

**RoHS (Pb) HF 16R Series**

**Description**

Littelfuse 16R Series Radial Leaded PTCs are designed to provide resettable overcurrent protection serving a wide range of electronics applications. With maximum 16 volts and maximum 100-ampere short circuit rating, they offer an ideal solution for USB protection.



**Features**

- 100A short circuit rating
- 16V Operating voltages
- Fast time-to-trip
- Meets all USB protection requirements
- RoHS compliant, Lead-Free and Halogen-Free\*

**Applications**

- Computers & peripherals
- Any USB application
- General Electronics

**Agency Approvals**

| AGENCY  | AGENCY FILE NUMBER |
|---|--------------------|
|  | E183209            |
|  | R50119318          |

**Electrical Characteristics**

| Part Number | I <sub>hold</sub> (A) | I <sub>trip</sub> (A) | V <sub>max</sub> (Vdc) | I <sub>max</sub> (A) | P <sub>d</sub> typ. (W) | Maximum Time To Trip |             | Resistance           |                       | Agency Approvals  |   |
|-------------|-----------------------|-----------------------|------------------------|----------------------|-------------------------|----------------------|-------------|----------------------|-----------------------|---|---|
|             |                       |                       |                        |                      |                         | Current (A)          | Time (Sec.) | R <sub>min</sub> (Ω) | R <sub>1max</sub> (Ω) |  |  |
| 16R250G     | 2.5                   | 4.7                   | 16                     | 100                  | 1.0                     | 12.5                 | 5.0         | 0.0220               | 0.0530                | X   | X   |
| 16R300G     | 3.0                   | 5.1                   | 16                     | 100                  | 2.3                     | 15.0                 | 1.0         | 0.0380               | 0.0975                | X   | X   |
| 16R400G     | 4.0                   | 6.8                   | 16                     | 100                  | 2.4                     | 20.0                 | 1.7         | 0.0210               | 0.0600                | X   | X   |
| 16R500G     | 5.0                   | 8.5                   | 16                     | 100                  | 2.6                     | 25.0                 | 2.0         | 0.0150               | 0.0340                | X   | X   |
| 16R600G     | 6.0                   | 10.2                  | 16                     | 100                  | 2.8                     | 30.0                 | 3.3         | 0.0100               | 0.0280                | X   | X   |
| 16R700G     | 7.0                   | 11.9                  | 16                     | 100                  | 3.0                     | 35.0                 | 3.5         | 0.0077               | 0.0200                | X   | X   |
| 16R800G     | 8.0                   | 13.6                  | 16                     | 100                  | 3.0                     | 40.0                 | 5.0         | 0.0056               | 0.0175                | X   | X   |
| 16R900G     | 9.0                   | 15.3                  | 16                     | 100                  | 3.3                     | 45.0                 | 5.5         | 0.0047               | 0.0135                | X   | X   |
| 16R1000G    | 10.0                  | 17.0                  | 16                     | 100                  | 3.6                     | 50.0                 | 6.0         | 0.0040               | 0.0102                | X   | X   |
| 16R1100G    | 11.0                  | 18.7                  | 16                     | 100                  | 3.7                     | 55.0                 | 7.0         | 0.0037               | 0.0089                | X   | X   |
| 16R1200G    | 12.0                  | 20.4                  | 16                     | 100                  | 4.2                     | 60.0                 | 7.5         | 0.0033               | 0.0086                | X   | X   |
| 16R1400G    | 14.0                  | 23.8                  | 16                     | 100                  | 4.6                     | 70.0                 | 9.0         | 0.0026               | 0.0064                | X   | X   |

I<sub>hold</sub> = Hold current: maximum current device will pass without tripping in 23°C still air.

I<sub>trip</sub> = Trip current: minimum current at which the device will trip in 23°C still air.

