

---

---

# EDLC (Electric Double Layer Capacitor)의 응용 연구

---

---

이 문 배 기술이사

(코 칩)



# Application Research of Electric Double Layer Capacitors

2003.11.21

[www.korchip.com](http://www.korchip.com)

## Principal

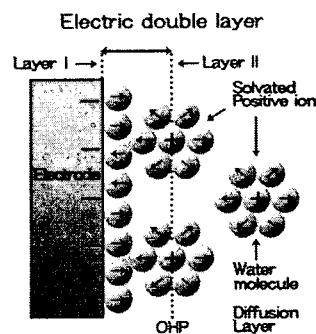
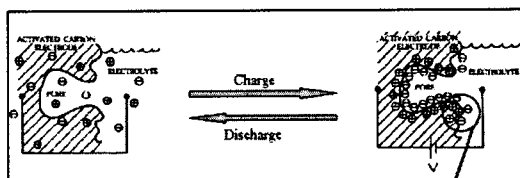
Electrostatic  
Capacitors

Electrolytic  
Capacitor

Electrochemical  
Capacitor

■ Electric Double Layer Capacitor

■ Pseudo Capacitor



[www.korchip.com](http://www.korchip.com)

We are *EDLC*  
*MICRO-CELL* technical leader

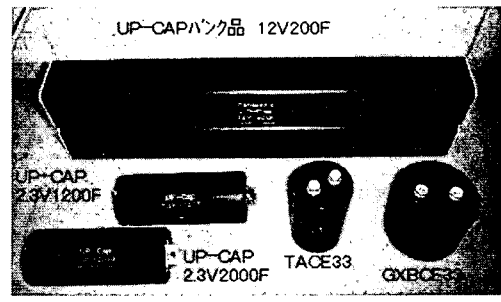
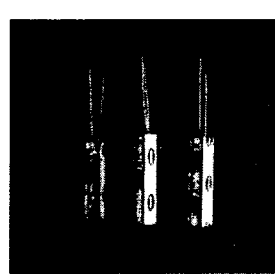
**Products**

Capacitance	Electrode	Electrolyte	Shape	Reaction
Small	AC	Aqueous	Coin	EDLC
Medium	ACF	Organic	Mold	Pseudo
Large	Aerogel	Solid	Winding	Hybrid
	Polymer		Stacking	
	Metal			

※ AC : Activated Carbon , ACF : Activated Carbon Fiber

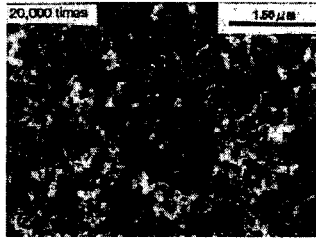
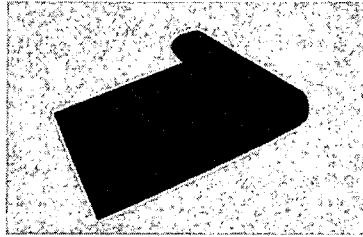
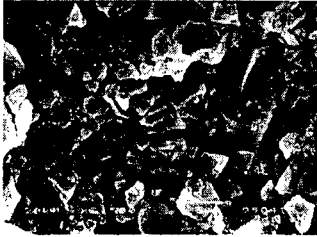
[www.korchip.com](http://www.korchip.com)

We are *EDLC*  
*MICRO-CELL* technical leader



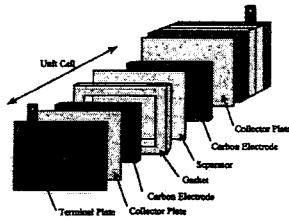
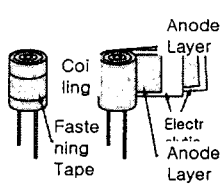
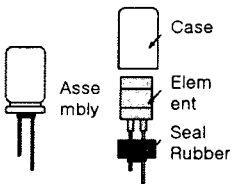
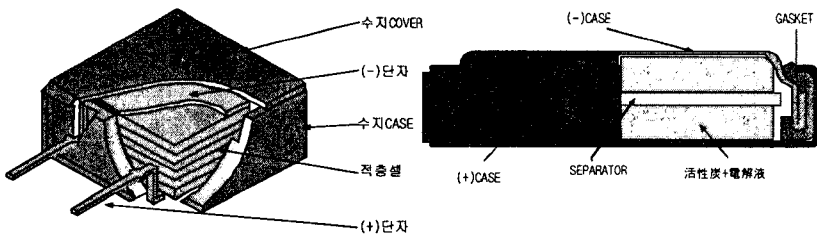
[www.korchip.com](http://www.korchip.com)

