



MICRO SWITCH™ Premium
Subminiature Basic Switches
SX Series



MICRO SWITCH™ SX Series

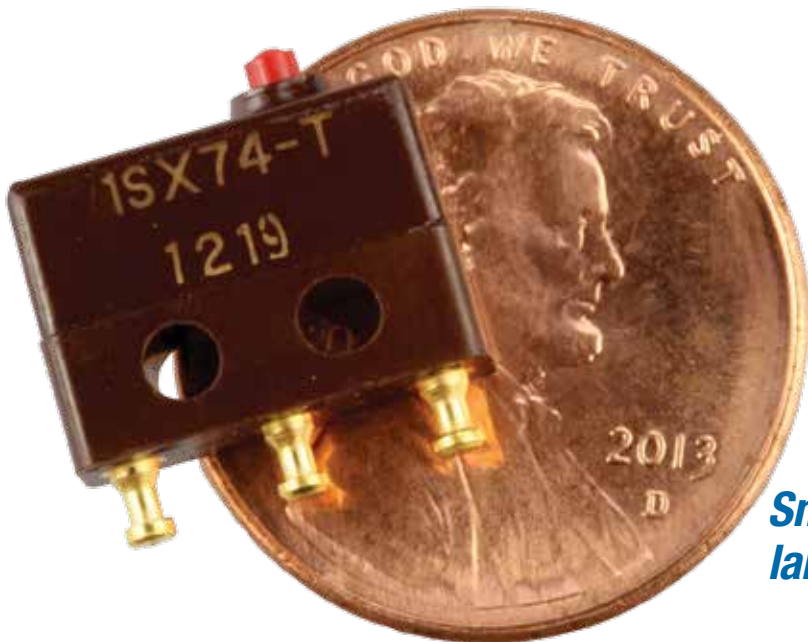
Premium Subminiature Basic Switches

The industry-defining name in snap-action switches, Honeywell MICRO SWITCH™ premium subminiature switches are designed for repeatability and enhanced product life. The MICRO SWITCH™ SX Series delivers consistent performance within a range of conditions.

Offering enhanced repeatability, the MICRO SWITCH™ SX Series' lower operating force provides for application versatility. Like the MICRO SWITCH™ SM Series, the SX Series (which is a smaller package) offers gold contacts for low energy switching and bifurcated gold contacts for maximum reliability. Bifurcated contacts provide parallel redundancy within the SX switch.

What makes our switches better?

- Industry-leading life cycle rating reduces the need to replace switches over life in an OEM platform – reducing total system cost
- Very wide temperature range allows for years of reliable performance in the harshest of conditions
- MIL-PRF-8805 qualified listings
- Operating forces as low as 0,147 N [15 g] and differential travel as low as 0,025 mm [0.001 in] delivers consistent precise switch characteristics



***Small in size,
large in capability!***

COST OPTIMIZATION • PERFORMANCE
RELIABILITY • GLOBAL ACCEPTANCE

Features and Benefits

LONG LIFE

With a mechanical life of up to **10,000,000 operations**, SX Series switches boast an industry-leading life cycle.

APPLICATION FLEXIBILITY

MICRO SWITCH™ SX Series delivers a selection of actuation, electrical termination, and operating characteristics along with **high-temperature construction options**.

Life of up to 10,000,000 cycles

INDUSTRY-LEADING TEMPERATURE RANGE

With a wide temperature range of -54 °C to 204 °C [-65 °F to 400 °F], SX Series switches allow for **years of reliable performance in harsh conditions**.

Precision switch characteristics

COMPACT AND ROBUST

Built from **military-grade components**, MICRO SWITCH™ SX switches deliver MIL-PRF-8805 qualified listings in a lightweight, subminiature package. SX switches are available with **FAA-PMA approvals** for commercial aircraft applications.

EASILY CONTROLS LOW-VOLTAGE DC APPLICATIONS

Switches available with a choice of **silver, gold-plated, or bifurcated gold contacts** to handle a variety of electrical load requirements.

GLOBAL APPROVALS

UL/CSA, cUL, ENEC, and CE approvals allows the customer to **utilize switches in products sold across the globe** - in some of the most regulated regions.