V<sub>max</sub> = Maximum voltage device can withstand without damage at rated current (I<sub>max</sub>)

I<sub>max</sub> = Maximum fault current device can withstand without damage at rated voltage (V<sub>max</sub>)

P<sub>d</sub> = Power dissipated from device when in the tripped state at 23°C still air.

R<sub>min</sub> = Minimum resistance of device in initial (un-soldered) state.

R<sub>1max</sub> = Maximum resistance of device at 23°C measured one hour after tripping.

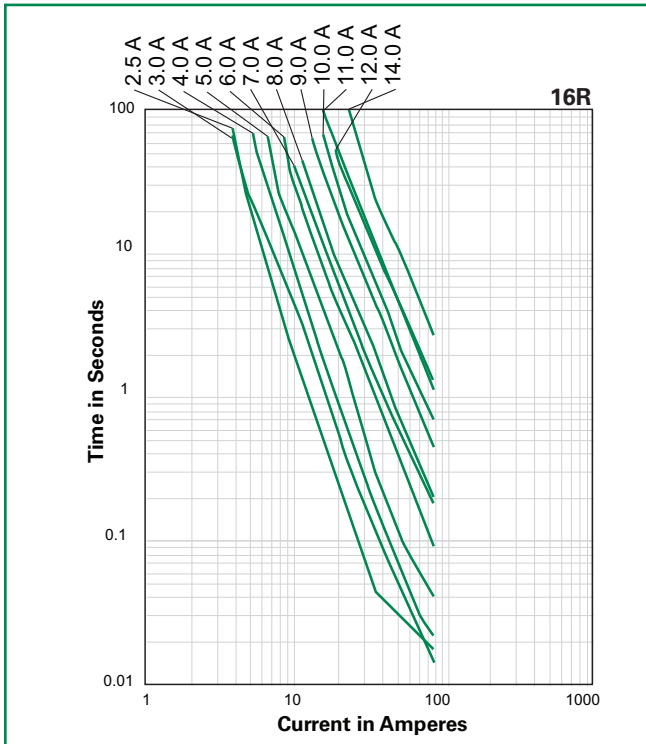
**Caution:** Operation beyond the specified rating may result in damage and possible arcing and flame.

\* Effective January 1, 2010, all 16R PTC products will be manufactured Halogen Free (HF). Existing Non-Halogen Free 16R PTC products may continue to be sold, until supplies are depleted.