We are EDLC MICRO-CELL technical leader



www.korchip.com

We are EDLC MICRO-CELL technical leader



www.korchip.com

E D L C  
We are MICRO-CELL technical leader

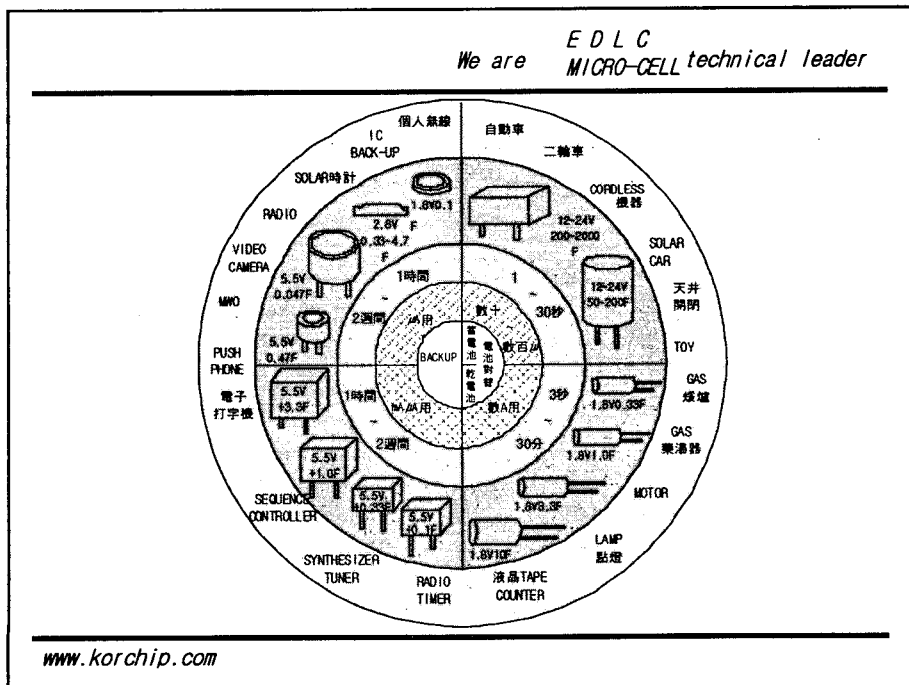
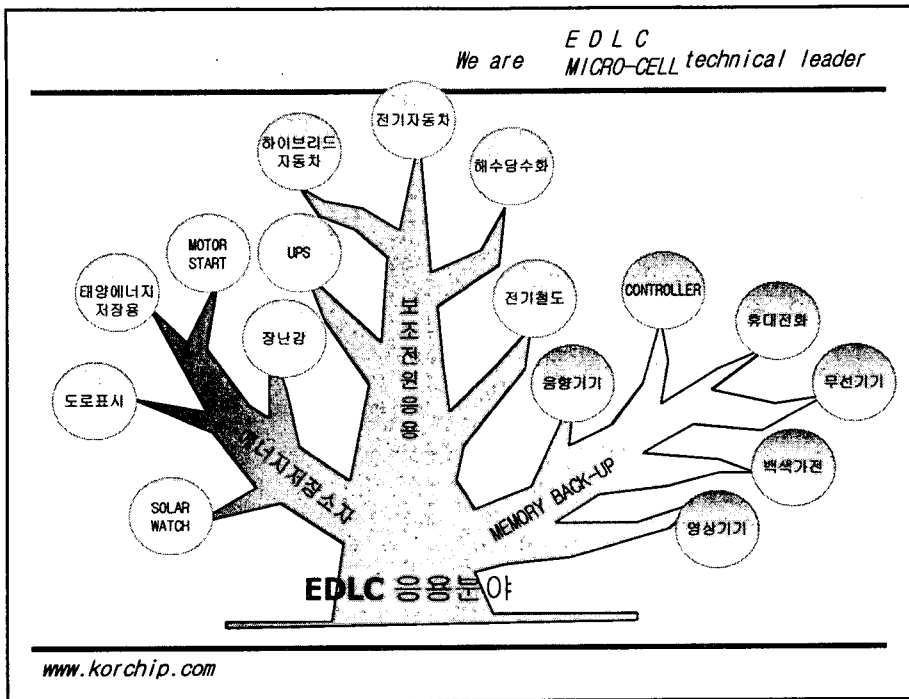
기업명	전극구성	기술보유 및 개발현황	상업화 여부	적용용도
Asahi glass (일본)	활성탄/유기계	3V, 70 ~ 1500F, 중. 대용량 EDLC 연구	상업화	Power sources
Maxwell (미국)	활성탄/유기계	3V, 10~4000F급, 중. 대용량 EDLC 연구	상업화	Power sources
Kanebo (일본)	PAS/유기계	2.5V, 0.3F급 소용량 EDLC 개발	상업화	휴대폰 RTC용
ELNA (일본)	활성탄/유기계	3.3V, 0.2F급 소용량 EDLC 개발	상업화	휴대폰, PDA
Seiko (일본)	-	3.3V, 0.1F급, 소용량 의사 커패시터 개발	-	휴대폰, PDA
PRI (미국)	RuO <sub>2</sub>	100V/400V, 1F (모듈)	-	군용
EVANS (미국)	Ta <sub>2</sub> O <sub>5</sub> /RuO <sub>2</sub>	28V, 0.02F급 고효율형 하이브리드 커패시터 개발	상업화	Packaged prototype
ESMA (러시아)	NiOOH/활성탄	1.7V, 8-10kW/kg 중용량 하이브리드 커패시터 개발	상업화	자동차 엔진시동용
Telcordia (미국)	PFPT/Li <sub>4</sub> Ti <sub>5</sub> O <sub>12</sub>	2.75V, 20Wh/kg급 중용량 하이브리드 커패시터 개발	-	-

