

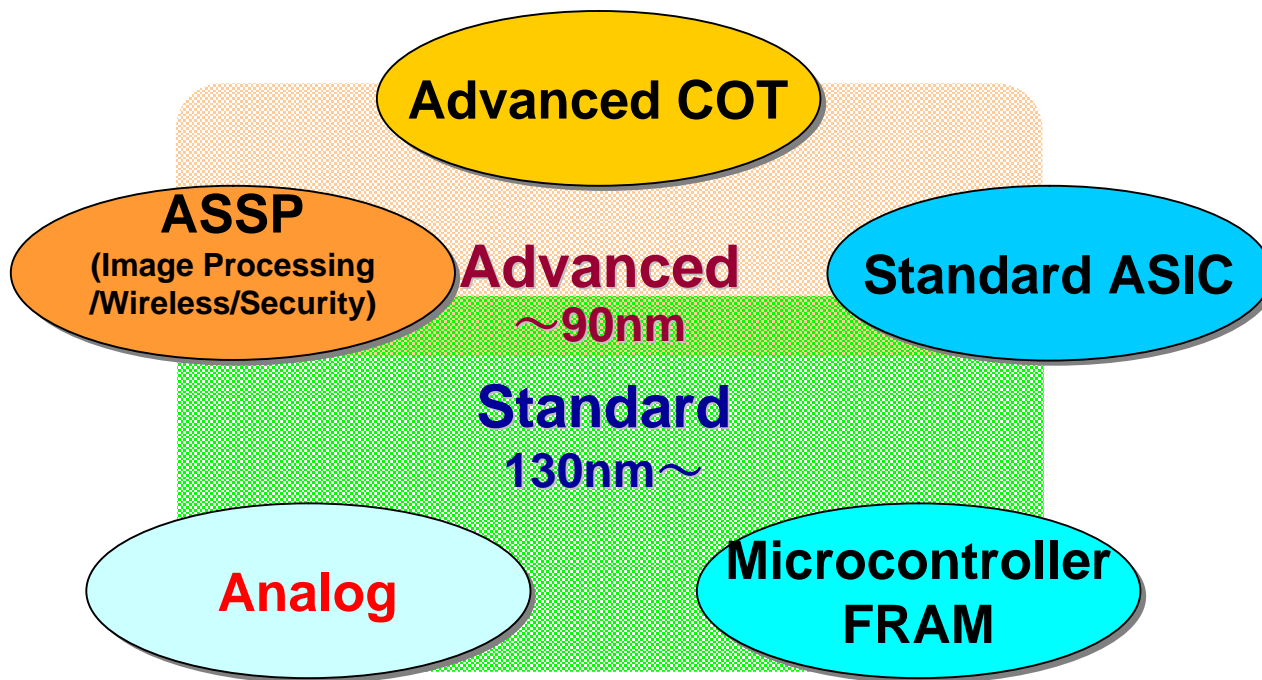
便携式手持设备的 电源管理IC技术趋势

September 12 2007
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Analog Products Division
Electronic Devices
Fujitsu Limited

Agenda

1. System Power Management for Portable Appliance
2. Requirement for Portable Appliance
3. Transition of Portable Appliance & Fujitsu ASSP
4. Macro Implementation
5. Technology of Small Packaging

Fujitsu Electronic Devices Business



ASSP: Application Specific Standard Products; COT: Customer-Owned Tooling;

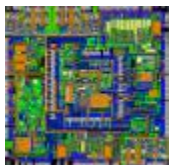
Analog IC Products

Products, designed & supported by Analog Product Division



1. PLL/RF ICs

PLL Frequency Synthesizer, RF transmitter, GPS Receivers
Other Custom devices,,,



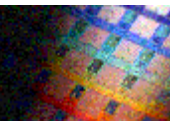
2. Power Management ICs

Switch, DC/DC controllers, DC/DC converters, Battery Chargers,
PMU for Mobile Phones, PMU for Gaming, PMU for DSC/DVC,,,



3. MEMS Sensor ICs

Sensor Amplifiers,,,



4. BiCMOS/CMOS Process Technologies

BiCMOS RF Foundry service, Customized Process, etc.,,,

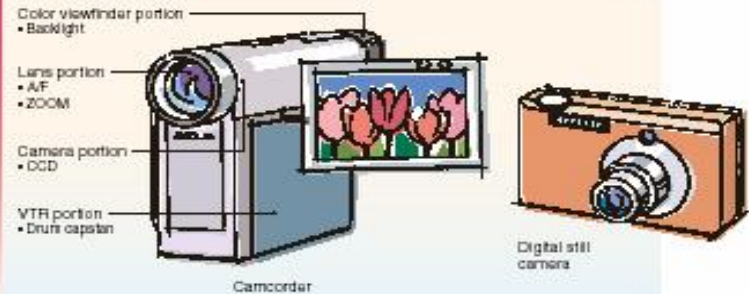
Power Management ICs ASSP Line Up

Fujitsu's power management ICs-providing refined high reliability and performance.
 Ready to meet a wide range of needs with our comprehensive lineup.

The requirements for today's electronic devices are ever smaller size, higher capabilities, and lower power consumption. Fujitsu offers a wide range of power management ICs that feature low-power consumption, low-voltage operation, high precision, and multiple channels. A wide range of products is available to meet your diverse needs, including low-voltage operation, multi-channel, high-efficiency, built-in FET regulator ICs, low-power consumption, high-precision voltage detection reset ICs, and low-temperature-resistant power-switching ICs.