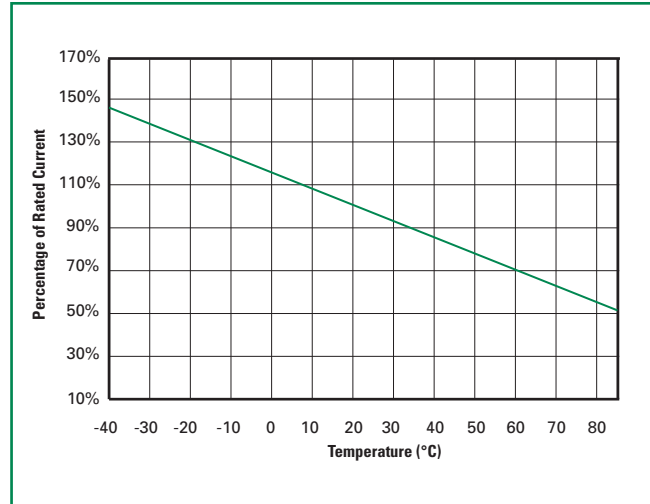
**Temperature Derating**

| Part Number | Ambient Operation Temperature |       |      |      |      |      |      |      |      |
|-------------|-------------------------------|-------|------|------|------|------|------|------|------|
|             | -40°C                         | -20°C | 0°C  | 23°C | 40°C | 50°C | 60°C | 70°C | 85°C |
| 16R250G     | 3.7                           | 3.3   | 2.9  | 2.5  | 2.2  | 2.0  | 1.8  | 1.6  | 1.3  |
| 16R300G     | 4.4                           | 4.0   | 3.5  | 3.0  | 2.6  | 2.4  | 2.1  | 1.9  | 1.6  |
| 16R400G     | 5.9                           | 5.3   | 4.7  | 4.0  | 3.5  | 3.2  | 2.9  | 2.6  | 2.1  |
| 16R500G     | 7.4                           | 6.6   | 5.9  | 5.0  | 4.4  | 4.0  | 3.6  | 3.2  | 2.6  |
| 16R600G     | 8.9                           | 8.0   | 7.1  | 6.0  | 5.2  | 4.8  | 4.3  | 3.9  | 3.2  |
| 16R700G     | 10.4                          | 9.3   | 8.2  | 7.0  | 6.1  | 5.6  | 5.0  | 4.5  | 3.7  |
| 16R800G     | 11.8                          | 10.6  | 9.4  | 8.0  | 7.0  | 6.3  | 5.7  | 5.1  | 4.2  |
| 16R900G     | 13.3                          | 12.0  | 10.6 | 9.0  | 7.8  | 7.1  | 6.5  | 5.8  | 4.7  |
| 16R1000G    | 14.8                          | 13.3  | 11.8 | 10.0 | 8.7  | 7.9  | 7.1  | 6.4  | 5.3  |
| 16R1100G    | 16.3                          | 14.6  | 12.9 | 11.0 | 9.6  | 8.7  | 7.9  | 7.0  | 5.8  |
| 16R1200G    | 17.7                          | 15.9  | 14.1 | 12.0 | 10.5 | 9.5  | 8.6  | 7.7  | 6.3  |
| 16R1400G    | 20.7                          | 18.6  | 16.5 | 14.0 | 12.2 | 11.1 | 10.0 | 9.0  | 7.4  |

**Average Time Current Curves**



**Temperature Derating Curve**



The average time current curves and Temperature Derating curve performance is affected by a number of variables, and these curves provided as guidance only. Customer must verify the performance in their application.

**Soldering Parameters - Wave Soldering**

|                         |  |
|-------------------------|--|
| <b>Pre-Heating Zone</b> | Refer to the condition recommended by the flux manufacturer.<br>Max. ramping rate should not exceed 4°C/Sec. |
| <b>Soldering Zone</b>   | Max. solder temperature should not exceed 260°C  |
| <b>Cooling Zone</b>     | Cooling by natural convection in air.  |



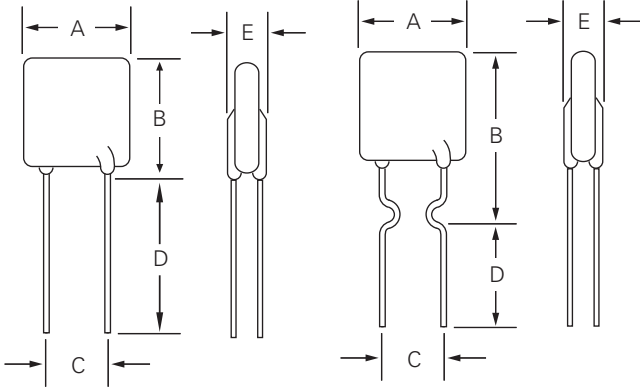
**Physical Specifications**

|                                  |  |
|----------------------------------|--|
| <b>Lead Material</b>             | 2.5A: Tin-plated Copper clad Steel<br>3.0 - 14.0A: Tin-plated Copper |
| <b>Soldering Characteristics</b> | Solderability per MIL-STD-202, Method 208E                           |
| <b>Insulating Material</b>       | Cured, flame retardant epoxy polymer meets UL94V-0 requirements.     |
| <b>Device Labeling</b>           | Marked with 'LF', voltage, current rating, and date code.            |