Potential Applications



AEROSPACE

- In precision switch assemblies for commercial aircraft to monitor doors for “closed” and “locked” position
- Monitor whether landing gear is “up” or “down and locked”
- In precision switch assemblies for commercial cockpit applications for pushbuttons, toggle, or joystick assemblies
- MIL-PRF-8805 listings suitable for precision switch assemblies in military applications
- FAA-PMA approvals for commercial aircraft



INDUSTRIAL

- In precision switch assemblies for pressure switches and temperature switches
- In power generation, fuel level switch for gas and oil



MICRO SWITCH™ Premium Subminiature Basic Switches

Table 1. Specifications

Characteristic	Parameter
Differentiator	low operating force to 0,147 N [15 g] max; sensitive differential travel as low as 0,025 mm [0.001 in] max.; power load switching capability to 7 A
Ampere rating	1 A to 7 A
Circuitry	SPDT, SPNO
Operating force	0.71 oz to 6 oz
Termination	quick connect, solder, pcb
Actuator	pin plunger, straight lever, roller lever, simulated roller lever, offset flag lever, crossed roller lever
Voltage	125 Vac, 250 Vac, 28 Vdc
Circuitry	SPNO, SPDT, DPDT
Agency approvals	UL, CE, CSA, ENEC, MIL-PRF-8805, FAA-PMA
Agency file information	UL: E12252; CSA: LR41372
Operating temperature	-54 °C to 121 °C [-65 °F to 250 °F]; select catalog listings 204 °C [400 °F]
Contacts	silver, gold-plated, bifurcated gold
Housing	phenolic or thermoplastic polyester
Sealing	not weather sealed
Mechanical life	up to 10,000,000 operations for 11SX Series up to 1,000,000 operations for 1SX Series
Size	10,2 mm H x 5,08 mm W x 12,7 mm L [0.4 in H x 0.20 in W x 0.5 in L]

ELECTRICAL DATA AND UL CODES

Table 2. UL Electrical Ratings

Code	Circuitry	Electrical data and UL codes
A	SPDT	5 A res., 3 A ind., (sea level), 4 A res., 2 A ind., (50,000 feet), 28 Vdc 5 A res. or ind. 115 Vac, 60 Hz. UL/CSA rating: 5 A, 250 Vac
B	SPDT	7 A res., 4 A ind., (sea level), 7 A res., 2.5 A ind., (50,000 feet), 28 Vdc. UL/CSA rating: 7 A, 250 Vac
C	SPDT	3.5 A res., 2 A ind., (sea level), 3.5 A res., 1.5 A ind., (50,000 feet), 28 Vdc. UL rating: 7 A, 250 Vac
D	SPDT	1 A res., 0.5 amp ind., (sea level and 50,000 feet), 28 Vdc. UL/CSA rating: 1 amp, 125 Vac
E	SPDT	3 A res., 2 A ind., (sea level), 28 Vdc. UL rating: 3 A, 250 Vac
F	SPDT	7 A res., 4 A ind., 2.5 A lamp load, (sea level), 4 A res., 2.5 A ind., 2.5 A lamp load, (50,000 feet), 28 Vdc. 7 A res., 7 A ind., 2 A lamp load, 115 Vac, 60 Hz (sea level)
G	SPDT	2 A res., lamp ind., (sea level) 28 Vdc
H	SPDT	.010 A res. and ind., (sea level), 28 Vdc. UL/CSA rating: 1 A, 125 Vac
I	SPDT	7 A res., 4 A ind., (sea level), 28 Vdc
L	SPDT	1 A res., 1/2 A ind., (sea level) 28 Vdc

O.F. • Operating force
 R.F. • Release force
 P.T. • Pretravel
 O.T. • Overtravel
 D.T. • Differential travel
 O.P. • Operating position