DSC/Camcorder



Power management ICs



- AC/DC converter**
- MB3759
 - MB3760A

- General-purpose DC/DC converter**
- MB3800
 - MB3769
 - MB3817
 - MB3885
 - MB3775
 - MB3778
 - MB3821
 - MB3882
 - MB3880
 - MB38A106
 - MB38A104
 - MB3782
 - MB38A112
 - MB38C011
 - MB38C011A

- DC/DC converter with SW FET**
- MB39C014
 - MB39C015

- DC/DC converter for DSC/camcorders**
- MB3785A
 - MB39A102
 - MB39A103
 - MB39A110
 - MB39A108
 - MB3825A
 - MB3883
 - MB3881
 - MB39A115
 - MB39A123

- For rechargeable batteries**

- For charging control**
- MB3832A
 - MB3874
 - MB3875
 - MB3876
 - MB3877
 - MB3878
 - MB3887
 - MB3888
 - MB3879
 - MB39A113
 - MB39A114
 - MB39A119
 - MB39A125
 - MB39A126
 - MB39A129

- Monitoring of power supply voltage**

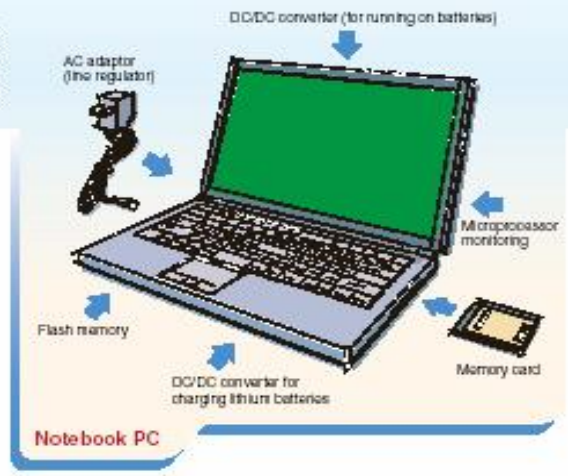
- Monitoring of power supply voltage**
- MB3761
 - MB3771

- Monitoring of power supply voltage with watchdog timer**
- MB3773
 - MB3793

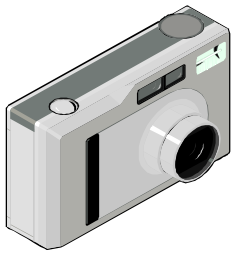
- Power management switch**
- MB3841
 - MB3842
 - MB3845



Digital TVs/Recorders/Printers/IP telephones



Requirement for Portable Appliance



High Efficiency

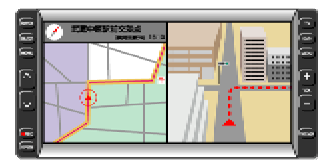
- Buck/Boost control
- Intermitted Control
- Internal FET Switch Low Ron
- Low Qg