www.korchip.com

E D L C  
We are MICRO-CELL technical leader

기업명	전극구성	기술보유 및 개발현황	상업화 여부	비고
SY hitech	활성탄/유기계	5.5V, <1F급 소용량 EDLC 개발	상업화 (600만개/년)	
	활성탄/유기계	2.5V, 100~3000F급 중. 대용량 EDLC 연구	-	
NESS	활성탄/유기계	2.5V, 100~5000F급 중. 대용량 EDLC 연구	상업화 (대용량제품)	
	MnO <sub>2</sub> /유기계	1V급 중대용량 의사 커패시터 개발	-	
Ginori	Ta <sub>2</sub> O <sub>5</sub> /RuO <sub>2</sub>	4.2V, 1F급 고효율형 하이브리드 커패시터 연구	-	
Korchip	활성탄/유기계	5.5V, <0.22F급 소용량 EDLC 개발	상업화 (3000만개/년)	
	활성탄/유기계	5.5V, <1F급 유기계 소용량 EDLC 개발	상업화 (800만개/년)	
	활성탄/유기계	2.5V, 100F급 중용량 EDLC 개발	상업화 (500만개/년)	

www.korchip.com



*E D L C*  
We are *MICRO-CELL* technical leader

SET	使用目的
据置型 VCR	- 時計의 停電時의 BACK-UP
VIDEO CAMERA	- MAIN 電池 交換時의 COUNTER, WHITE BALANCE等의 MEMORY BACK-UP
MINI COMPONENT	- PRE SET TUNER의 BACK-UP/- S/W OFF시 狀態保存(VOLUME LEVEL, CD의 選曲)
HEADPHONE STEREO	- 電池交換時의 PRE SET TUNER BACK-UP
CAR STEREO	- ACC OFF時의 TUNER BACK-UP
CAMERA	- 攝影枚數의 液晶表示 電池交換時 BACK-UP/- 內裝 STROBO 充電時의 電壓降下 對策
MEMORY CARD, 電子手帖, PAGER	- MAIN 電池 交換時의 MEMORY BACK-UP
多技能電話, 携帯電話	- DIAL MEMORY等 BACK-UP(停電時)/- 電池 交換時의 BACK-UP
W/P, DATA TERMINAL	- MAIN 電池 交換時의 MEMORY BACK-UP
COMPUTER	- 瞬間 停電時의 BOARD 및 MEMORY BACK-UP
FDD, HDD	- 停電時의 HEAD  올바른 整地/- PORTABLE, BAG PC의 電池壽命 向上
PRINTER	- 停電時 BUFFER MEMORY의 BACK-UP
PC, FA機器, ROBOT, 計測機	- 停電時의 MEMORY BACK-UP
GAS爐爐, 藥湯器	- GAS 着火時의 電子弁 驅動用
玩具, 電動玩具	- 急速充電에 의한 MOTOR驅動
學習技能 REMOCON	- MAIN 電池 交換時의 MEMORY BACK-UP
SOLAR應用(時計, 道路表示等)	- 太陽電池와 組合하여 HYBRIDGE 電源으로 日照동안의 太陽電池로부터 ENERGY를 供給받아 어두워지면 放電하여 ENERGY를 供給함.

[www.korchip.com](http://www.korchip.com)

*E D L C*  
We are *MICRO-CELL* technical leader



[www.korchip.com](http://www.korchip.com)

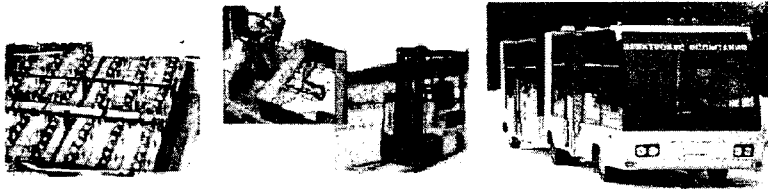


*E D L C*  
We are *MICRO-CELL* technical leader

**Specification of the traction supercapacitors and batteries**

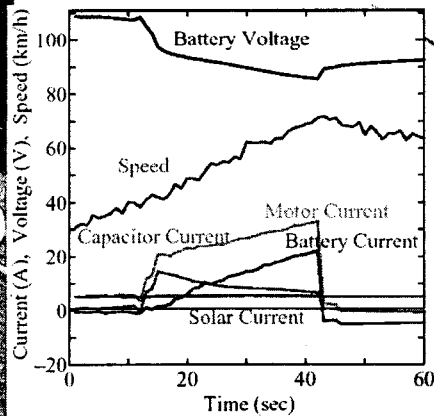
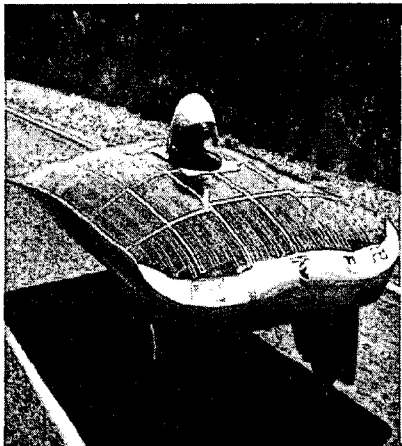
	7717-30	30 1717-30	501717-30
Nominal voltage, V	1.6	48	80(240)
Available energy, kJ	100	3000	5000
Discharge current max., A	800	800	800
Time of charging, min.	13-15	13-15	13-15
Working temperature, °C	-40...+40	-40...+40	-40...+40
Durability, years	5	5	5
Dimensions, mm			
height	235	235	235
length	83	500	830
width	99	495	495
Weight, kg	2.7	88	145

In accordance with a consumer's will the batteries can be assembled in various configurations with output voltage ranging from 6 to 500 V.



