages. A 260kHz switching frequency provides for efficiencies as high as 95%. Full-load (up to 0.5A) operation from 9V, 12V, 24V, or 36V supplies at ambient temperatures up to +70°C requires no heat sinks, no temperature derating, no forced-air cooling, and no external capacitors.

78SR switching regulators provide many significant improvements over their linear counterparts: lower quiescent current (3mA vs. 5 mA), higher input voltage (40V vs. 32V), and better output accuracy ( $\pm 1.5\%$  vs.  $\pm 5\%$ ). All these features combine to make 78SR regulators ideal for new or existing LM7805 & LM7812 applications requiring full-load operation at elevated voltages.

## TECHNICAL NOTES

1. **Input/Output (I/O) Filtering:** As shown in the noise and ripple graphs, 78SR switching regulators exhibit excellent low-noise performance with no external I/O capacitors. However, if additional noise reduction is required, be sure to use low-ESR capacitors that are rated for continuous operation (with an additional 20% safety margin) at the highest system voltages and temperatures. Adding external output capacitors will also improve the unit's load-transient response.  
Applications in which 78SR regulators are located more than 24 inches (61cm) from the input power supply should include an external 47uF/50V (or greater) aluminum electrolytic capacitor, connected as close as possible to the regulator's +Vin and GND terminals (pins 1 and 2). An external input capacitor is particularly important if the input voltage is applied to the regulator via a mechanical switch or relay. Contact bounce at turn-on can produce large inductive current-spikes, and these current spikes can generate damaging voltage transients at the regulator's input terminals.
2. **Input Fusing:** 78SR switching regulators are not internally fused. If fusing their input and/or output terminals is required, use the data shown in the Efficiency Curves as a guide to selecting an appropriate slow-blow fuse.
3. **Input-Output Isolation:** 78SR regulators' internal input and output circuits share a common connection (GND, pin 2); there is no electrical isolation between the INPUT (pin 1) and OUTPUT (pin 3) terminals.
4. **Oversupply Protection:** 78SR switching regulators do not provide input or output oversupply protection. In the extremely rare situation in which a catastrophic failure occurs, the output voltage may rise to excessively high levels. If your load must be protected against all possible oversupply situations, external voltage-limiting circuitry must be provided.
5. **Operation at 40Vdc:** Operating with inputs up to 40Vdc is permissible if, for inputs between 36 and 40Vdc, the maximum load current is reduced to 0.35A for 7805SR-C and 7803SR-C, and to 0.3A for 7812SR-C. Under no circumstances should the input voltage be allowed to exceed 45Vdc.

## Ordering Information

MPS Part No.	Output Voltage	Output Current	Input Voltage
<b>Standard Pin Package</b>			
7803SR-C	+3.3Vdc	0.5A	+7.5–36Vdc
7805SR-C	+5.0Vdc	0.5A	+7.5–36Vdc
7812SR-C	+12.0Vdc	0.4A	+15–36Vdc
<b>Horizontal Pin Package</b>			
7803SRH-C	+3.3Vdc	0.5A	+7.5–36Vdc
7805SRH-C	+5.0Vdc	0.5A	+7.5–36Vdc
7812SRH-C	+12.0Vdc	0.4A	+15–36Vdc



For full details go to  
[www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