Miniaturization

- High Frequency
- Small Inductance
- Small Package

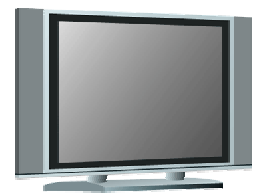
High Reliability

- ON/OFF Control
- Dynamic Current Control
- Thermal Protection



Quick Response

- Current Control
- Pulse by Pulse Control

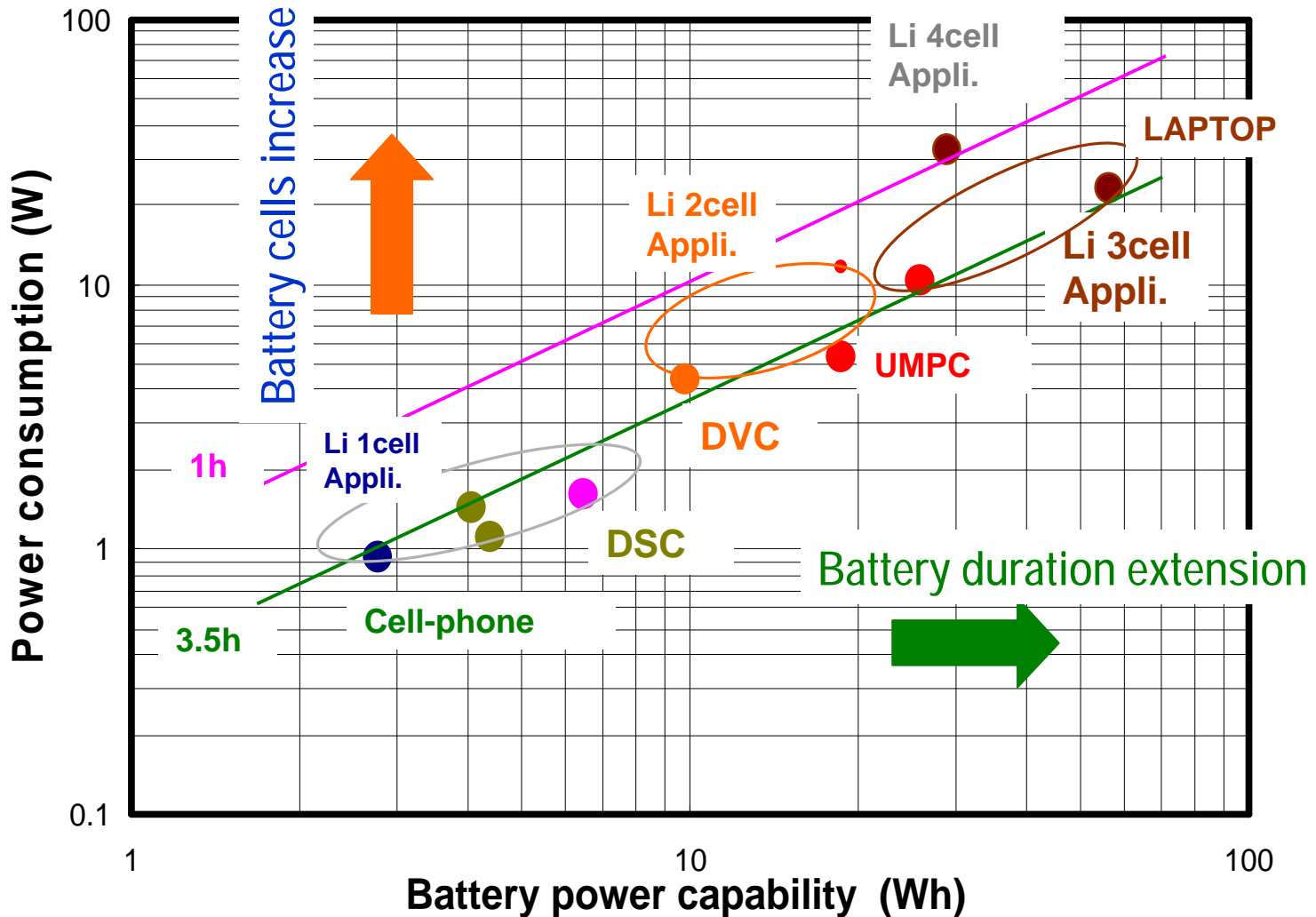


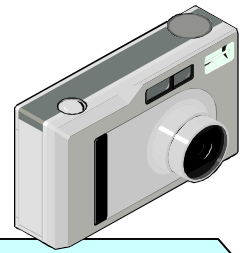
Low Voltage High Current

- Synchronous control
- High Side LDMOS

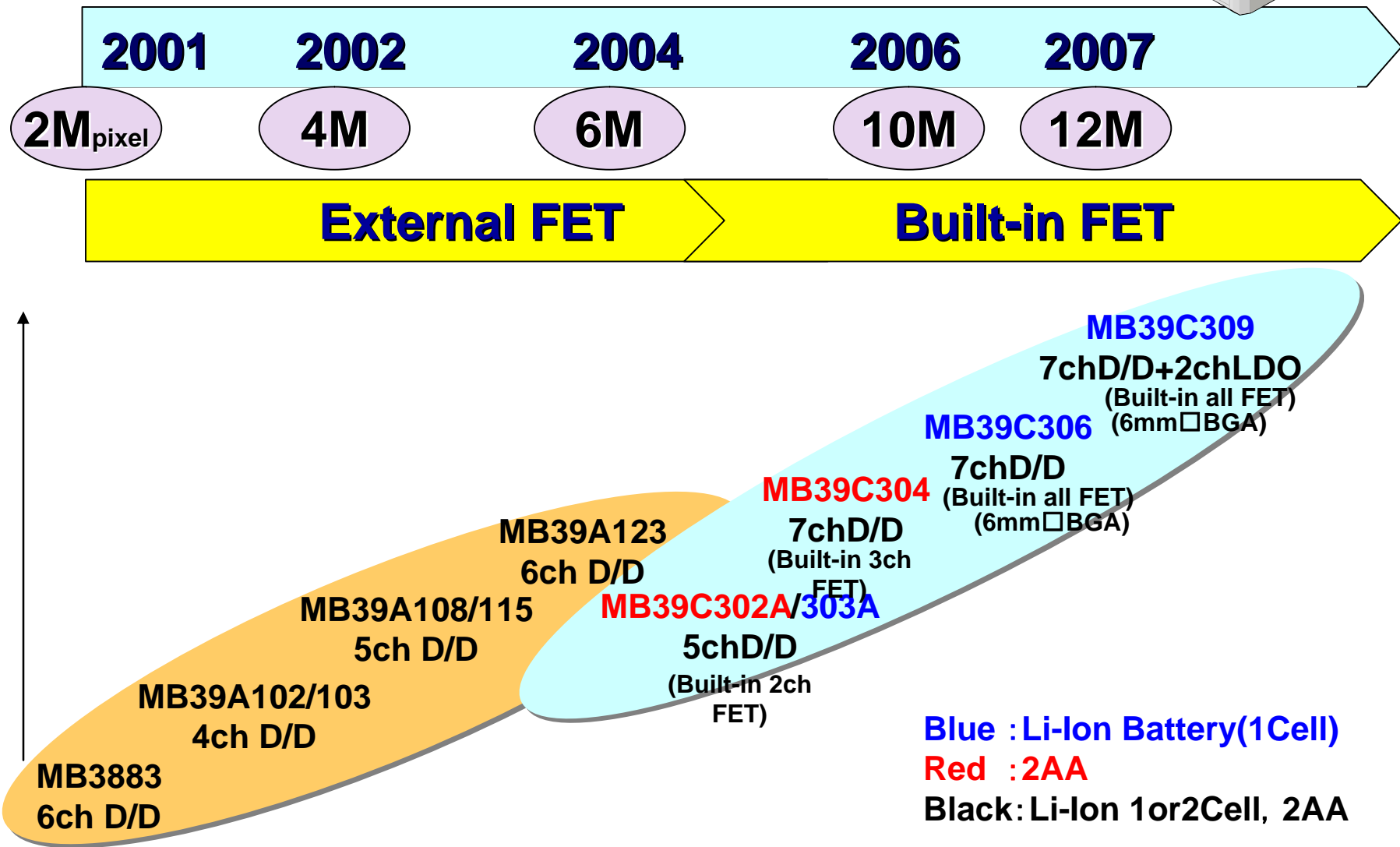
Portable Appliance

Battery power capability vs Power consumption