MICRO SWITCH™ SX SERIES ORDER GUIDE • PIN PLUNGER

	Catalog Listing	Recommended For	Electrical Data and UL Codes	O.F. N [oz]	R.F. min. N [oz]	P.T. max. mm [in]	O.T. min. mm [in]	D.T. mm [in]	O.P. * mm [in]
	12SX2-T	Bifurcated gold contacts	0.01 A H	0.7 to 1,39 [2.5 to 5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,051 [0.002]	8,13 [0.32]
	3SX1-T	Gold-plated contacts (1SX type)	1 A D	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	12SX1-T	Enhanced reliability (gold bifurcated contacts)	1 A D	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,076 [0.003]	8,13 [0.32]
	12SX3-T	Lowest differential travel, bifurcated gold contacts	1 A H	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,025 [0.001]	8,13 [0.32]
	13SX21-T	Gold-plated contacts (11SX type)	1 A D	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,051 [0.002]	8,13 [0.32]
	23SX39-T (MS24547-2)	MIL-PRF-8805, gold contacts, 82 °C [180 °F] max. use	1 A D	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	23SX39-T2 (MS24547-5)	MIL-PRF-8805, gold contacts, 82 °C [180 °F] max. use	1 A D	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	93SX39-T (M8805/109-03)	0.156 in wide, gold contacts, 82 °C [180 °F]	1 A D	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	411SX21-T (M8805/106-01)	204 °C [400 °F] for 100 hours	2 A G	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	413SX21-T (M8805/106-02)	204 °C [400 °F] for 100 hours	1 A L	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,051 [0.002]	8,13 [0.32]
	11SX1-T	Lowest differential travel	3 A E	0,97 [3.5]	0,21 [0.75]	0,51 [0.02]	0,1 [0.004]	0,025 [0.001]	8,13 [0.32]
	11SX21-T	General purpose	5 A A	0.7 to 1,39 [2.5 to 5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,051 [0.002]	8,13 [0.32]
	11SX22-T	General purpose	5 A A	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,025 [0.001]	8,13 [0.32]
	17SX21-T	Enhanced stability under varying humidity, 11SX type	5 A A	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,051 [0.002]	8,13 [0.32]
	1SX1-T	Power-duty switching	7 A B	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	1SX12-T	Low differential travel	7 A C	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,051 [0.002]	8,13 [0.32]
	1SX48-T	Added overtravel	7 A B	1,39 [5]	0,28 [1]	0,51 [0.02]	0,25 [0.01]	0,13 [0.005]	8,13 [0.32]
	2SX1-T	Lower operating force	7 A B	0,83 [3]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	4SX1-T	204 °C [400 °F] for 100 hours	7 A I	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	21SX1-T	Enhanced stability under varying humidity, 1SX type	7 A B	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	21SX39-T (MS24547-1)	MIL-PRF-8805 82 °C [180 °F]	7 A F	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	21SX39-T2 (MS24547-4)	MIL-PRF-8805 82 °C [180 °F]	7 A F	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]
	91SX39-T M8805-109-01	0.156 in wide, 82 °C [180 °F]	7 A F	1,39 [5]	0,28 [1]	0,51 [0.02]	0,1 [0.004]	0,13 [0.005]	8,13 [0.32]



* ±0,38 mm [±0.015 in]

MICRO SWITCH™ Premium Subminiature Basic Switches

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MICRO SWITCH™ SX SERIES ORDER GUIDE • INTEGRAL LEVER

	Catalog Listing	Recommended For	Electrical Data and UL Codes	O.F. N [oz]	R.F. min. N [oz]	P.T. max. mm [in]	O.T. min. mm [in]	D.T. mm [in]	O.P. mm [in]
	311SX1-T	3,43 mm [0.135 in] straight lever	5 A A	0,49 [1.76]	0,09 [0.32]	1,65 [0.065]	0,36 [0.014]	0,51 [0.020]	8,43 mm ±1,14 mm [0.332 in ±0.045 in]
	313SX1-T	3,43 mm [0.135 in] straight lever with gold contacts	1 A D	0,49 [1.76]	0,09 [0.32]	1,65 [0.065]	0,36 [0.014]	0,51 [0.020]	8,43 mm ±1,14 mm [0.332 in ±0.045 in]
	311SX2-T	12,8 mm [0.505 in] straight lever	5 A A	0,31 [1.1]	0,05 [0.18]	2,92 [0.115]	0,64 [0.025]	0,89 [0.035]	8,26 mm ±1,91 mm [0.325 in ±0.075 in]
	313SX2-T	12,8 mm [0.505 in] straight lever with gold contacts	1 A D	0,31 [1.1]	0,05 [0.18]	2,92 [0.115]	0,64 [0.025]	0,89 [0.035]	8,26 mm ±1,91 mm [0.325 in ±0.075 in]
	311SX3-T	24,5 mm [0.965 in] straight lever	5 A A	0,20 [0.71]	0,03 [0.11]	4,70 [0.185]	0,61 [0.024]	1,52 [0.060]	7,75 mm ±2,92 mm [0.305 in ±0.115 in]
	313SX3-T	24,5 mm [0.965 in] straight lever with gold contacts	1 A D	0,20 [0.71]	0,03 [0.11]	4,70 [0.185]	0,61 [0.024]	1,52 [0.060]	7,75 mm ±2,92 mm [0.305 in ±0.115 in]
	311SX4-T	1,1 mm [0.042 in] simulated roller lever	5 A A	0,58 [2.1]	0,11 [0.39]	1,27 [0.050]	0,25 [0.010]	0,38 [0.015]	14,15 mm ±0,91 mm [0.557 in ±0.036 in]
	313SX4-T	1,1 mm [0.042 in] simulated roller lever with gold contacts	1 A D	0,58 [2.1]	0,11 [0.39]	1,27 [0.050]	0,25 [0.010]	0,38 [0.015]	14,15 mm ±0,91 mm [0.557 in ±0.036 in]
	311SX5-T	11,7 mm [0.459 in] simulated roller lever	5 A A	0,31 [1.1]	0,05 [0.18]	2,67 [0.105]	0,56 [0.022]	0,89 [0.035]	14,86 mm ±1,65 mm [0.585 in ±0.065 in]
	313SX5-T	11,7 mm [0.459 in] simulated roller lever with gold contacts	1 A D	0,31 [1.1]	0,05 [0.18]	2,67 [0.105]	0,56 [0.022]	0,89 [0.035]	14,86 mm ±1,65 mm [0.585 in ±0.065 in]