**TECHNICAL NOTES** (continued)

6. **Soldering & Handling Precautions:** All units are designed to be hand soldered to pc-boards using no-clean solders (+260°C, 5 seconds max.). Water-soluble solders can also be used, but the units must be washed and dried using processes appropriate to the type of solder employed. See the Mechanical Specifications section for pin 1 orientation and recommended plated-through hole dimensions.  
While 78SR regulators easily withstand a 2kV ESD discharge to any terminal (using human body model), they should always be treated as ESD sensitive devices.
7. **Horizontal-Pin Models (78XXSRH-C):** 78XXSRH-C switching regulators are pin-compatible replacements for TO-220 style LM78XX linear regulators that are installed with their metal tabs lying flat on the surface of the pc-board. However, because the surface of inductor L1 on 78XXSRH-C models is electrically conductive, it must not be allowed to come in contact with any exposed pc-board traces, other than power ground (GND). While the 2-mil-thick (0.05mm) polyester label attached to L1 provides some degree of electrical insulation (only if L1 sits perfectly flat on the pc-board), it is recommended that a 0.020" (0.5mm) clearance be maintained between L1 and all exposed pc-board traces.
8. **Dropout Voltage:** 78SR series regulators described in this data sheet specify a minimum input voltage at which full-load accuracy and output regulation are guaranteed (7.5V for 7803SR-C and 7805SR-C, and 15.0V for 7812SR-C). However, these devices will stay in regulation at lower input voltages if they are operated at less than their rated loads.  
The following dropout-voltage data, derived from sample testing performed at an ambient temperature of +25°C with resistive loads, should be used for information purposes only. For these tests, a unit was considered to be out of regulation when its output changed by more +/-0.005Vdc from its nominal value. All voltages were measured directly at the regulator's I/O pins.

**Typical Dropout Voltage**

	0% Load	25% Load	50% Load	100% Load
7803SR-C	6.0V	6.2V	6.2V	6.3V
7805SR-C	6.3V	6.2V	6.2V	6.8V
7812SR-C	12.8V	13.0V	12.8V	13.0V

# 78xxSR Series

3.3V/5V/12V Outputs High-Efficiency  
Switching Regulators with LM78xx Pinouts

## Performance/Functional Specifications

Typical at T<sub>A</sub> = +25°C

Input/Output	7803SR-C	7805SR-C	7812SR-C
Models			
Output Voltage	+3.3Vdc	+5.0Vdc	+12.0Vdc
Rated Output Current	0.5A	0.5A	0.4A
Output Voltage Accuracy	$\pm 2\%$	$\pm 1.5\%$	$\pm 2\%$
Input Voltage Range ①	+7.5-36Vdc	+7.5-36Vdc	+15-36Vdc
Line Regulation (100% load)	$\pm 0.3\%$	$\pm 0.3\%$	$\pm 0.3\%$
Load Regulation (0-100% load)	$\pm 0.2\%$	$\pm 0.2\%$	$\pm 0.2\%$
Quiescent Current	3mA typ., 5mA max.		
Input Current		See Performance Curves	
Efficiency		See Performance Curves	
Transient Response		See Performance Curves	
Input & Output Noise		See Performance Curves	
Short Circuit Protection ②		Continuous	
Isolation		None	
Overvoltage Protection		None	
Undervoltage Protection		None	

Environmental	7803SR-C	7805SR-C	7812SR-C
Models			
Operating Temperature	-40 to +70°C		
Storage Temperature	-40 to +85°C		
Cooling	Free Air Convection		
Humidity (Non-condensing)	0 to 85%		

Physical	
Mechanical	See Mechanical Specifications
Package	Open-frame SIP
Pins	0.025" (0.64mm) square, tin-plated bronze
Weight	0.08 ounces (2.2g)
Pin Soldering	+260°C for 5 seconds

① See Technical Note 5.

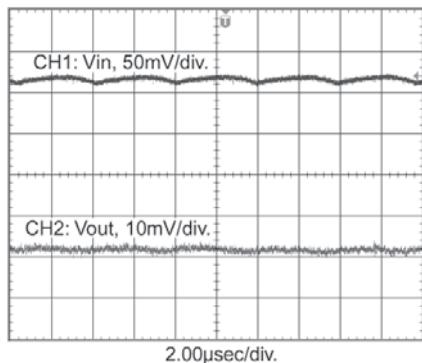
② While these regulators can withstand a continuous short-circuit across their output terminals, they will experience a significant temperature rise. Extended short-circuit operation will adversely affect the unit's reliability.

