

# ALUMINUM ELECTROLYTIC CAPACITORS

**PW** Miniature Sized, Low Impedance, High Reliability For Switching Power Supplies series



- Smaller case size and lower impedance than PM series.
- Low impedance and high reliability withstanding 2000 hours to 8000 hours.
- Capacitance ranges available based on the numerical values in E12 series under JIS.
- Compliant to the RoHS directive (2011/65/EU).



## Specifications

Item	Performance Characteristics											
Category Temperature Range	-55 to +105°C (6.3 to 100V), -40 to +105°C (160 to 400V), -25 to +105°C (450V)											
Rated Voltage Range	6.3 to 450V											
Rated Capacitance Range	0.47 to 15000µF											
Capacitance Tolerance	±20% at 120Hz, 20°C											
Leakage Current	Rated voltage (V)	6.3 to 100	160 to 450									
	Leakage current	After 1 minute's application of rated voltage at 20°C, leakage current is not more than 0.03CV or 4 (µA), whichever is greater. CV ≤ 1000: I = 0.1CV+40 (µA) max. CV > 1000: I = 0.04CV+100 (µA) max.										
Tangent of loss angle (tan δ)	For capacitance of more than 1000µF, add 0.02 for every increase of 1000µF. Measurement frequency : 120Hz at 20°C											
	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160 to 250	315 - 350	400 - 450
Stability at Low Temperature	Impedance ratio (MAX.)	Z-25°C / Z+20°C	—	—	—	—	3	3	4	6	15	—
		Z-40°C / Z+20°C	—	—	—	—	—	—	4	6	10	—
		Z-55°C / Z+20°C	3	3	3	3	—	—	—	—	—	—
Endurance	The specifications listed at right shall be met when the capacitors are restored to 20°C after D.C. bias plus rated ripple current is applied for 8000 hours (2000 hours for φD=4, 5 and 6.3, 3000 hours for φD=8, 5000 hours for φD=10, 7000 hours for φD=12.5) at 105°C, the peak voltage shall not exceed the rated voltage.											
	Capacitance change	Within ±20% of the initial capacitance value										
Shelf Life	tan δ	200% or less than the initial specified value										
	Leakage current	Less than or equal to the initial specified value										
Marking	Printed with white color letter on dark brown sleeve.											

## Radial Lead Type

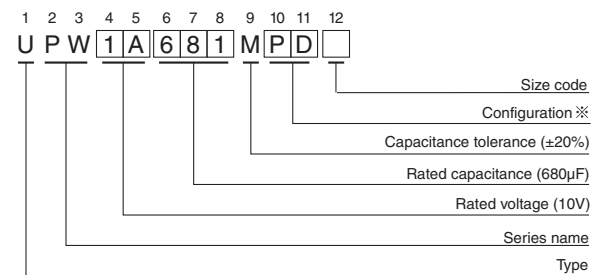


α	(L = 7) 1.0
	(L < 20) 1.5
	(L ≥ 20) 2.0

	(mm)										
φD	4	5	6.3	8	10	12.5	16	18	20	22	25
P	1.5	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0	12.5
φd	0.45	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
β	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0

※: Applied to L>25 products  
( ): Applied to 7mmL products

## Type numbering system (Example : 10V 680µF)



### ※ Configuration

φ D	Pb-free leadwire Pb-free PET sleeve
4 - 5	DD
6.3	ED (7mm L : DD)
8 - 10	PD
12.5 to 18	HD
20 to 25	RD

• Please refer to page 20 about the end seal configuration.

## Frequency coefficient of rated ripple current

V	Cap. (µF)	Frequency				
		50Hz	120Hz	300Hz	1kHz	10kHz or more
6.3 to 100	0.47 to 56	0.20	0.30	0.50	0.80	1.00
	68 to 330	0.55	0.65	0.75	0.85	1.00
	390 to 1000	0.70	0.75	0.80	0.90	1.00
	1200 to 15000	0.80	0.85	0.90	0.95	1.00
160 to 450	0.47 to 220	0.80	1.00	1.25	1.40	1.60
	330 to 470	0.90	1.00	1.10	1.13	1.15

Please refer to page 20, 21, 22 about the formed or taped product spec.