SX Series

NUMERIC DESIGNATIONS FOR MICRO SWITCH™ SX SERIES/ORDER GUIDE

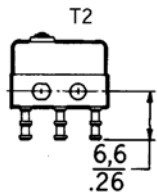
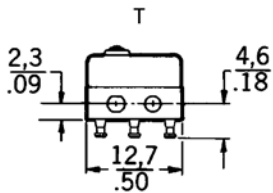
Prefix	Description
1SX	Plastic pin plunger, fine silver contacts with 0.188 mounting hole centers
2SX	1SX with low force characteristics (3 oz. max. operating force)
3SX	1SX with gold/gold alloy contacts
4SX	1SX with high temperature construction [400 °F]
6SX	1SX with high temperature and gold/gold alloy contacts
7SX	2SX with gold/gold alloy contacts
11SX	Low force characteristics (OF and DT)
12SX	11SX with bifurcated gold contacts
13SX	11SX with gold/gold alloy contacts
14SX	11SX with high temperature construction
21SX	1SX with MIL-approvals
22SX	2SX with MIL-approvals
23SX	1SX with gold/gold alloy contacts and MIL-approvals
311SX	11SX with integral lever actuator
312SX	12SX with integral lever actuator
313SX	13SX with integral lever actuator
323SX	311SX with gold/gold alloy contacts
91SX	Thin SX (0.156 in thick)
93SX	Thin SX (0.156 in thick), gold/gold alloy contacts
411SX	11SX with high temperature construction [400 °F]

MICRO SWITCH™ Premium Subminiature Basic Switches

SX SERIES • STANDARD ACTUATOR OPTIONS, SCREW TERMINALS, & DIMENSIONS (mm/in)

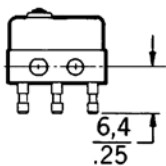
Pin plunger, "T" terminals	Pin plunger, "T1" terminals	Integral lever, 3,43 mm [0.135 in] straight lever 12,8 mm [0.505 in] straight lever				
<p>MOUNTING HOLES ACCEPT PINS OR SCREWS OF 2.3/.09 DIA</p>		<p>Dim. "A"</p> <table border="1"> <tr> <td>311SX1-T</td> <td>3,6/.14</td> </tr> <tr> <td>311SX2-T</td> <td>13,0/.51</td> </tr> </table>	311SX1-T	3,6/.14	311SX2-T	13,0/.51
311SX1-T	3,6/.14					
311SX2-T	13,0/.51					
<p>Integral lever, 24,5 mm [0.965 in] straight lever</p>	<p>Integral lever, 1,1 mm [0.042 in] simulated roller lever</p>	<p>Integral lever, 11,7 mm [0.459 in] simulated roller lever</p> <p>Interchangeable with 1SX-1T switch with JX-25 actuator.</p>				

MICRO SWITCH™ SX SERIES AVAILABLE TERMINALS

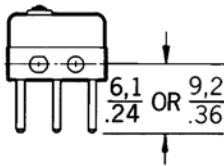


Mounting torque:
0,226 Nm max.
[2 in-lb max.]

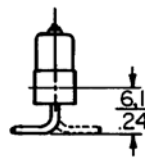
H58



STRAIGHT PIN



H391, H392
90° FORMED PIN



Mate with Amp Inc. Part No.
640024-1 Std.