Typical Performance Curves  $T_A = +25^\circ\text{C}$ ,  $V_{IN}$  as indicated

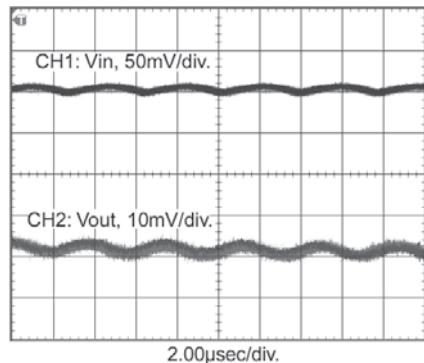
3.3V/5V/12V Outputs High-Efficiency  
Switching Regulators with LM78xx Pinouts

**Noise and Ripple - 10% and 100% Load, 20MHz Bandwidth**

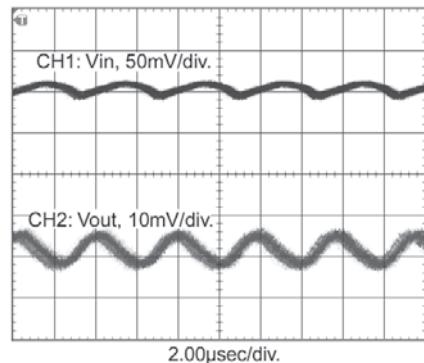
7803SR-C  $V_{IN} = 12\text{V}$ ,  $I_{LOAD} = 50\text{mA}$



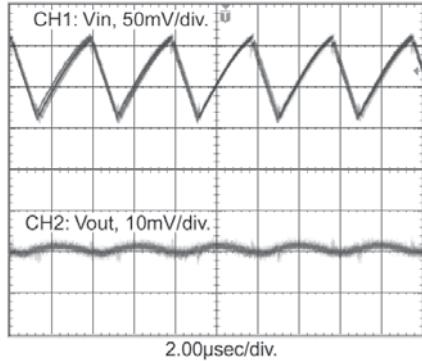
7805SR-C  $V_{IN} = 12\text{V}$ ,  $I_{LOAD} = 50\text{mA}$



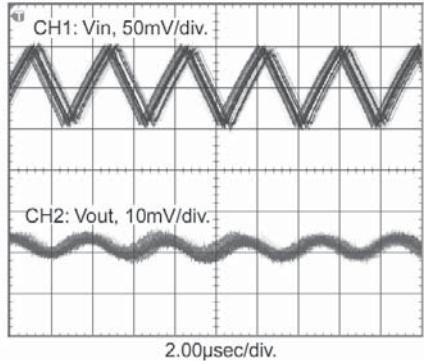
7812SR-C  $V_{IN} = 24\text{V}$ ,  $I_{LOAD} = 40\text{mA}$



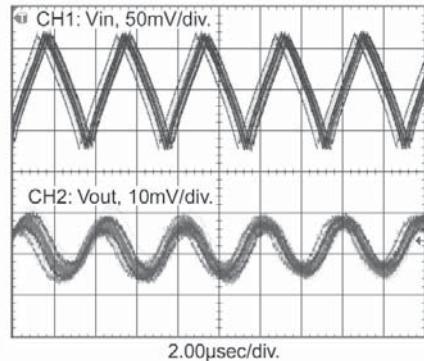
7803SR-C  $V_{IN} = 12\text{V}$ ,  $I_{LOAD} = 500\text{mA}$