Please refer to page 4 for the minimum order quantity.

- Dimension table in next page.



## Standard Ratings

Cap. (μF)	V (Code) Item Code	6.3 (0J)				10 (1A)			
		Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz
			20°C / 100kHz	-10°C / 100kHz			20°C / 100kHz	-10°C / 100kHz	
22	220	5 × 11	0.60	1.20	180	5 × 11 ▲ 4 × 7	0.60 2.00	1.20 5.00	180 65
27	270	4 × 7	2.00	5.00	65				
33	330	5 × 11 ▲ 5 × 7	0.60 0.95	1.20 2.40	180 120	5 × 11 ▲ 5 × 7	0.60 0.95	1.20 2.40	180 120
39	390					5 × 7	0.95	2.40	120
47	470	5 × 11 ▲ 5 × 7	0.60 0.95	1.20 2.40	180 120	5 × 11 ▲ 4 × 11	0.60 1.30	1.20 2.60	180 120
56	560	5 × 7	0.95	2.40	120				
68	680	4 × 11	1.30	2.60	120				
82	820					5 × 11 ▲ 6.3 × 7	0.60 0.45	1.20 1.20	180 200
100	101	5 × 11	0.60	1.20	180	5 × 11 ▲ 5 × 15	0.60 0.50	1.20 1.00	180 235
120	121	6.3 × 7	0.45	1.20	200				
150	151	6.3 × 11 ▲ 5 × 15	0.25 0.50	0.50 1.00	290 235	6.3 × 11	0.25	0.50	290
180	181					6.3 × 11	0.25	0.50	290
220	221	6.3 × 11	0.25	0.50	290	6.3 × 11 ▲ 6.3 × 15	0.25 0.23	0.50 0.46	290 430
330	331	6.3 × 11 ▲ 6.3 × 15	0.25 0.23	0.50 0.46	290 430	8 × 11.5	0.117	0.234	555
470	471	8 × 11.5	0.117	0.234	555	8 × 11.5	0.117	0.234	555
560	561	8 × 11.5	0.117	0.234	555				
680	681	10 × 12.5	0.090	0.180	755	10 × 12.5 ▲ 8 × 15	0.090 0.085	0.180 0.170	760 730
820	821	8 × 15 ▲ 10 × 12.5	0.085 0.090	0.170 0.180	730 755				
1000	102	10 × 12.5	0.090	0.180	755	10 × 16 ▲ 8 × 20	0.068 0.065	0.136 0.130	1050 995
1200	122	8 × 20 ▲ 10 × 16	0.065 0.068	0.130 0.136	995 1050	10 × 20	0.052	0.104	1220
1500	152	10 × 20	0.052	0.104	1220	10 × 20 ▲ 10 × 25	0.052 0.045	0.104 0.090	1220 1440
2200	222	12.5 × 20 ▲ 10 × 25	0.038 0.045	0.076 0.090	1655 1440	12.5 × 20 ▲ 10 × 31.5	0.038 0.035	0.076 0.070	1655 1815
2700	272	10 × 31.5	0.035	0.070	1815	12.5 × 25	0.030	0.060	1945
3300	332	12.5 × 20	0.038	0.076	1655	12.5 × 25 ▲ 12.5 × 31.5	0.030 0.025	0.060 0.050	1950 2310
3900	392	12.5 × 25	0.030	0.060	1945	12.5 × 35.5 ▲ 16 × 20	0.022 0.029	0.044 0.058	2510 2210
4700	472	16 × 25 ▲ 12.5 × 31.5	0.022 0.025	0.044 0.050	2555 2310	16 × 25	0.022	0.044	2555
5600	562	12.5 × 35.5 ▲ 16 × 20	0.022 0.029	0.044 0.058	2510 2210	16 × 25 ▲ 18 × 20	0.022 0.028	0.044 0.056	2560 2490
6800	682	16 × 25 ▲ 18 × 20	0.022 0.028	0.044 0.056	2560 2490	16 × 31.5 ▲ 18 × 25	0.018 0.020	0.036 0.040	3010 2740
8200	822	16 × 31.5	0.018	0.036	3010	16 × 35.5 ▲ 18 × 31.5	0.016 0.016	0.032 0.032	3150 3635
10000	103	16 × 31.5 ▲ 18 × 25	0.016 0.020	0.032 0.040	3150 2740	18 × 35.5	0.015	0.030	3680
12000	123	18 × 31.5	0.016	0.032	3635				
15000	153	18 × 35.5	0.015	0.030	3680	18 × 40	0.014	0.028	3800

