

Switch Mode Power Supply S8VS

15/30-W Models

Compact, Thin Power Supplies That Mount Just About Anywhere to Contribute to Control Panel Downsizing

- Compact, thin size: 22.5 × 85 × 96.5 mm (W × H × D).
- Three mounting directions (standard, horizontal, facing horizontal).
- Mounting directly onto the panel is possible.
- Safety standards: UL508/60950-1/1604, CSA C22.2 No. 14/60950-1/213, EN50178 (= VDE0160), EN60950-1 (= VDE0805).



60/90/120/180/240-W Models

New Models with Total Run Time Monitor in Addition to Models with Maintenance Forecast Monitor

- Compact size: 40 × 95 mm (W × H) (60-W Models).
- Status displayed on 3-digit, 7-segment display.
- Safety standards: UL508/60950, CSA C22.2 No. 14/60950, EN50178 (= VDE0160), EN60950 (= VDE0805).



Features Common to All Models

- Mount to DIN-rail.
- Lead-free solder.

Model Number Structure

■ Model Number Legend

S8VS-

1	2	3			

1. Power Ratings

- 015: 15 W
- 030: 30 W
- 060: 60 W
- 090: 90 W
- 120: 120 W
- 180: 180 W
- 240: 240 W

2. Output voltage

- 05: 5 V
- 12: 12 V
- 24: 24 V

3. Configuration

15-W, 30-W Models

None: Standard

60-W Models

None: Standard

A: With maintenance forecast monitor

B: With total run time monitor

90-W, 120-W, 180-W, 240-W Models

None: Standard

A: With maintenance forecast monitor and undervoltage alarm (transistor (sinking))

B: With total run time monitor and undervoltage alarm (transistor (sinking))

AP: With maintenance forecast monitor and undervoltage alarm (transistor (sourcing))

BP: With total run time monitor and undervoltage alarm (transistor (sourcing))

Ordering Information

Power ratings	Input Voltage	Output voltage	Output current	Alarm output	Model number
15 W	100 to 240 VAC	5 V	2.0 A	---	S8VS-01505 (See note 1.)
		12 V	1.2 A	---	S8VS-01512
		24 V	0.65 A	---	S8VS-01524
30 W		5 V	4.0 A	---	S8VS-03005 (See note 2.)
		12 V	2.5 A	---	S8VS-03012
		24 V	1.3 A	---	S8VS-03024
60 W		24 V	2.5 A	---	S8VS-06024
				Sinking	S8VS-06024A
				Sourcing	S8VS-06024B
90 W	100 to 240 VAC	3.75 A	---	S8VS-09024	
			Sinking	S8VS-09024A	
			Sourcing	S8VS-09024AP	
			Sinking	S8VS-09024B	
			Sourcing	S8VS-09024BP	
120 W		5 A	---	S8VS-12024	
			Sinking	S8VS-12024A	
			Sourcing	S8VS-12024AP	
			Sinking	S8VS-12024B	
180 W		7.5 A	---	S8VS-18024	
			Sinking	S8VS-18024A	
			Sourcing	S8VS-18024AP	
			Sinking	S8VS-18024B	
240 W		10 A	---	S8VS-24024	
			Sinking	S8VS-24024A	
	Sourcing		S8VS-24024AP		
	Sinking		S8VS-24024B		
240 W	10 A	10 A	Sourcing	S8VS-24024BP	
			Sinking	S8VS-24024A	
			Sourcing	S8VS-24024AP	
			Sinking	S8VS-24024B	
240 W	10 A	10 A	Sourcing	S8VS-24024BP	
			Sinking	S8VS-24024A	
			Sourcing	S8VS-24024AP	
			Sinking	S8VS-24024B	

Note: 1. The output capacity of the S8VS-01505 is 10 W.