7805SR-C  $V_{IN} = 12\text{V}$ ,  $I_{LOAD} = 500\text{mA}$

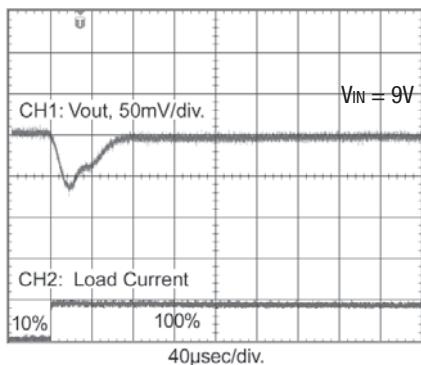


7812SR-C  $V_{IN} = 24\text{V}$ ,  $I_{LOAD} = 400\text{mA}$

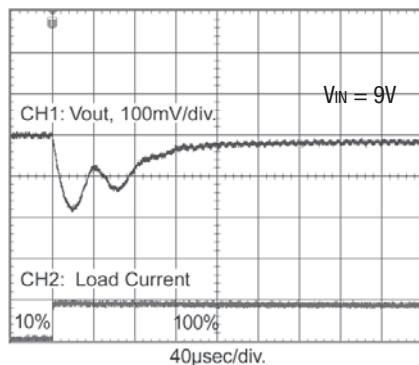


**Transient Response - 90% Load Step**

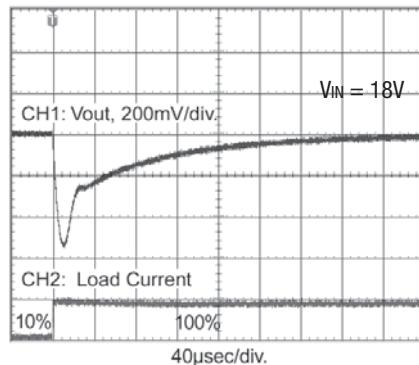
7803SR-C 10% to 100% Load Step



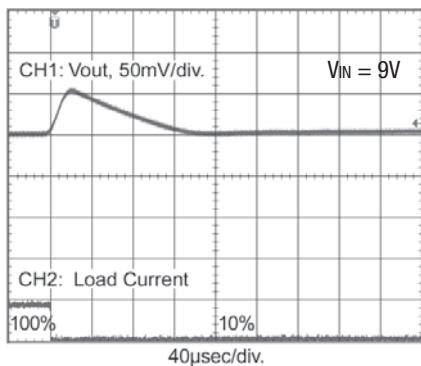
7805SR-C 10% to 100% Load Step