**Environmental Specifications**

|  |   |
|--|---|
| <b>Operating/Storage Temperature</b>                       | -40°C to +85°C  |
| <b>Maximum Device Surface Temperature in Tripped State</b> | 125°C   |
| <b>Passive Aging</b>                                       | +85°C, 1000 hours<br>-/+ 5% typical resistance change           |
| <b>Humidity Aging</b>                                      | +85°C, 85% R.H., 1000 hours<br>-/+ 5% typical resistance change |
| <b>Thermal Shock</b>                                       | +85°C to -40°C 10 times<br>-/+ 5% typical resistance change     |
| <b>Solvent Resistance</b>                                  | MIL-STD-202, Method 215F<br>No change                           |
| <b>Moisture Resistance Level</b>                           | Level 1, J-STD-020C   |

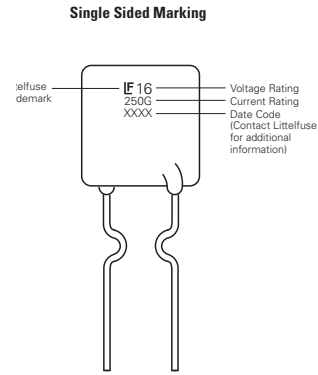
**Dimensions**



**Figure 1**

**Figure 2**

**Part Marking System**



| Part Number | Figure | A      |       | B      |       | C      |      | D      |      | E      |      | Physical Characteristics |      |          |
|-------------|--------|--------|-------|--------|-------|--------|------|--------|------|--------|------|--------------------------|------|----------|
|             |        | Inches | mm    | Inches | mm    | Inches | mm   | Inches | mm   | Inches | mm   | Lead (dia)               |      | Material |
|             |        | Max.   | Max.  | Max.   | Max.  | Typ.   | Typ. | Min.   | Min. | Max.   | Max. | Inches                   | mm   |          |
| 16R250G     | 2      | 0.35   | 8.90  | 0.50   | 12.80 | 0.20   | 5.1  | 0.13   | 3.18 | 0.12   | 3.00 | 0.020                    | 0.51 | Sn/CuFe  |
| 16R300G     | 1      | 0.28   | 7.10  | 0.43   | 11.00 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R400G     | 1      | 0.35   | 8.90  | 0.50   | 12.80 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R500G     | 1      | 0.41   | 10.40 | 0.56   | 14.30 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R600G     | 1      | 0.42   | 10.70 | 0.67   | 17.10 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R700G     | 1      | 0.44   | 11.20 | 0.78   | 19.70 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R700GKL   | 2      | 0.44   | 11.20 | 0.93   | 23.70 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R800G     | 1      | 0.50   | 12.70 | 0.82   | 20.90 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R900G     | 1      | 0.55   | 14.00 | 0.85   | 21.70 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R1000G    | 1      | 0.65   | 16.50 | 0.99   | 25.20 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R1100G    | 1      | 0.69   | 17.50 | 1.02   | 26.00 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.00 | 0.032                    | 0.81 | Sn/Cu    |
| 16R1200G    | 1      | 0.69   | 17.50 | 1.10   | 28.00 | 0.40   | 10.2 | 0.30   | 7.6  | 0.14   | 3.50 | 0.039                    | 1.00 | Sn/Cu    |
| 16R1400G    | 1      | 0.93   | 23.50 | 1.10   | 27.90 | 0.40   | 10.2 | 0.30   | 7.6  | 0.14   | 3.50 | 0.039                    | 1.00 | Sn/Cu    |