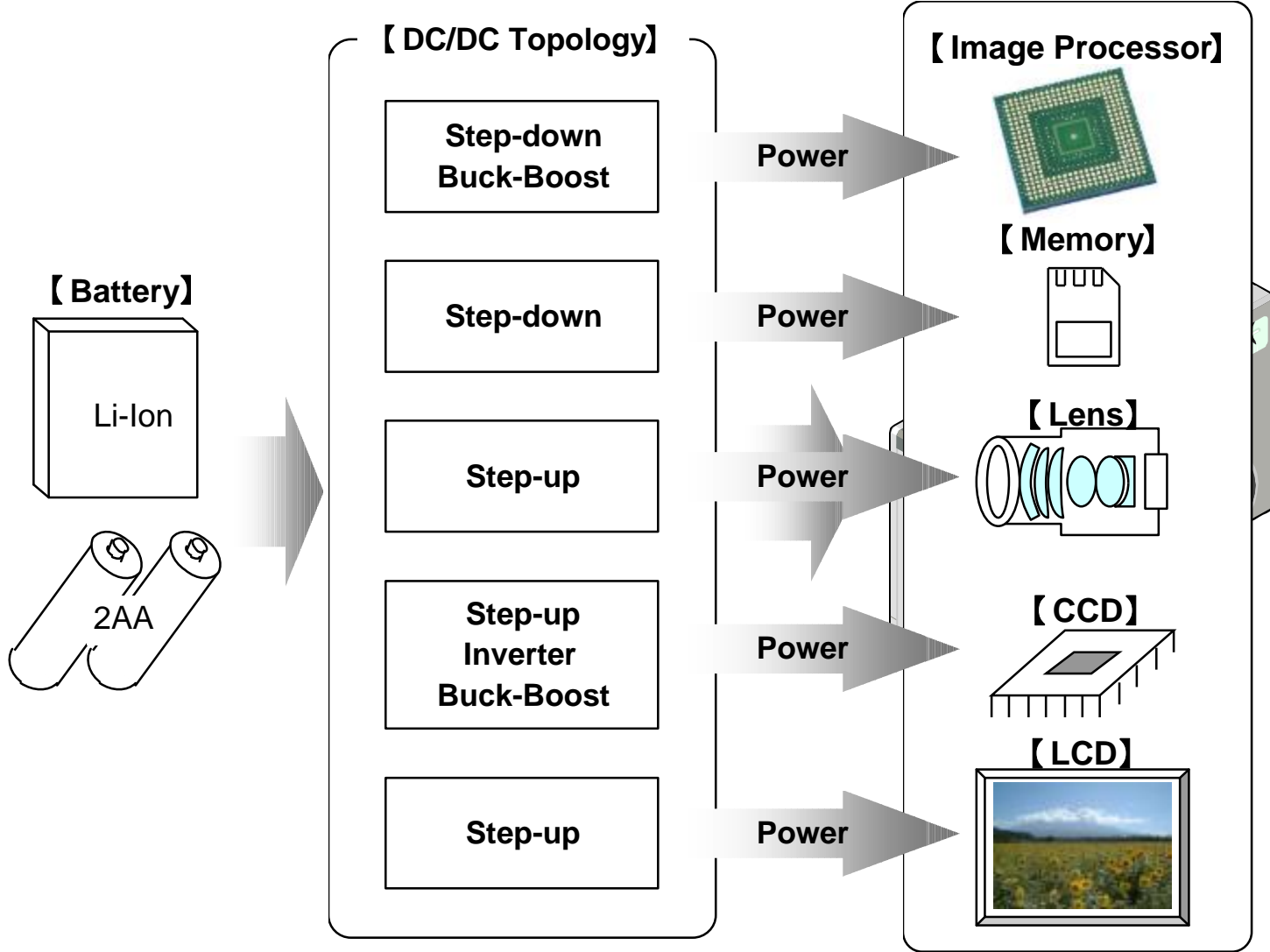




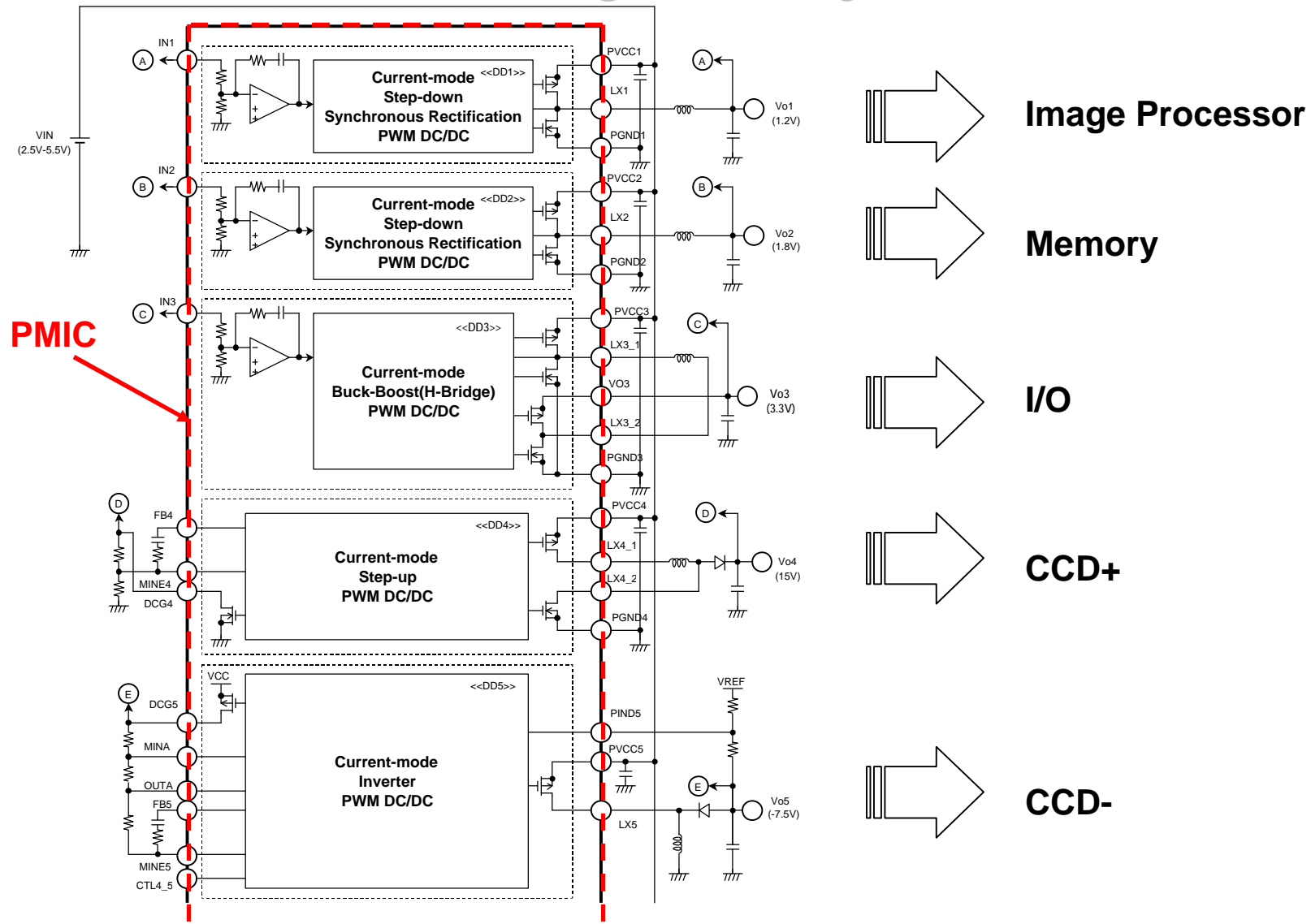
Fujitsu PMIC with Transition of DSC



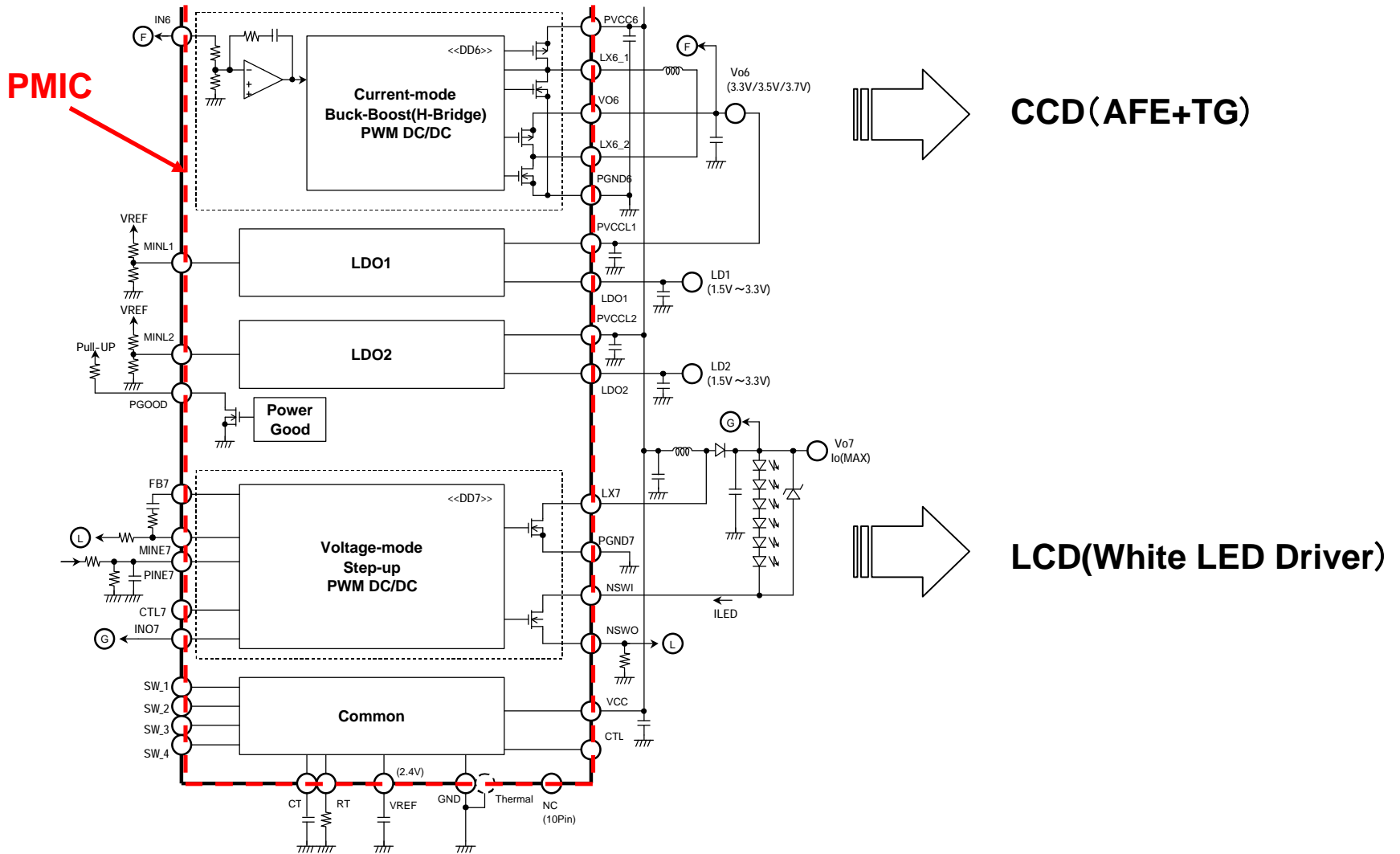
Fujitsu PMIC with Transition of DSC



2008 Model Power Management System for DSC