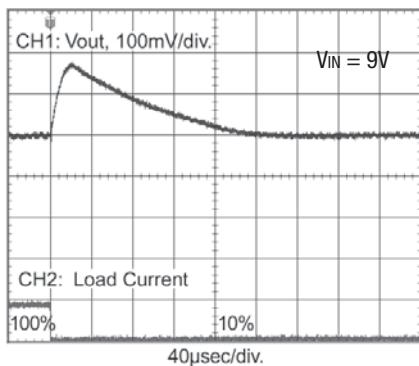
7812SR-C 10% to 100% Load Step



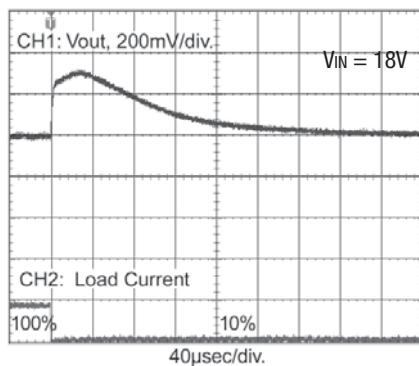
7803SR-C 100% to 10% Load Step



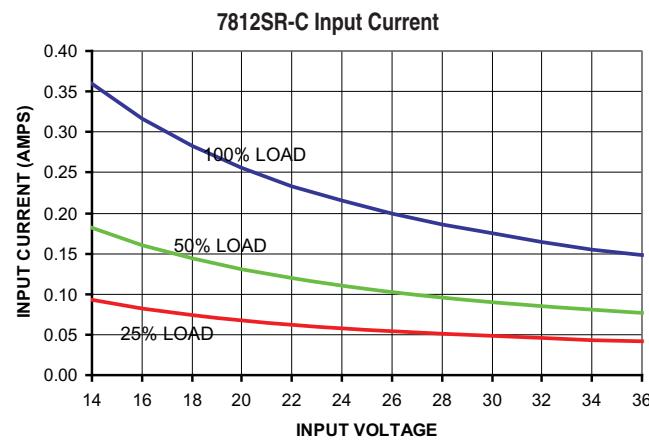
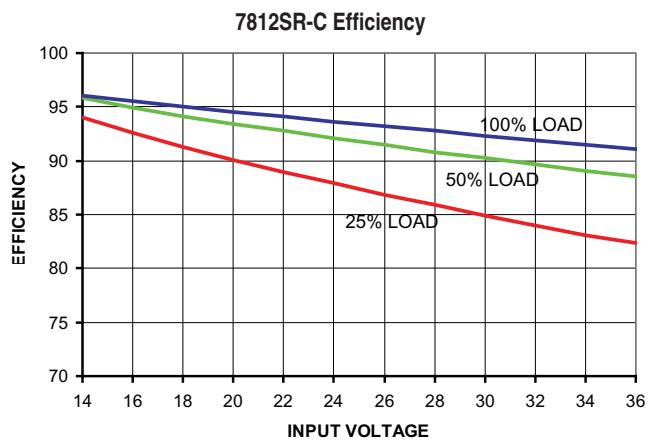
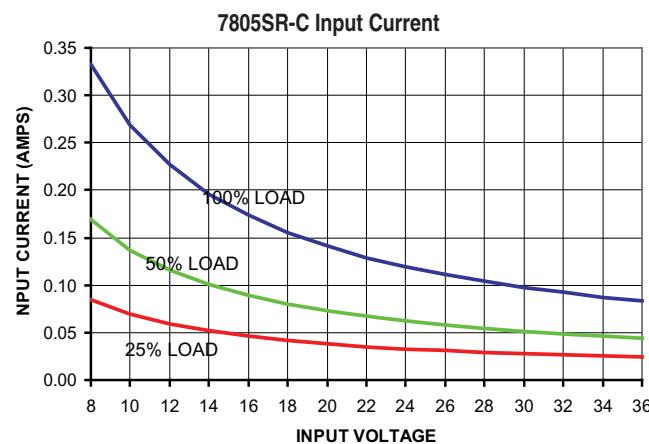
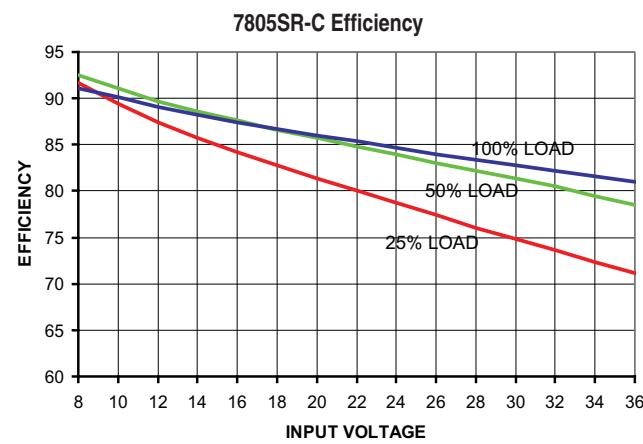
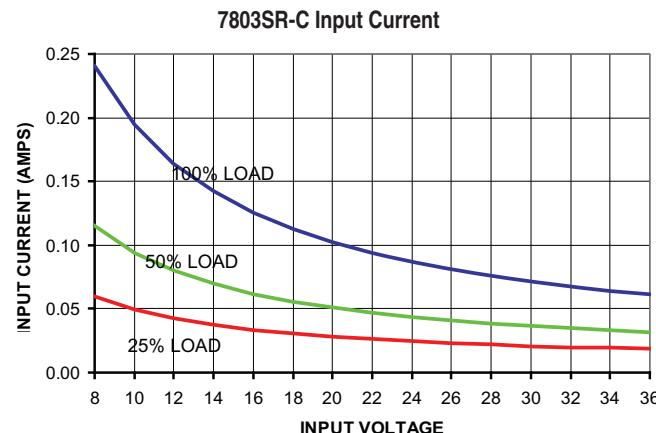
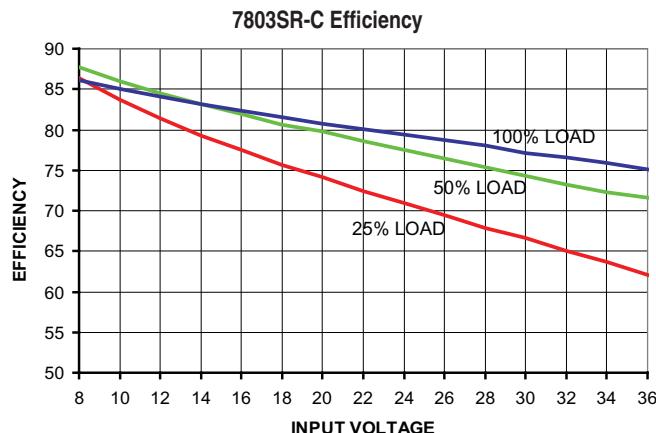
7805SR-C 100% to 10% Load Step



