

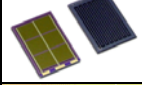


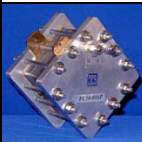






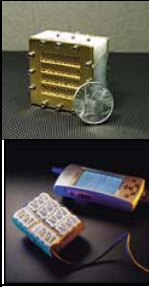


## MICRO FUEL CELLS – Technical Info.

Company Name	Product	Types of Fuel Cells Developed	# Of Cells in Stack	Standard Voltage	Current (A)	Power (W)	Efficiency	Size	Weight	Picture
AER Energy Resources, Inc.	Nokia phone prototype	Zinc-Air								
<a href="#">Casio Computer Co., Ltd.</a>	High-Performance Fuel Cells for Portable Devices (Lap top)	Direct-type fuel cell								
Casio Computer Co., Ltd.	High-Performance Fuel Cells for Portable Devices (Digital Camera)	Direct-type fuel cell								
Casio Computer Co., Ltd.	Micro reformer	N/A								
<a href="#">Dais-Analytic</a>	DAC-10	PEM		DC		10 W		3"x4"x4"	Less than 2 lbs.	
Dais-Analytic	DAC-1	PEM		DC		1 W				
Dais-Analytic	DAC-15	PEM		DC		15 W				
Dais-Analytic	Fuel cell Radio	PEM								
<a href="#">Electric Fuel Corp.</a>	INSTANT POWER™ products	Zinc/air fuel cells	INSTANT POWER products: 4 per cartridge; batteries 4 to 7, depending on model.	Open circuit: 1.4 V per cell (5.6 V per cartridge); operating 0.9-1.2V (3.6-4.8V per cartridge)	0.5-0.9 A continuous (2.0 A pulse) depending on cell configuration	50W/kg	70%	3300 mAh cell: 1.5 cc/Wh	INSTANT POWER 3.7 gm/Wh	
Electric Fuel Corp.	Primary zinc-air packs for military applications	Zinc/air fuel cells	24 cells	19-28V or 10-14V	1.5-2.5A continuous	50W/kg	70%	30Ah cell: 1.0 cc/Wh	2.5 gm/Wh	
ElectroChem, Inc.	FC50-03SP	PEM	7			50 W (peak power = 100W)	Can operate at utilization of H2 and O2 close to 99%	15x15x1.5 cm	4 kg	

<a href="#">Electro-Chem-Technic</a>	FC03 PEM Fuel Cell System - 2 cell stack	PEM	2	5 volts nominal		1.2 W		60 x 80 x 30 mm	Mass = 200 g	
<a href="#">Energy Visions, Inc.</a>		PEM-based DMFC								
Fraunhofer Institute for Solar Energy Applications in Freiburg, Germany	Portable Fuel Cells (for notebooks)	PEM	27 cells	24 volts		50 Watt				
Fraunhofer Institute for Solar Energy Applications in Freiburg, Germany	Portable Fuel Cells (for camcorder)	PEM	15 cells (16 bipolar plates)	8 volts		10 Watts				
<a href="#">Fuel Cell Systems, Inc.</a>	Mk2 module	Alkaline	24 cells	4 VDC +/- 5%	107A +/- 5% (max = 120A)	410W +/- 5%	45 to 55% = electrical eff.	98 x 250 x 310 mm	6 kg	
<a href="#">Giner, Inc</a>	Direct Methanol Fuel Cell	DMFC				55 Watt				
Giner, Inc	Regenerative Fuel Cell	PEM								
Giner, Inc	Reformate-Air Fuel Cell	PEM								
<a href="#">Greenvolt Power Corp.</a>	PM-60 Emergency Fuel Cell Module	Magnesium Air Saltwater Fuel Cell (MASWFC)		6 VDC	2 amps (max)				3 lbs.	
Greenvolt Power Corp.	PM-120 Portable Fuel Cell Module	Magnesium Air Saltwater Fuel Cell (MASWFC)		12 V	2 amps (max)	40 to 60 W			4.5 lbs.	
Greenvolt Power Inc.	PM-135	Magnesium Air Saltwater Fuel Cell (MASWFC)		13.5 V	10 amps (max)				7 lbs.	
<a href="#">H2 ECOmy</a>	FC100 - Single Cell	PEM	1	0.3 to 1.0 V		Up to 4 W		5 sq. cm active area (diameter = 10.5 cm x 2 cm)		