2008 Model Power Management System for DSC

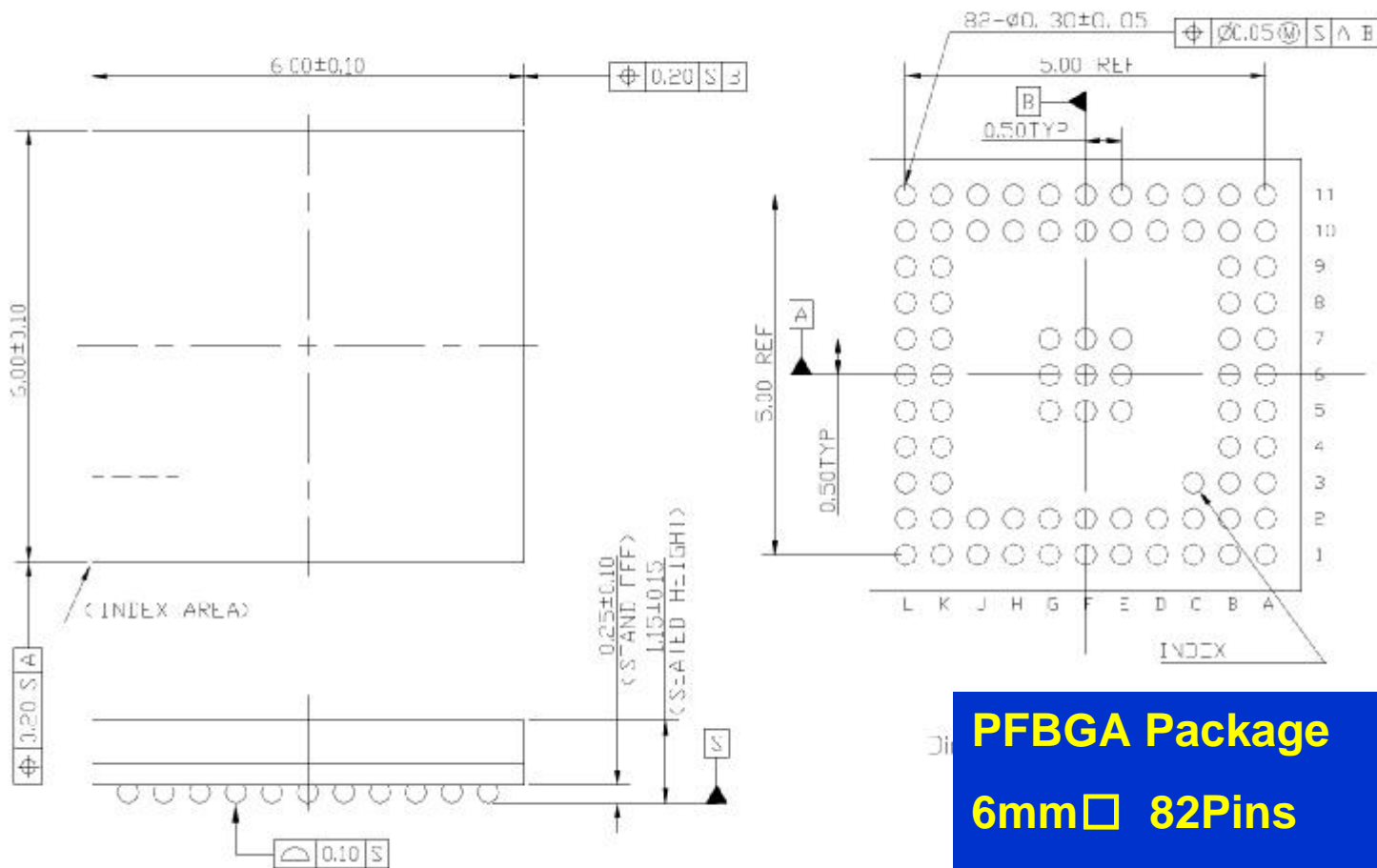


Packaging

< PFBGA-73P+Thermal 9P >

BGA-82P-M01

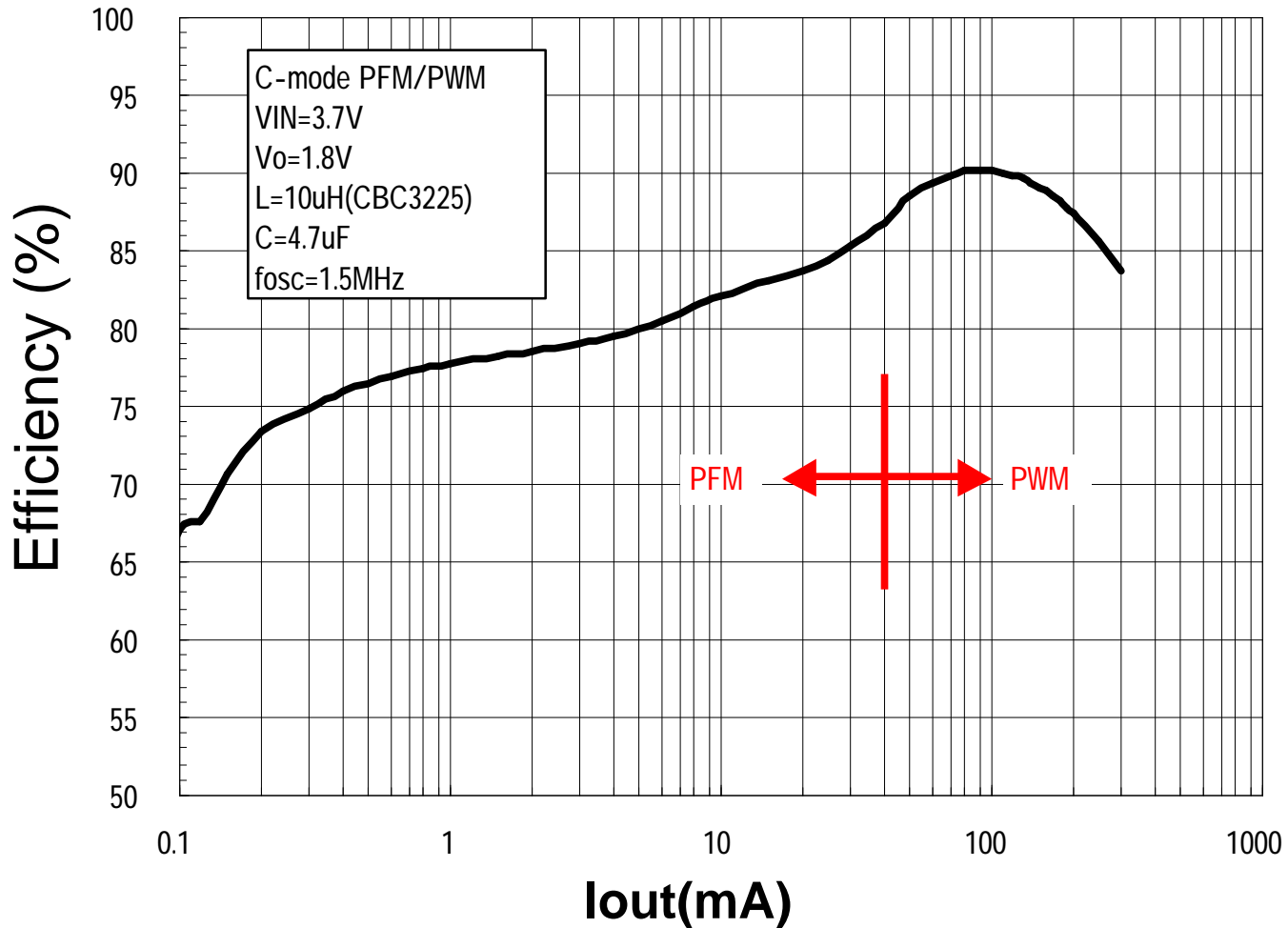
TOP VIEW



PFBGA Package
6mm□ 82Pins
0.5mm Ball Pitch
 $R_{\theta} = 56^{\circ}\text{C/Watt}$