2. The output capacity of the S8VS-03005 is 20 W.

Specifications

■ Ratings/Characteristics

Item	Power ratings		15 W		30 W	
	Type		Standard		Standard	
Efficiency (typical)	5-V models		72% min. (76% typ.)		70% min. (76% typ.)	
	12-V models		74% min. (79% typ.)		76% min. (83% typ.)	
	24-V models		77% min. (81% typ.)		80% min. (85% typ.)	
Input	Voltage		100 to 240 VAC (85 to 264 VAC)			
	Frequency		50/60 Hz (47 to 450 Hz)			
	Current	100 V input	0.45 A max.		0.9 A max.	
		200 V input	0.25 A max.		0.6 A max.	
		230 V input	5 V: (0.14 A typ.), 12 V/24 V (0.19 A typ.)		5 V: (0.27 A typ.), 12 V/24 V (0.37 A typ.)	
	Power factor		---			
	Harmonic current emissions		Conforms to EN61000-3-2			
	Leakage current	100 V input	0.5 mA max.			
		200 V input	1.0 mA max.			
		230 V input	5 V/12 V/24 V: (0.30 mA typ.)		5 V/12 V/24 V: (0.32 mA typ.)	
Inrush current (See note 1.)	100 V input	25 A max. (20 A typ.) (for a cold start at 25°C)				
	200 V input	50 A max. (40 A typ.) (for a cold start at 25°C)				
	230 V input	5 V/12 V/24 V: (29 A typ.) (See note 6.)		5 V/12 V/24 V: (40 A typ.) (See note 6.)		
Output	Voltage adjustment range (See note 2.)		-10% to 15% (with V.ADJ) (guaranteed)			
	Ripple			2.0% (p-p) max. (at rated input/output voltage)		
		f=20MHz measuring	5 V: (0.70%(p-p) typ.), 12 V:(0.48%(p-p) typ.), 24 V:(0.25%(p-p) typ.)		5 V: (0.70%(p-p) typ.), 12 V:(0.52%(p-p) typ.), 24 V:(0.19%(p-p) typ.)	
		f=100MHz measuring	5 V: (0.86%(p-p) typ.), 12 V:(0.56%(p-p) typ.), 24 V:(0.32%(p-p) typ.)		5 V: (0.80%(p-p) typ.), 12 V:(0.58%(p-p) typ.), 24 V:(0.21%(p-p) typ.)	
	Input variation influence		0.5% max. (at 85 to 264 VAC input, 100% load)			
	Load variation influence (rated input voltage)		2.0% max. (5 V), 1.5% max. (12 V, 24 V), (with rated input, 0 to 100% load)			
	Temperature variation influence		0.05%/°C max.			
	Start up time (See note 1 and 7.)			100 ms max. (at rated input/output voltage)		1,000 ms max. (at rated input/output voltage)
				5 V: (6 ms typ.), 12 V: (12 ms typ.), 24 V: (18 ms typ.)		5 V/12 V/24 V: (240 ms typ.)
	Hold time (See note 1.)			20 ms min. (at rated input/output voltage)		
		at 100% load		5 V: (328 ms typ.), 12V: (251 ms typ.), 24 V: (243 ms typ.)		5 V: (299 ms typ.), 12 V: (217 ms typ.), 24 V: (210 ms typ.)
	Additional functions	Overload protection (See note 1.)		105% to 160% of rated load current, voltage drop, automatic reset		105% to 160% of rated load current, voltage drop, intermittent operation, automatic reset
		Overvoltage protection (See note 1.)		Yes (a zener diode clamp) (See note 3.)		Yes (See note 4.)
Output voltage indication		No				
Output current indication		No				
Peak-hold current indication		No				
Maintenance forecast monitor indication		No				
Maintenance forecast monitor output		No				
Total run time monitor indication		No				
Total run time monitor output		No				
Undervoltage alarm indication		Yes (color: red)				
Undervoltage alarm output		No				
Parallel operation		No				
Series operation		Models with 24-V output: Possible for up to 2 Power Supplies (with external diode) Models with 5- or 12-V output: Not possible				
Other	Operating ambient temperature		Refer to the derating curve in <i>Engineering Data</i> . (with no icing or condensation)			
	Storage temperature		-25 to 65°C			
	Operating ambient humidity		25% to 85% (Storage humidity: 25% to 90%)			
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and outputs; detection current: 20 mA) 2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA) 1.0 kVAC for 1 min. (between all outputs and PE terminals; detection current: 20 mA)			
	Insulation resistance		100 MΩ min. (between all outputs and all inputs/ PE terminals) at 500 VDC			
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions 10 to 150 Hz, 0.35-mm single amplitude (5 G max.) for 80 min. each in X, Y, and Z directions			
	Shock resistance		150 m/s ² , 3 times each in ±X, ±Y, and ±Z directions			
	Output indicator		Yes (color: green)			
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class B and based on FCC Class A			
		Radiated Emissions	Conforms to EN61204-3 EN55011 Class B			
	EMS		Conforms to EN61204-3 high severity levels			
	Approved standards		UL: UL508 (Listing, Class 2: Per UL1310), UL60950-1, UL1604 (Class I/Division2) cUL: CSA C22.2 No.14 (Class 2), No.60950-1, No.213 (Class I/Division2) EN/VDE: EN50178 (=VDE0160), EN60950-1 (=VDE0805) SELV (EN60950/EN50178/UL60950-1) According to VDE0106/P100, IP20			
	Weight		160 g max.		180 g max.	