H2 ECOmy	FC100 - 2	PEM	2	0.6 to 2.0 V		Up to 40 W		thick) 50 sq. cm active area (13.5 x 13.5 x 4 cm)		
Lynntech, Inc.		Monopolar DMFC	40 cells			15 W			1.5 kg dry weight (FC stacks = 175 g)	
<a href="#">Manhattan Scientifics, Inc.</a>	MicroFuel Cells									
Manhattan Scientifics, Inc.	NovArs Mid-Range Fuel Cell									
Nasa's Jet Propulsion Laboratory (JPL)	Flat fuel cell	Monopolar PEMFC				5 W				
<a href="#">Medis</a>	3G Cellular Phone Battery	DMFC		0.7 to 0.8 V per cell		1.5 and 3.6 watts (w/ new Intel chip); 0.1 to 0.115 W per cell		2.25" x 1.5" x .5"; .75" x .75" x .375" per cell	90 grams; 15 to 20 grams per cell	
Medis	DLM Fuel Cell Modules	DMFC								
Medis	DLM Fuel Cell Power Pack	DMFC								
<a href="#">Motorola Labs</a>	Ceramic based miniature DMFC	DMFC				100 mW net continuous		2" x 4" x .5"		
Motorola Labs	Portable hydrogen fuel cells	PEMFC				1-20 Watts				
<a href="#">MTI Micro Fuel Cells</a>	Portable hybrid fuel cell	DMFC								
Nasa's Jet Propulsion Laboratory (JPL)	Flat fuel cell	Monopolar PEMFC				5 W				
<a href="#">Neah Power Systems</a>	Portable Methanol fuel cells	DMFC								
NEC Corporation [specifically their Fundamental Research Laboratories]	Tiny portable PAFC	PAFC				Energy capacity is expected to be 1300		40 x 50 x 5 mm		

						Wh/kg (Li-ion batteries are around 130 Wh/kg)				
Polyfuel, Inc.	Rechargeable battery replacements	DMFC								
PowerZinc Electric Inc.	PowerChip	Zinc / Air								
Protonex Technology Corp.		PEMFC and DMFC				Focused on 10- 3000 W				
Samsung Advanced Research Institute of Technology	DMFC Pack	DMFC	3.6 V	570 mA		2000 mW @ 32 mW/cm2 ; 2600 mW @ 50 mW/cm2				
<a href="#">Smart Fuel Cell GmbH</a>	DMFC for Cameras	DMFC	12 VDC			25 W contin. (peak = 80 W)		46 x 24 x 16 cm	9.7 kg w/ fuel	
Smart Fuel Cell GmbH	DMFC for Traffic Lights	DMFC	12 VDC			25 W contin.		120 x 160 x 170 mm	2.8 kg	
Toshiba International Fuel Cell Corporation (w/ UTC)	Fuel Cell powered Genio (PDA)	DMFC	0.4 to 0.5 volts			5W (8W peak)	90% fuel utilization (10% lost at cross over) 33% power gen. efficiency	127mm x 105mm x 25mm	500 grams	
<a href="#">Trimol Group Inc.</a>	Wireless Phone Aluminum-Air Fuel Cell	Aluminum-Air	1.2 operating voltage	2.5 A (nominal); 4.50 A max		18 Watt- hours		12 ml; 60 x 35 x 8 mm	25 grams	
Trimol Group Inc.	Portable PC Aluminum-Air Fuel Cell	Aluminum-Air	12 operating voltage			200 Wh; 15 W nominal; 30 W max; 45 W peak		180 x 70 x 20 mm	0.450 kg	

Notice: For additional information or comments on Fuel Cells 2000's charts, contact Jennifer Gangi at: [jennifer@fuelcells.org](mailto:jennifer@fuelcells.org).