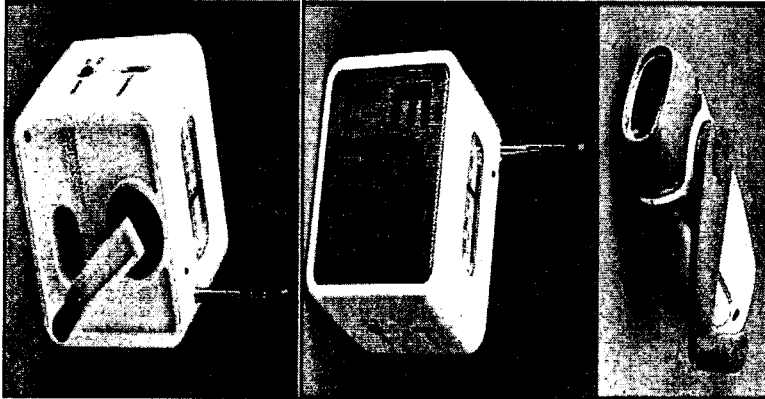
[www.korchip.com](http://www.korchip.com)

*E D L C*  
We are *MICRO-CELL* technical leader



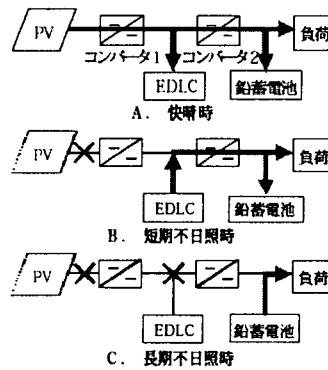
[www.korchip.com](http://www.korchip.com)

We are *EDLC*  
*MICRO-CELL* technical leader



[www.korchip.com](http://www.korchip.com)

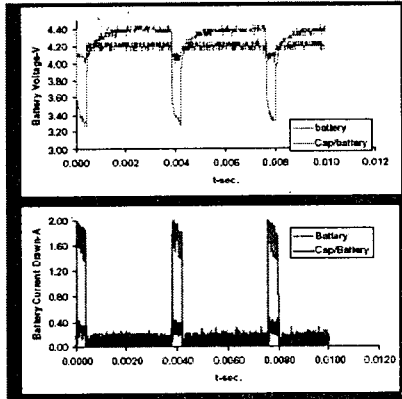
We are *EDLC*  
*MICRO-CELL* technical leader



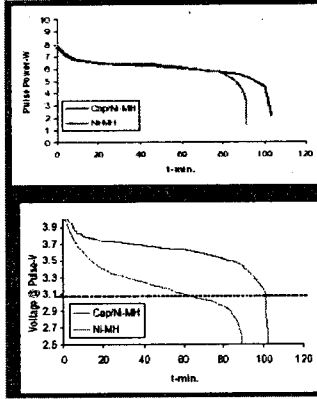
[www.korchip.com](http://www.korchip.com)

We are **E D L C**  
MICRO-CELL technical leader

**SuperCAP/ Battery System  
Reduces Voltage Sag at Pulse Peak**



**At the same pulse power level the SuperCAP/NI Metal Hydride System has a longer run time than the NI Metal Hydride battery alone**



[www.korchip.com](http://www.korchip.com)