▲ : In this case, [6] will be put at 12th digit of type numbering system.



## Standard Ratings

Cap. (μF)	V(Code)	Item Code	16 (1C)				25 (1E)			
			Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz
				20°C / 100kHz	-10°C / 100kHz			20°C / 100kHz	-10°C / 100kHz	
4.7	4R7					5 × 11	0.60	1.20	180	
10	100	5 × 11	0.60	1.20	180	5 × 11	0.60	1.20	180	
						▲4 × 7	2.00	5.00	65	
15	150	4 × 7	2.00	5.00	65					
22	220	5 × 11	0.60	1.20	180	5 × 11	0.60	1.20	180	
		▲5 × 7	0.95	2.40	120	▲5 × 7	0.95	2.40	120	
27	270	5 × 7	0.95	2.40	120	4 × 11	1.30	2.60	120	
33	330	5 × 11	0.60	1.20	180	5 × 11	0.60	1.20	180	
		▲6.3 × 7	0.45	1.20	200					
39	390	4 × 11	1.30	2.60	120	5 × 11	0.60	1.20	180	
						▲6.3 × 7	0.45	1.20	200	
47	470	5 × 11	0.60	1.20	180	5 × 11	0.60	1.20	180	
56	560	5 × 11	0.60	1.20	180	5 × 15	0.50	1.00	235	
		▲6.3 × 7	0.45	1.20	200					
82	820	5 × 15	0.50	1.00	235	6.3 × 11	0.25	0.50	290	
100	101	6.3 × 11	0.25	0.50	290	6.3 × 11	0.25	0.50	290	
120	121	6.3 × 11	0.25	0.50	290	6.3 × 15	0.23	0.46	430	
150	151	6.3 × 11	0.25	0.50	290	8 × 11.5	0.117	0.234	555	
180	181	6.3 × 15	0.23	0.46	430					
220	221	8 × 11.5	0.117	0.234	555	8 × 11.5	0.117	0.234	555	
330	331	8 × 11.5	0.117	0.234	555	10 × 12.5	0.090	0.180	760	
						▲8 × 15	0.085	0.170	730	
470	471	10 × 12.5	0.090	0.180	760	10 × 16	0.068	0.136	1050	
		▲8 × 15	0.085	0.170	730	▲8 × 20	0.065	0.130	995	
560	561					10 × 20	0.052	0.104	1220	
680	681	10 × 16	0.068	0.136	1050	10 × 20	0.052	0.104	1220	
		▲8 × 20	0.065	0.130	995					
820	821	10 × 20	0.052	0.104	1220	10 × 25	0.045	0.090	1440	
1000	102	10 × 20	0.052	0.104	1220	12.5 × 20	0.038	0.076	1660	
						▲10 × 31.5	0.035	0.070	1815	
1200	122	10 × 25	0.045	0.090	1440					
1500	152	12.5 × 20	0.038	0.076	1655	16 × 25	0.022	0.044	2555	
		▲10 × 31.5	0.035	0.070	1815	▲12.5 × 25	0.030	0.060	1950	
1800	182					12.5 × 31.5	0.025	0.050	2310	
						▲16 × 20	0.029	0.058	2210	
2200	222	12.5 × 25	0.030	0.060	1945	16 × 25	0.022	0.044	2555	
						▲18 × 20	0.028	0.056	2490	
						※12.5 × 35.5	0.022	0.044	2510	
2700	272	12.5 × 31.5	0.025	0.050	2310	16 × 25	0.022	0.044	2555	
		▲16 × 20	0.029	0.058	2210					
3300	332	16 × 25	0.022	0.044	2555	16 × 31.5	0.018	0.036	3010	
		▲12.5 × 35.5	0.022	0.044	2510	▲18 × 25	0.020	0.040	2740	
3900	392	16 × 25	0.022	0.044	2560	16 × 35.5	0.016	0.032	3150	
		▲18 × 20	0.028	0.056	2490	▲18 × 31.5	0.016	0.032	3635	
4700	472	16 × 31.5	0.018	0.036	3010	18 × 35.5	0.015	0.030	3680	
		▲18 × 25	0.020	0.040	2740					
5600	562	16 × 35.5	0.016	0.032	3150					
		▲18 × 31.5	0.016	0.032	3635					
6800	682	18 × 35.5	0.015	0.030	3680	18 × 40	0.014	0.028	3800	
8200	822	18 × 35.5	0.015	0.030	3680					
10000	103	18 × 40	0.014	0.028	3800					