**Part Ordering Number System**

**Packaging Options**

| Part Number | Ordering Number | I <sub>hold</sub> (A) | I <sub>hold</sub> Code | Packaging Option | Quantity | Quantity & Packaging Codes |
|-------------|-----------------|-----------------------|------------------------|------------------|----------|----------------------------|
| 16R250G     | 16R250GU        | 2.50                  | 250                    | Bulk             | 500      | U                          |
|             | 16R250GPR       |                       |                        | Tape and Ammo    | 2000     | PR                         |
| 16R300G     | 16R300GU        | 3.00                  | 300                    | Bulk             | 500      | U                          |
|             | 16R300GPR       |                       |                        | Tape and Ammo    | 2000     | PR                         |
| 16R400G     | 16R400GU        | 4.00                  | 400                    | Bulk             | 500      | U                          |
|             | 16R400GPR       |                       |                        | Tape and Ammo    | 2000     | PR                         |
| 16R500G     | 16R500GU        | 5.00                  | 500                    | Bulk             | 500      | U                          |
|             | 16R500GPR       |                       |                        | Tape and Ammo    | 2000     | PR                         |
| 16R600G     | 16R600GU        | 6.00                  | 600                    | Bulk             | 500      | U                          |
|             | 16R600GDR       |                       |                        | Tape and Ammo    | 1500     | DR                         |
| 16R700G     | 16R700GF        | 7.00                  | 700                    | Bulk             | 200      | F                          |
|             | 16R700GKLF      |                       |                        | Tape and Ammo    | 1000     | MR                         |
|             | 16R700GMR       |                       |                        |                  |          |                            |
|             | 16R700GKLMR     |                       |                        |                  |          |                            |
| 16R800G     | 16R800GF        | 8.00                  | 800                    | Bulk             | 200      | F                          |
|             | 16R800GMR       |                       |                        | Tape and Ammo    | 1000     | MR                         |
| 16R900G     | 16R900GF        | 9.00                  | 900                    | Bulk             | 200      | F                          |
|             | 16R900GMR       |                       |                        | Tape and Ammo    | 1000     | MR                         |
| 16R1000G    | 16R1000GF       | 10.00                 | 1000                   | Bulk             | 200      | F                          |
|             | 16R1000GMR      |                       |                        | Tape and Ammo    | 1000     | MR                         |
| 16R1100G    | 16R1100GF       | 11.00                 | 1100                   | Bulk             | 200      | F                          |
|             | 16R1100GMR      |                       |                        | Tape and Ammo    | 1000     | MR                         |
| 16R1200G    | 16R1200GH       | 12.00                 | 1200                   | Bulk             | 100      | H                          |
|             | 16R1200GMR      |                       |                        | Tape and Ammo    | 1000     | MR                         |
| 16R1400G    | 16R1400GH       | 14.00                 | 1400                   | Bulk             | 100      | H                          |