SX Series

MICRO SWITCH™ JX SERIES AUXILIARY ACTUATORS FOR THE MICRO SWITCH™ SX SERIES SWITCHES (stainless steel actuators and hardware)

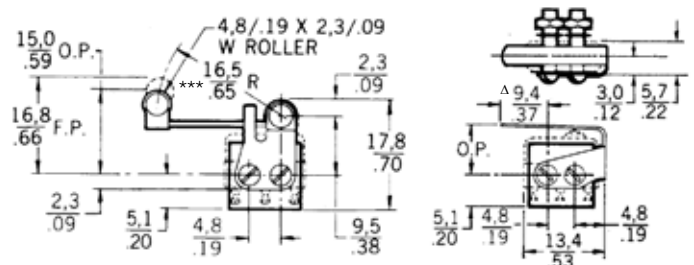
		Description	Actuator length	Operating Force max.	Release Force min.	Pretravel max.	Overtravel min.	Differential Travel max.	Operating Point approx.	Free Position ref.
JX-20 JX-219		Straight lever (JX-219 for higher temperatures)	18,3 mm [0.72 in]***	0,28 N [1 oz] approx.	0,04 N [0.14 oz]	–	0,76 mm [0.030 in] approx.	0,76 mm [0.030 in] approx.	10,8 mm [0.425 in]	12,3 mm [0.485 in]
JX-25 JX-220		Roller lever (JX-220 for higher temperatures)	16,5 mm [0.65 in]***	0,42 N [1.5 oz]	0,04 N [0.14 oz]	–	0,51 mm [0.020 in]	0,76 mm [0.030 in]	14,9 ,mm [0.585 in]	168 mm [0.660 in]
JX-40 JX-95		Straight leaf (JX-95 for higher temperatures)	9,4 mm [0.37 in]^A	1,95 N [7 oz]	0,56 N [2 oz]	5,7 mm [0.225 in] approx.	0,38 mm [0.015 in]	0,64mm [0.025 in]	7,5 mm [0.295 in]	12,3 mm [0.485 in]
JX-41**		Reverse leaf	9,4 mm [0.37 in]^A	1,67 N [6 oz]	0,28 N [1 oz]	2,79 mm [0.110 in] approx.	0,38 mm [0.015 in]	0,64mm [0.025 in]	7,5 mm [0.295 in]	9,4 mm [0.370 in]
JX-45 JX-96		Roller leaf (JX-96 for higher temperatures)	6,1 mm [0.24 in]^A	1,95 N [7 oz]	0,28 N [1 oz]	5,7 mm [0.225 in] approx.	0,38 mm [0.015 in]	0,64mm [0.025 in]	12,2 mm [0.48 in]	16,5 mm [0.650 in]
JX-51**		Reverse roller leaf	7,6 mm [0.30 in]^A	1,67 N [6 oz]	0,56 N [2 oz]	2,79 mm [0.110 in] approx.	0,38 mm [0.015 in]	0,64mm [0.025 in]	12,8 mm [0.505 in]	14,7 mm [0.58 in]
JX-4		Tandem leaf	7,9 mm [0.31 in]^A	4,17 N [15 oz]	0,83 N [3 oz]	1,65 mm [0.065 in] approx.	0,20 mm [0.008 in]	0,76 mm [0.030 in]	7,6 mm [0.30 in]	9,40 mm [0.37 in]

** Switch is mounted with plunger end reversed from JX-40

NOTE: Above actuators should be used below 149 °C [300 °F], except listings JX-95, JX-96, JX-219, and JX-220 are for use with 4SX1-T to 204 °C [400 °F]

^ Measurement for leaf-style levers is from center of mounting hole nearest tip of lever to the point indicated on the drawing

*** Measurement for hinge-style levers is from pivot point of the lever to the end of the lever or center of the lever's roller



MICRO SWITCH™ Premium Subminiature Basic Switches

ADDITIONAL INFORMATION

The following associated literature is available on Honeywell's web site at sensing.honeywell.com:

- Product installation instructions
- Product range guide
- Aerospace range guide
- Applying basic switches
- Low energy switching guide
- Product application-specific information
 - Application Note: Central Vacuum System
 - Application Note: Electronic Taping Machine
 - Application Note: Sensors and Switches in Sanitary Valves
 - Application Note: Sensors and Switches in Oil Rig Applications
 - Application Note: Sensors and Switches for Potential Medical Applications

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell website, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Find out more

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office.

To learn more about Honeywell's sensing and control products, call **+1-815-235-6847** or **1-800-537-6945**, visit **sensing.honeywell.com**, or e-mail inquiries to **info.sc@honeywell.com**

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The Honeywell logo is displayed in a bold, red, sans-serif font.

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

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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