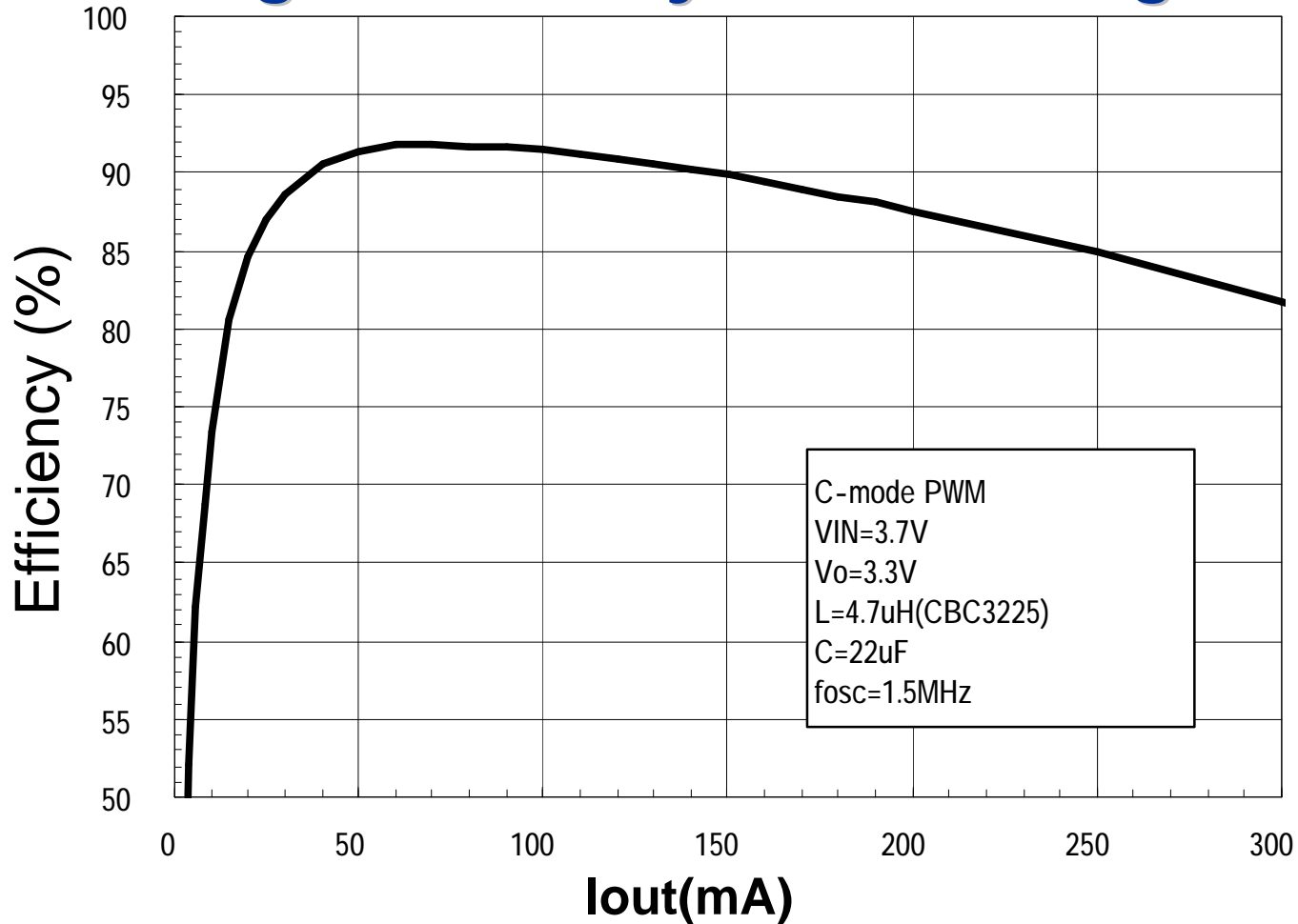
Step-down DC/DC

High efficiency in wide range



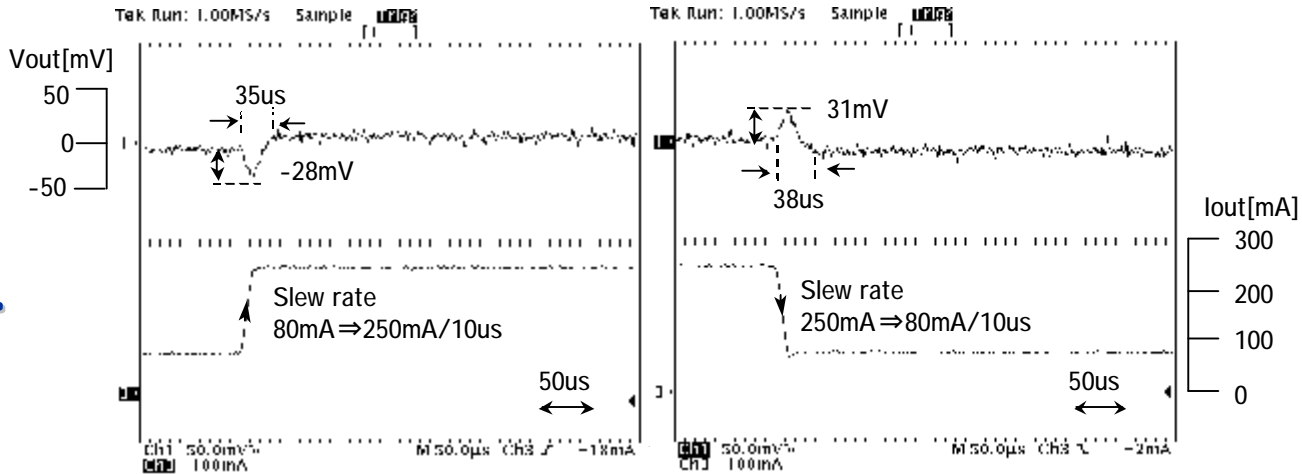
Buck-Boost DC/DC

High efficiency in wide range



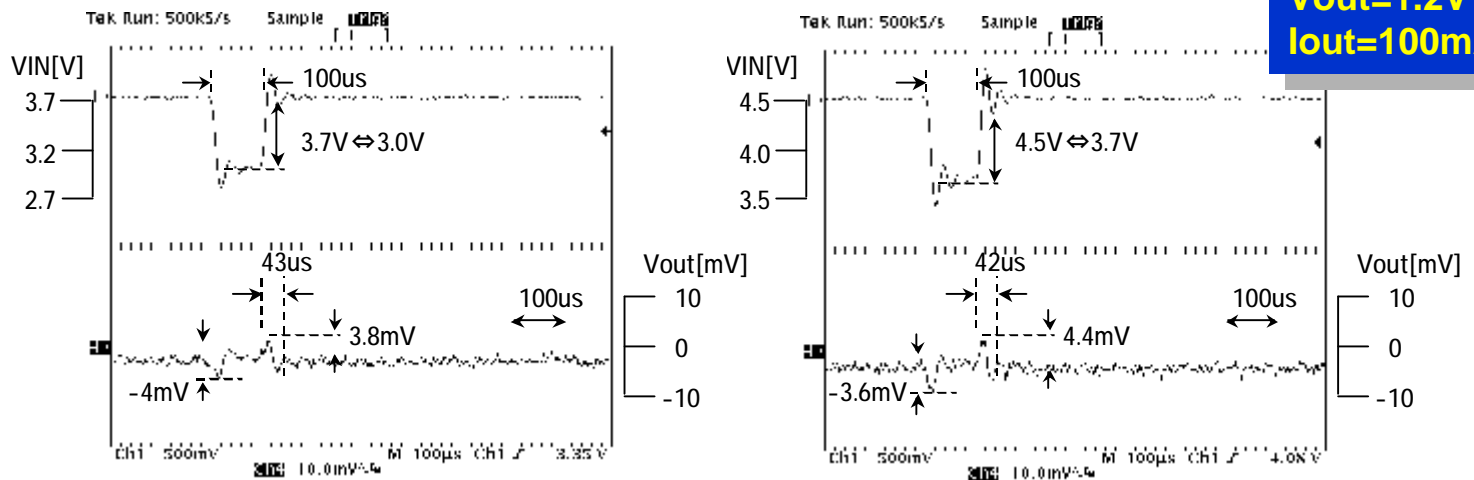
Quick Response

Load
Tran.