- Note:**
1. Refer to the *Engineering Data* section on page B-21 for details.
 2. If the V.ADJ adjuster is turned, the voltage will increase by more than +15% of the voltage adjustment range. When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
 3. The overvoltage protection of the S8VS-015□□ uses a zener diode clamp. If the internal feedback circuit is destroyed by any chance, the load may be destroyed by the clamped output voltage (approx. 140% to 190% of the rated output voltage).
 4. To reset the protection, turn OFF the power supply for three minutes or longer and then turn the power supply back ON.
 5. The typical values indicate the values for an input condition of 230 VAC. All items are measured at a frequency of 50 Hz.
 6. The inrush current circuits do not differ for voltage specifications. Therefore, the typical values are the data values for 24-V models.
 7. The circuit forms are different, so the start up time is shorter only when using a 15-W power rating.

Specifications

■ Ratings/Characteristics

Item	Power ratings Type	60 W			90 W			
		Standard	Maintenance forecast monitor	Total run time monitor	Standard	Maintenance forecast monitor	Total run time monitor	
Efficiency (typical)		78% min. (86% typ.)			80% min. (87% typ.)			
Input	Voltage	100 to 240 VAC (85 to 264 VAC)						
	Frequency	50/60 Hz (47 to 450 Hz)						
	Current	100 V input	1.7 A max.			2.3 A max.		
		200 V input	1.0 A max.			1.4 A max.		
		230 V input	(0.7 A typ.)			(0.9 A typ.)		
	Power factor	---						
	Harmonic current emissions	Conforms to EN61000-3-2						
	Leakage current	100 V input	0.5 mA max.					
		200 V input	1.0 mA max.					
		230 V input	(0.40 mA typ.)			(0.35 mA typ.)		
Inrush current (See note 1.)	100 V input	25 A max. (for a cold start at 25°C)						
	200 V input	50 A max. (for a cold start at 25°C)						
	230 V input	(47 A typ.)			(38 A typ.)			
Output	Voltage adjustment range (See note 2.)	-10% to 15% (with V.ADJ.) (guaranteed)						
	Ripple	2.0% (p-p) max. (at rated input/output voltage)						
		f=20MHz measuring	(0.29% (p-p) typ.)			(0.38% (p-p) typ.)		
	f=100MHz measuring	(0.32% (p-p) typ.)			(0.42% (p-p) typ.)			
	Input variation influence	0.5% max. (at 85 to 264 VAC input, 100% load)						
	Load variation influence (rated input voltage)	1.5% max. (with rated input, 0 to 100% load)						
	Temperature variation influence	0.05%/°C max.						
	Start up time (See note 1.)	1,000 ms max. (at rated input/output voltage)						
		(270 ms typ.)			(260 ms typ.)			
	Hold time (See note 1.)	20 ms min. (at rated input/output voltage)						
		at 100% load	(220 ms typ.)			(190 ms typ.)		
	Additional functions	Overload protection (See note 1.)	105% to 160% of rated load current, voltage drop, intermittent, automatic reset					
		Overvoltage protection (See notes 1 and 3.)	Yes					
Output voltage indication (See note 4.)		No	Yes (selectable) (See note 5.)		No	Yes (selectable) (See note 5.)		
Output current indication (See note 4.)		No	Yes (selectable) (See note 6.)		No	Yes (selectable) (See note 6.)		
Peak-hold current indication (See note 4.)		No	Yes (selectable) (See note 7.)		No	Yes (selectable) (See note 7.)		
Maintenance forecast monitor indication (See note 4.)		No	Yes (selectable)	No	No	Yes (selectable)	No	
Maintenance forecast monitor output		No			Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	
Total run time monitor indication (See note 4.)		No	Yes (selectable)		No	Yes (selectable)		
Total run time monitor output		No			Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		Yes (selectable)	
Undervoltage alarm indication (See note 4.)		No	Yes (selectable)		No	Yes (selectable)		
Undervoltage alarm output terminals		No			Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)			
Parallel operation		No						
Series operation		Yes for up to 2 Power Supplies (with external diode)						
Other	Operating ambient temperature	Refer to the derating curve in <i>Engineering Data</i> . (with no icing or condensation)						
	Storage temperature	-25 to 65°C						
	Operating ambient humidity	25% to 85% (Storage humidity: 25% to 90%)						
	Dielectric strength	3.0 kVAC for 1 min. (between all inputs and outputs/ alarm outputs; detection current: 20 mA)						
		2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA)						
		1.0 kVAC for 1 min. (between all outputs/ alarm outputs and PE terminals; detection current: 20 mA)						
		500 VAC for 1 min. (between all outputs and alarm outputs; detection current: 20 mA)						
	Insulation resistance	100 MΩ min. (between all outputs/ alarm outputs and all inputs/ PE terminals) at 500 VDC						
	Vibration resistance	10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions						
		10 to 150Hz, 0.35-mm single amplitude (5 G max.) for 80 min each in-X, Y, and Z directions						
	Shock resistance	150 m/s ² , 3 times each in ±X, ±Y, and ±Z directions						
	Output indicator	Yes (color: green)						
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class A and based on FCC Class A					
Radiated Emissions		Conforms to EN61204-3 EN55011 Class B (See note 9.)						
EMS	Conforms to EN61204-3 high severity levels							
Approved standards	UL: UL508 (Listing, Class 2: Per UL1310), UL60950 cUL: CSA C22.2 No.14 (Class 2), No.60950 EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805) SELV (EN60950/EN50178/UL60950-1) According to VDE0106/P100, IP20			UL: UL508 (Listing), UL60950 cUL: CSA C22.2 No.14, No.60950 EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805) SELV (EN60950/EN50178/UL60950-1) According to VDE0106/P100, IP20				
Weight	330 g max.			490 g max.				