▲ : In this case, [6] will be put at 12th digit of type numbering system.  
 ※ : In this case, [3] will be put at 12th digit of type numbering system.

## Standard Ratings

Cap. (μF)	V(Code)	Item Code	35 (1V)				50 (1H)			
			Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz
				20°C / 100kHz	-10°C / 100kHz			20°C / 100kHz	-10°C / 100kHz	
0.47	R47					5 × 11	5.00	10.0	25	
1	010					5 × 11	3.50	7.00	40	
2.2	2R2					5 × 11	3.00	6.00	55	
3.3	3R3					5 × 11	2.60	5.20	65	
4.7	4R7	5 × 11	0.60	1.20	180	5 × 11	2.30	4.60	90	
6.8	6R8	4 × 7	2.00	5.00	65					
10	100	5 × 11	0.60	1.20	180	5 × 11	1.40	2.80	120	
		▲ 5 × 7	0.95	2.40	120	▲ 4 × 11	2.50	5.00	90	
12	120	5 × 7	0.95	2.40	120					
18	180	4 × 11	1.30	2.60	120	5 × 11	1.30	2.60	155	
22	220	5 × 11	0.60	1.20	180	5 × 11	1.20	2.40	170	
27	270	5 × 11	0.60	1.20	180	5 × 15	0.90	1.80	215	
		▲ 6.3 × 7	0.45	1.20	200					
33	330	5 × 11	0.60	1.20	180	6.3 × 11	0.43	0.86	300	
39	390	5 × 15	0.50	1.00	235					
47	470	6.3 × 11	0.25	0.50	290	6.3 × 11	0.43	0.86	300	
56	560	6.3 × 11	0.25	0.50	290	6.3 × 15	0.40	0.80	360	
82	820	6.3 × 15	0.23	0.46	430	8 × 11.5	0.234	0.468	485	
100	101	8 × 11.5	0.117	0.234	555	8 × 11.5	0.234	0.468	485	
						8 × 15	0.155	0.310	635	
120	121					▲ 10 × 12.5	0.162	0.324	620	
						10 × 12.5	0.162	0.324	615	
150	151	8 × 11.5	0.117	0.234	555	8 × 20	0.120	0.240	860	
180	181					▲ 10 × 16	0.119	0.238	850	
						10 × 16	0.119	0.238	850	
220	221	10 × 12.5	0.090	0.180	760	▲ 10 × 20	0.090	0.180	1030	
		▲ 8 × 15	0.085	0.170	730	10 × 25	0.082	0.164	1200	
330	331	10 × 16	0.068	0.136	1050	10 × 20	0.090	0.180	1030	
		▲ 8 × 20	0.065	0.130	995	▲ 10 × 31.5	0.060	0.120	1610	
390	391	10 × 20	0.052	0.104	1220	12.5 × 20	0.063	0.126	1480	
470	471	10 × 20	0.052	0.104	1220	12.5 × 20	0.060	0.120	1500	
560	561	10 × 25	0.045	0.090	1440	12.5 × 25	0.050	0.100	1832	
680	681	12.5 × 20	0.038	0.076	1660	12.5 × 25	0.050	0.100	1840	
		▲ 10 × 31.5	0.035	0.070	1815	▲ 16 × 20	0.048	0.096	1840	
820	821					12.5 × 35.5	0.034	0.068	2290	
						▲ 18 × 20	0.042	0.084	2420	
1000	102	12.5 × 25	0.030	0.060	1950	16 × 25	0.034	0.068	2235	
1200	122	12.5 × 31.5	0.025	0.050	2310	16 × 31.5	0.028	0.056	2700	
		▲ 16 × 20	0.029	0.058	2210	▲ 18 × 25	0.029	0.058	2610	
1500	152	16 × 25	0.022	0.044	2555	16 × 31.5	0.028	0.056	2700	
		▲ 12.5 × 35.5	0.022	0.044	2510	▲ 16 × 35.5	0.025	0.050	2790	
1800	182	16 × 25	0.022	0.044	2555	18 × 31.5	0.025	0.050	3000	
		▲ 18 × 20	0.028	0.056	2490					
2200	222	16 × 31.5	0.018	0.036	3010	18 × 35.5	0.023	0.046	3100	
		▲ 18 × 25	0.020	0.040	2740					
2700	272	16 × 35.5	0.016	0.032	3150					
		▲ 18 × 31.5	0.016	0.032	3635					
3300	332	18 × 35.5	0.015	0.030	3680					
4700	472	18 × 40	0.014	0.028	3800					