We are **E D L C**  
MICRO-CELL technical leader

Product	Specification	Current (A) Usage	Configuration	Discharge Rate	Application
Personal Wireless	1.8V±1F	µA	Button Cell	1 Hr-2 Wk	Memory Protection
IC Backup	2.8V±0.33-4.7F	µA	Button Cell	1 Hr-2 Wk	Memory Protection
Solar Watch	2.8V±0.33-4.7F	µA	Button Cell	1 Hr-2 Wk	Memory Protection
Radio	5.5V±0.047F	µA	Radial Lead	1 Hr-2 Wk	Memory Protection
VCR Camera	5.5V±0.047F	µA	Radial Lead	1 Hr-2 Wk	Memory Protection
Sewing Machine	5.5V±0.47F	µA	Radial Lead	1 Hr-2 Wk	Memory Protection
Telephone Handset	5.5V±0.47F	µA	Radial Lead	1 Hr-2 Wk	Memory Protection
Electronic Typewriter	5.5V±3.3F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
Computer Bridge	5.5V±0.010-1.5F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
Sequence Controller	5.5V±1F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
SPAM	5.5V±1F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
CAIV	5.5V±1F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
Audic Systems	5.5V±1F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
Flash Camera	5.5V±0.043-0.056F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
Synthesizer Tuner	5.5V±0.33F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
VCR Timer	5.5V±0.047F-0.47-1F	mA	Radial Lead	1 Hr-2 Wk	Memory Protection
LCD Counter	1.8V±10F	A	Radial Lead	3 Sec-30 Min	Memory Protection
Lamp Ballast	1.8V±10F	A	Radial Lead	3 Sec-30 Min	Load Leveling
Mobit	1.8V±3.3F	A	Radial Lead	3 Sec-30 Min	Load Leveling
Gas Kettle	1.8V±1F	A	Radial Lead	3 Sec-30 Min	Load Leveling
Gas Table	1.8V±0.33F	A	Radial Lead	3 Sec-30 Min	Load Leveling
Electronic Toys	12-24V±50-100F	10-100A	Radial Lug	1 Sec-30 Sec	Load Leveling
Skylight	12-24V±50-100F	10-100A	Radial Lug	1 Sec-30 Sec	Load Leveling
Electric Vehicle	12-24V±50-100F	10-100A	Radial Lug	1 Sec-30 Sec	Load Leveling
Cordless Apparatus	12-24V±50-100F	10-100A	Radial Lug	1 Sec-30 Sec	Load Leveling
Electric Bicycle	12-24V±50-100F	10-100A	Radial Lug	1 Sec-30 Sec	Load Leveling
Automobile	12-24V±200-2000F	10-1000A	Radial Lug	1 Sec-30 Sec	Load Leveling
Heavy Duty Truck	28V±95F	1300A	Radial Lug	1 Sec-30 Sec	Load Leveling
Electric Vehicle	28V±205F	1300A	Radial Lug	1 Sec-30 Sec	Load Leveling
Locomotive Engine	64V±23F	1900A	Radial Lug	1 Sec-30 Sec	Load Leveling
HV Power Supply	300V±0.95F	400A	Radial Lug	1 Sec-30 Sec	Load Leveling
Pulsed Power Supply	140-185V±2.5-4.5F	470A	Radial Lug	1 Sec-30 Sec	Load Leveling
EM Switch	350V±0.13F	250A	Radial Lug	1 Sec-30 Sec	Load Leveling
Magnetic Actuator	150V±2F	500A	Radial Lug	1 Sec-30 Sec	Load Leveling
Light Beacon Power	160V±3F	300A	Radial Lug	1 Sec-30 Sec	Load Leveling

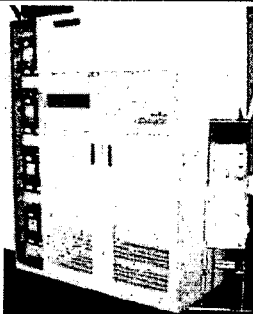
[www.korchip.com](http://www.korchip.com)

We are **EDLC**  
MICRO-CELL technical leader

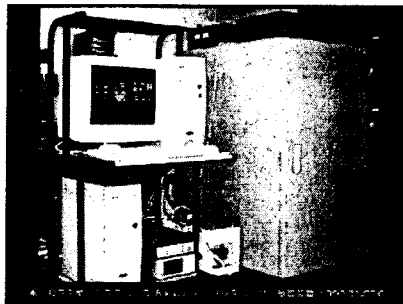
End-Use Market	Production	Potential for EDLC Cells (Large-Can)	Potential Value (\$/Millions)	EDLC Penetration
Heavy Trucks and Buses	227,000	4,300,000	\$129.00	4%
Forklifts	1,100,000	4,400,000	\$132.00	0%
Golf Carts	144,000	1,150,000	\$35.00	0%
Electric Passenger Vehicles	8,300	150,000	\$5.00	<1%
Other	1,500	60,000	\$12.00	1%
<b>Total Available Market</b>	<b>1,480,800</b>	<b>10,060,000</b>	<b>\$313.00</b>	<b>2%</b>

[www.korchip.com](http://www.korchip.com)

We are **EDLC**  
MICRO-CELL technical leader



<UPS 장치>



<부하평준화 SYSTEM>

부하전원의 질적향상을 위한 보조전원의 개념으로 사용이 가능하며 특히 무정전전원장치(UPS), 부하평준화(Load Leveling) SYSTEM에서의 적용시 커다란 장점을 가지고 있다.

[www.korchip.com](http://www.korchip.com)