7812SR-C 100% to 10% Load Step

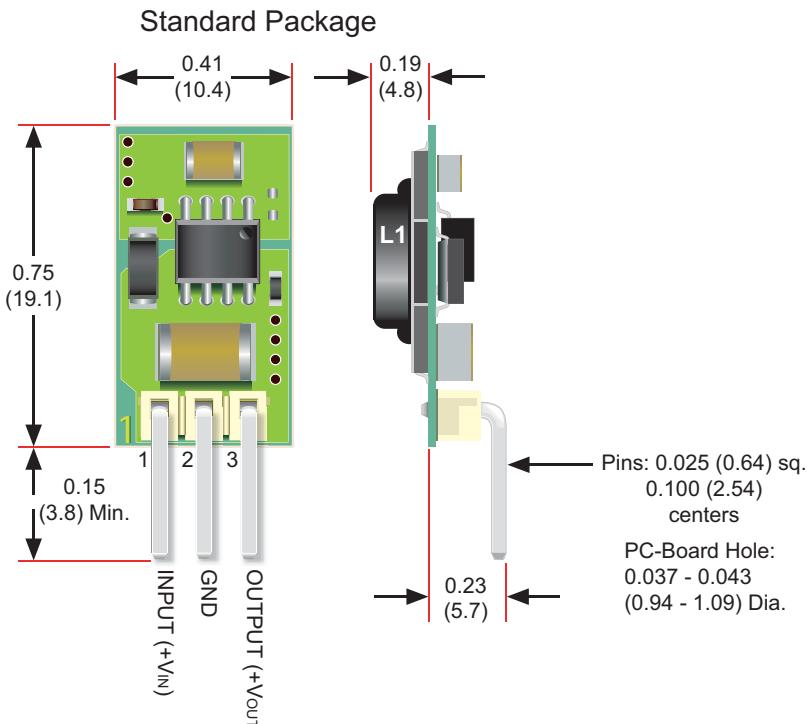


**Efficiency Curves**



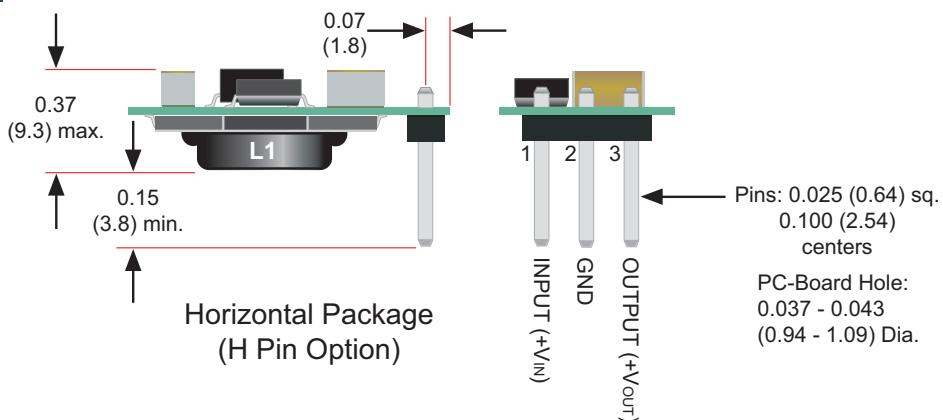
MECHANICAL DIMENSIONS: Inches (mm)

TOLERANCES: 2 PL DEC  $\pm 0.02$  ( $\pm 0.51$ )  
3 PL DEC  $\pm 0.010$  ( $\pm 0.254$ )



## NEW

### low-profile package





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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