▲ : In this case, [6] will be put at 12th digit of type numbering system.



## Standard Ratings

V(Code)		63 (1J)				100 (2A)					
Cap.(μF)	Code	Item	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz	
				20°C / 100kHz	-10°C / 100kHz			20°C / 100kHz	-10°C / 100kHz		
0.47	R47						5 × 11	43.0	86.0	20	
1	010						5 × 11	20.0	40.0	30	
2.2	2R2						5 × 11	9.80	19.6	44	
3.3	3R3						5 × 11	6.60	13.2	58	
4.7	4R7		5 × 11	4.70	9.40	68	5 × 11	4.60	9.20	74	
6.8	6R8		5 × 11	2.50	5.00	95	5 × 11	3.50	7.00	95	
		▲	4 × 11	3.50	7.00	80					
10	100		5 × 11	2.10	4.20	110	6.3 × 11	1.80	3.60	130	
12	120		5 × 11	2.00	4.00	145					
15	150		6.3 × 11	1.20	2.40	160	8 × 11.5	0.83	1.66	180	
18	180		5 × 15	1.30	2.60	200	6.3 × 15	0.80	1.60	200	
22	220		6.3 × 11	0.71	1.42	250	8 × 11.5	0.68	1.36	230	
33	330		6.3 × 11	0.71	1.42	250	10 × 12.5	0.46	0.92	320	
		▲	8 × 15				0.45	0.90	360		
39	390		6.3 × 15	0.70	1.40	330					
							10 × 16	0.37	0.74	420	
47	470		8 × 11.5	0.342	0.684	405	▲	8 × 20	0.37	0.74	420
68	680		8 × 11.5	0.342	0.684	405	10 × 20	0.30	0.60	490	
82	820						10 × 25	0.25	0.50	540	
100	101		10 × 12.5	0.256	0.512	540	12.5 × 20	0.18	0.36	580	
		▲	8 × 15	0.230	0.460	535					
120	121		10 × 16	0.194	0.388	600					
150	151		10 × 16	0.194	0.388	660	12.5 × 25	0.13	0.26	710	
180	181		10 × 20	0.147	0.294	890	12.5 × 31.5	0.12	0.24	790	
		▲	12.5 × 15	0.150	0.300	1020	▲	16 × 20	0.13	0.26	750
220	221		10 × 20	0.147	0.294	885	16 × 25	0.10	0.20	890	
		▲	10 × 25	0.130	0.260	1050	▲	18 × 20	0.11	0.22	850
270	271		16 × 15	0.090	0.180	1410					
330	331		12.5 × 20	0.085	0.170	1290	16 × 25	0.090	0.18	1080	
390	391		12.5 × 25	0.070	0.140	1720	18 × 25	0.083	0.166	1260	
		▲	18 × 15	0.086	0.172	1690					
470	471		12.5 × 25	0.070	0.140	1720	16 × 31.5	0.076	0.152	1310	
		▲	12.5 × 31.5	0.055	0.110	2090					
		※	16 × 20	0.059	0.118	1770					
560	561						18 × 31.5	0.068	0.136	1370	
680	681		16 × 25	0.050	0.100	2160	16 × 35.5	0.064	0.128	1410	
		▲	12.5 × 35.5	0.047	0.094	2270					
		※	18 × 20	0.055	0.110	2290					
820	821		16 × 31.5	0.043	0.086	2670					
		▲	18 × 25	0.043	0.086	2590					
1000	102		16 × 31.5	0.043	0.086	2770	18 × 40	0.047	0.094	1520	
		▲	16 × 35.5	0.036	0.072	2770					
1200	122		18 × 31.5	0.032	0.064	2950					
1500	152		18 × 35.5	0.030	0.060	3100					
2200	222		18 × 40	0.028	0.056	3200					