- Note:**
1. Refer to the *Engineering Data* section on page B-21 for details.
 2. If the V.ADJ adjuster is turned, the voltage will increase by more than +15% of the voltage adjustment range (by more than +10% for 240-W models). When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
 3. To reset the protection, turn OFF the power supply for three minutes or longer and then turn the power supply back ON.
 4. Displayed on 7-segment LED. (character height: 8 mm)
 5. Resolution of output voltage indication: 0.1 V, Precision of output voltage indication: ±2% (percentage of output voltage value, ±1 digit)
 6. Resolution of output current indication: 0.1 A; Precision of output current indication: ±5% F.S. ±1 digit max. (specified by rated output voltage)
 7. Resolution of peak-hold current indication: 0.1 A; Precision of peak-hold current indication: ±5% F.S. ±1 digit max. (specified by rated output voltage);
Signal width required for peak-hold current: 20 ms
 8. A Type and B Type: Sinking, AP Type and P Type: Sourcing
 9. To ensure the emission rating, a ferrite ring core should be used in all cabling (TDK HF60T, HF70RH or equivalent model).
 10. The typical values indicate the values for an input condition of 230 VAC. All items are measured at a frequency of 50 Hz.

Item	Power ratings Type	120 W			180 W			240 W			
		Standard	Maintenance forecast monitor	Total run time monitor	Standard	Maintenance forecast monitor	Total run time monitor	Standard	Maintenance forecast monitor	Total run time monitor	
Efficiency (typical)		80% min. (87% typ.)			80% min. (88% typ.)			80% min. (86% typ.)			
Input	Voltage		100 to 240 VAC (85 to 264 VAC)								
	Frequency		50/60 Hz (47 to 63 Hz)								
	Current	100 V input	1.9 A max.			2.9 A max.			3.8 A max.		
		200 V input	1.1 A max.			1.6 A max.			2.0 A max.		
		230 V input	(0.6 A typ.)			(0.9 A typ.)			(1.2 A typ.)		
	Power factor		0.95 min.								
	Harmonic current emissions		Conforms to EN61000-3-2								
	Leakage current	100 V input	0.5 mA max.								
		200 V input	1.0 mA max.								
		230 V input	(0.43 mA typ.)			(0.45 mA typ.)			(0.45 mA typ.)		
Inrush current (See note 1.)	100 V input	25 A max. (for a cold start at 25°C)									
	200 V input	50 A max. (for a cold start at 25°C)									
	230 V input	(41 mA typ.)			(34 mA typ.)			(39 mA typ.)			
Output	Voltage adjustment range (See note 2.)		-10% to 15% (with V.ADJ) (guaranteed)				±10% (with V.ADJ) (guaranteed)				
	Ripple		2.0% (p-p) max. (at rated input/output voltage)								
		f=20MHz measuring	(0.66%(p-p) typ.)			(0.45%(p-p) typ.)			(0.13%(p-p) typ.)		
		f=100MHz measuring	(0.67%(p-p) typ.)			(0.52%(p-p) typ.)			(0.21%(p-p) typ.)		
	Input variation influence		0.5% max. (at 85 to 264 VAC input, 100% load)								
	Load variation influence (rated input voltage)		1.5% max. (with rated input, 0 to 100% load)								
	Temperature variation influence		0.05%/°C max.								
	Start up time (See note 1.)		1,000 ms max. (at rated input/output voltage)								
		(380 ms typ.)			(530 ms typ.)			(780 ms typ.)			
		Hold time (See note 1.)		20 ms min. (at rated input/output voltage)							
		at 100% load			(60 ms typ.)			(30 ms typ.)			