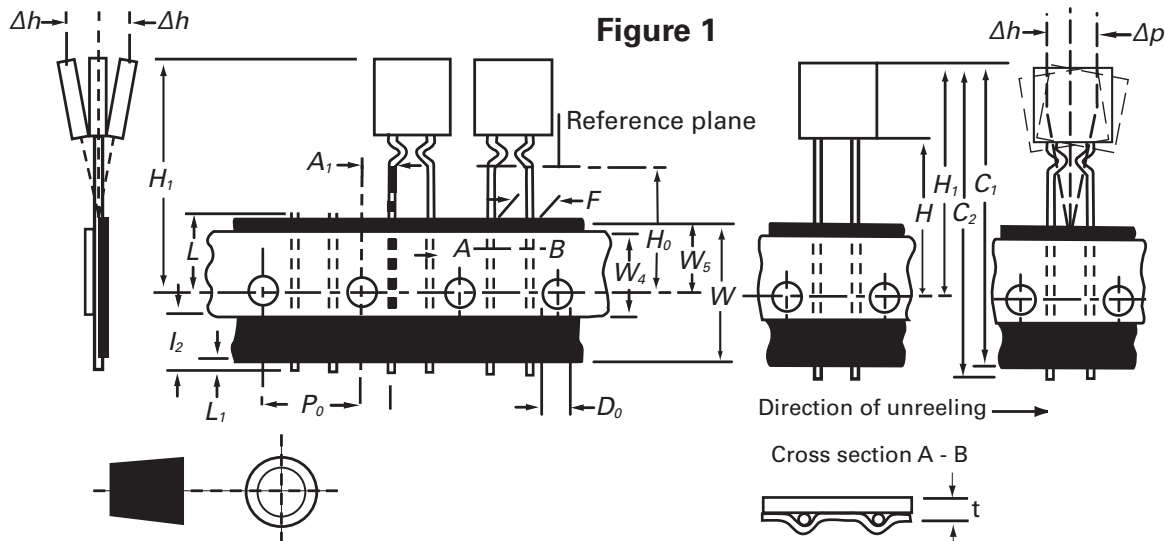
**Tape and Ammo Specifications**

Devices taped using EIA468-B/IE286-2 standards. See table below and Figure 1 for details.

| Dimension                            | EIA Mark             | IEC Mark             | Dimensions      |              |
|--------------------------------------|----------------------|----------------------|-----------------|--------------|
|                                      |                      |                      | Dim. (mm)       | Tol. (mm)    |
| Carrier tape width                   | <b>W</b>             | <b>W</b>             | 18              | -0.5 / +1.0  |
| Hold down tape width:                | <b>W<sub>4</sub></b> | <b>W<sub>0</sub></b> | 11              | min.         |
| Top distance between tape edges      | <b>W<sub>6</sub></b> | <b>W<sub>2</sub></b> | 3               | max.         |
| Sprocket hole position               | <b>W<sub>5</sub></b> | <b>W<sub>1</sub></b> | 9               | -0.5 / +0.75 |
| Sprocket hole diameter*              | <b>D<sub>0</sub></b> | <b>D<sub>0</sub></b> | 4               | -0.32 / +0.2 |
| Abscissa to plane(straight lead)     | <b>H</b>             | <b>H</b>             | 18.5            | -/+ 3.0      |
| Abscissa to plane(kinked lead)       | <b>H<sub>0</sub></b> | <b>H<sub>0</sub></b> | 16              | -/+ 0.5      |
| Abscissa to top                      |                      |                      | 45.0            | max.         |
| Overall width w/o lead protrusion    |                      |                      | 56              | max.         |
| Overall width w/ lead protrusion     |                      |                      | 57              | max.         |
| Lead protrusion                      | <b>L<sub>1</sub></b> | <b>I<sub>1</sub></b> | 1.0             | max.         |
| Protrusion of cut out                | <b>L</b>             | <b>L</b>             | 11              | max.         |
| Protrusion beyond hold-down tape     | <b>I<sub>2</sub></b> | <b>I<sub>2</sub></b> | Not specified   |              |
| Sprocket hole pitch                  | <b>P<sub>0</sub></b> | <b>P<sub>0</sub></b> | 25.4            | -/+ 0.5      |
| Device pitch:                        |                      |                      | 25.4            |              |
| Pitch tolerance                      |                      |                      | 20 consecutive. | -/+ 1        |
| Tape thickness                       | <b>t</b>             | <b>t</b>             | 0.9             | max.         |
| Tape thickness with splice           | <b>t<sub>1</sub></b> |                      | 2.0             | max.         |
| Splice sprocket hole alignment       |                      |                      | 0               | -/+ 0.3      |
| Body lateral deviation               | <b>Δh</b>            | <b>Δh</b>            | 0               | -/+ 1.0      |
| Body tape plane deviation            | <b>Δp</b>            | <b>Δp</b>            | 0               | -/+ 1.3      |
| Ordinate to adjacent component lead* | <b>P<sub>1</sub></b> | <b>P<sub>1</sub></b> | 3.81            | -/+ 0.7      |
| Ordinate to adjacent component lead* |                      |                      | 7.62            | -/+ 0.7      |
| Lead spacing:16R250G-16R1100G        | <b>F</b>             | <b>F</b>             | 5.08            | -/+ 0.8      |
| Lead spacing:16R1200G-16R1400G       | <b>F</b>             | <b>F</b>             | 10.18           | -/+ 0.8      |

\*Differs from EIA specification

**Tape and Ammo Diagram**



**Figure 1**

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9