▲ : In this case, [6] will be put at 12th digit of type numbering system.

※ : In this case, [3] will be put at 12th digit of type numbering system.

V(Code)		160		200		250		315		350		400		450			
Cap. (μF)	Code	2C		2D		2E		2F		2V		2G		2W			
		0.47	R47	6.3 × 11	12	6.3 × 11	12	6.3 × 11	12	8 × 11.5	11	8 × 11.5	11				
1	010	6.3 × 11	17	6.3 × 11	17	6.3 × 11	17	8 × 11.5	16	10 × 12.5	17	10 × 12.5	16	10 × 12.5	18		
2.2	2R2	6.3 × 11	25	6.3 × 11	25	8 × 11.5	29	10 × 12.5	28	10 × 16	31	10 × 16	27	10 × 20	29		
3.3	3R3	8 × 11.5	36	8 × 11.5	36	10 × 12.5	42	10 × 12.5	34	10 × 16	38	10 × 20	36	12.5 × 20	41		
4.7	4R7	8 × 11.5	43	10 × 12.5	50	10 × 12.5	50	10 × 16	45	10 × 20	49	10 × 20	43	12.5 × 20	49		
10	100	10 × 12.5	70	10 × 16	80	10 × 20	88	10 × 20	72	12.5 × 20	82	12.5 × 25	72	16 × 25	75		
22	220	10 × 20	130	10 × 20	140	12.5 × 25	155	12.5 × 25	120	16 × 25	130	16 × 25	110	16 × 31.5	115		
33	330	12.5 × 20	180	12.5 × 25	190	12.5 × 25	190	16 × 25	155	16 × 31.5	160	16 × 31.5	140	●	18 × 35.5	145	
47	470	12.5 × 25	220	12.5 × 25	220	16 × 25	230	16 × 35.5	190	●	18 × 35.5	200	●	18 × 35.5	170	20 × 40	175
100	101	16 × 25	330	16 × 31.5	335	●	18 × 35.5	340	▲	18 × 40	285	20 × 40	290	22 × 50	350	25 × 50	350
220	221	●	18 × 35.5	500	▲	18 × 40	515	20 × 40	525	22 × 50	540	25 × 50	550				
330	331	20 × 40	900	22 × 40	1100	22 × 50	1150										
470	471	22 × 50	1200	22 × 50	1310	25 × 50	1350										Case size φD × L (mm) ※

※Rated ripple current (mArms) at 105°C 120Hz

Size φ20 × 31 is available for capacitors marked " ● "

Size φ20 × 35 is available for capacitors marked " ▲ "

In this case, [6] will be put at 12th digit of type numbering system.

## 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

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