		Overload protection (See note 1.)		105% to 160% of rated load current, voltage drop, intermittent, automatic reset					105% to 160% of rated load current, voltage drop, automatic reset		
	Overvoltage protection (See notes 1 and 3.)		Yes								
Output voltage indication (See note 4.)		No	Yes (selectable) (See note 5.)		No	Yes (selectable) (See note 5.)		No	Yes (selectable) (See note 5.)		
Output current indication (See note 4.)		No	Yes (selectable) (See note 6.)		No	Yes (selectable) (See note 6.)		No	Yes (selectable) (See note 6.)		
Peak-hold current indication (See note 4.)		No	Yes (selectable) (See note 7.)		No	Yes (selectable) (See note 7.)		No	Yes (selectable) (See note 7.)		
Maintenance forecast monitor indication (See note 4.)		No	Yes (selectable)	No	No	Yes (selectable)	No	No	Yes (selectable)	No	
Maintenance forecast monitor output		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		
Total run time monitor indication (See note 4.)		No	Yes (selectable)		No	Yes (selectable)		No	Yes (selectable)		
Total run time monitor output		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		
Undervoltage alarm indication (See note 4.)		No	Yes (selectable)		No	Yes (selectable)		No	Yes (selectable)		
Undervoltage alarm output terminals		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		
Parallel operation		No									
Series operation		Yes for up to 2 Power Supplies (with external diode)									
Other	Operating ambient temperature		Refer to the derating curve in <i>Engineering Data</i> . (with no icing or condensation)								
	Storage temperature		-25 to 65°C								
	Operating ambient humidity		25% to 85% (Storage humidity: 25% to 90%)								
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and outputs/ alarm outputs; detection current: 20 mA) 2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA) 1.0 kVAC for 1 min. (between all outputs/ alarm outputs and PE terminals; detection current: 20 mA) 500 VAC for 1 min. (between all outputs and alarm outputs; detection current: 20 mA)								
	Insulation resistance		100 MΩ min. (between all outputs/ alarm outputs and all inputs/ PE terminals) at 500 VDC								
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions 10 to 150Hz, 0.35-mm single amplitude (5 G max.) for 80 min each in-X, Y, and Z directions								
	Shock resistance		150 m/s ² , 3 times each in ±X, ±Y, and ±Z directions								
	Output indicator		Yes (color: green)								
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class A and based on FCC Class A Conforms to EN61204-3 EN55011 Class B (See note 9.)								
		Radiated Emissions	Conforms to EN61204-3 EN55011 Class A Conforms to EN61204-3 EN55011 Class B (See note 9.)								
	EMS		Conforms to EN61204-3 high severity levels								
	Approved standards		UL: UL508 (Listing), UL60950 cUL: CSA C22.2 No.14, No.60950 EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805) SELV (EN60950/UL50178/UL60950-1) According to VDE0106/P100, IP20								
	Weight		550 g max.			850 g max.			1,150 g max.		

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.);

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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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