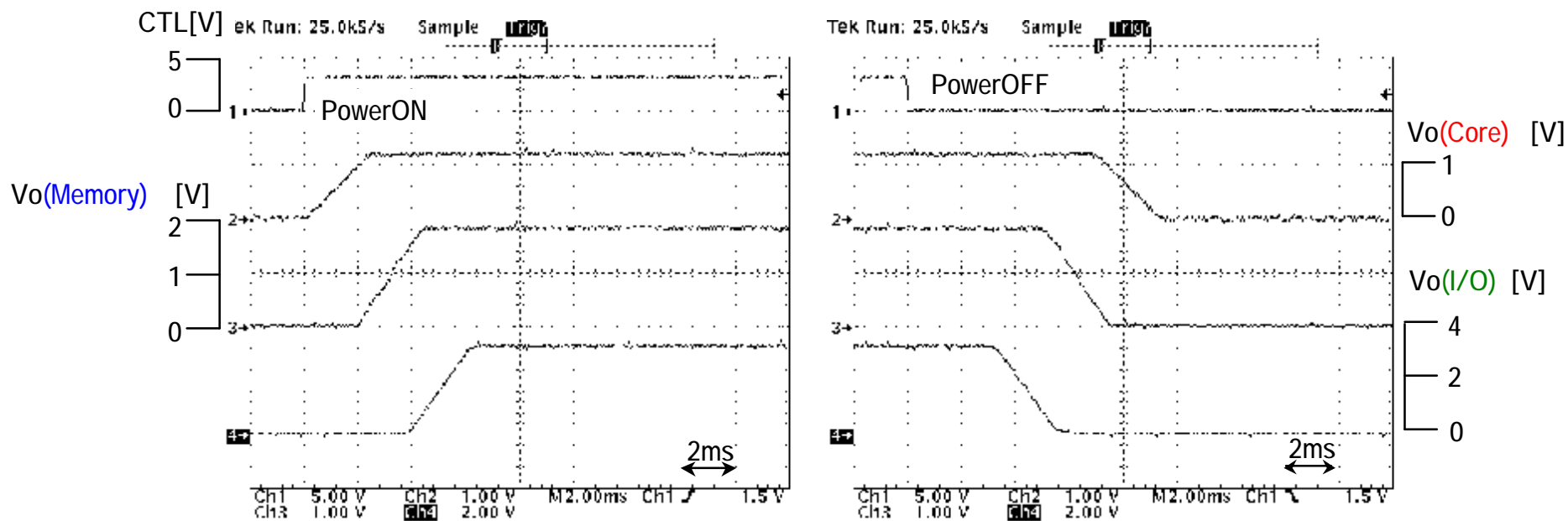
VIN=3.7V
Vout=1.2V

VIN
Tran.



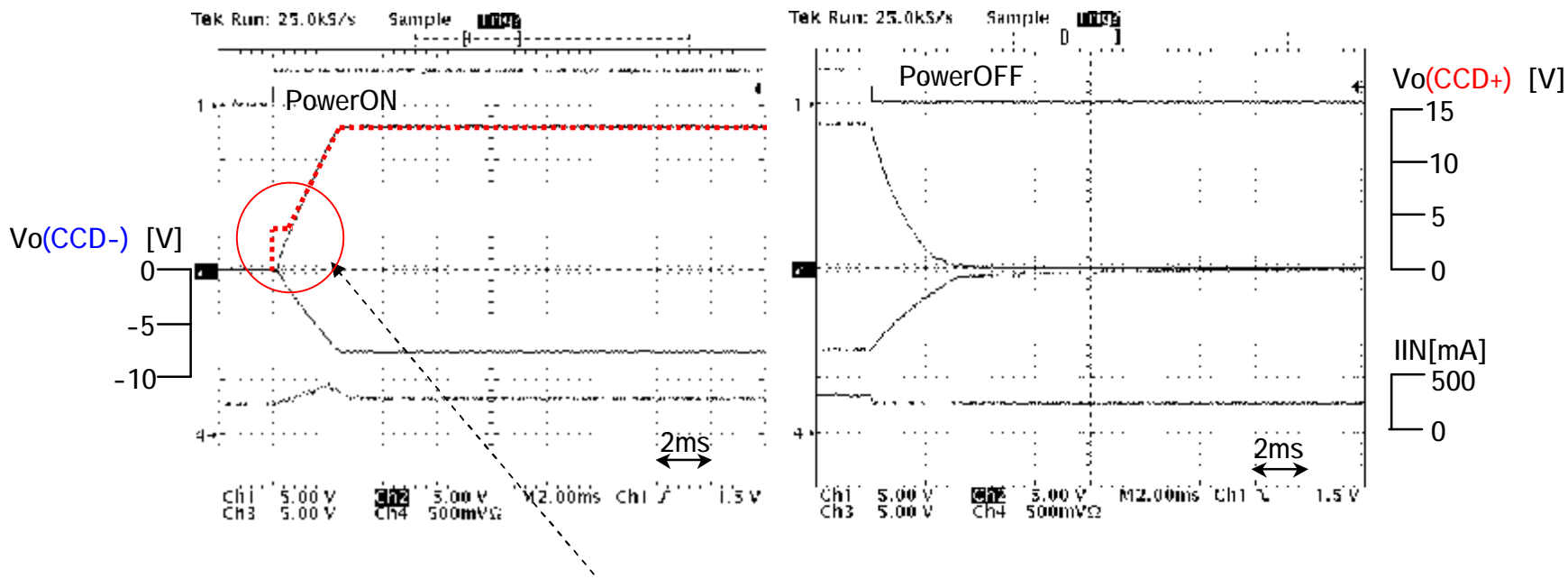
Vout=1.2V
Iout=100mA

Soft-Start & Soft-Off(Step-down&Buck-Boost)



Soft-start and Soft-off that doesn't depend on the load are possible.

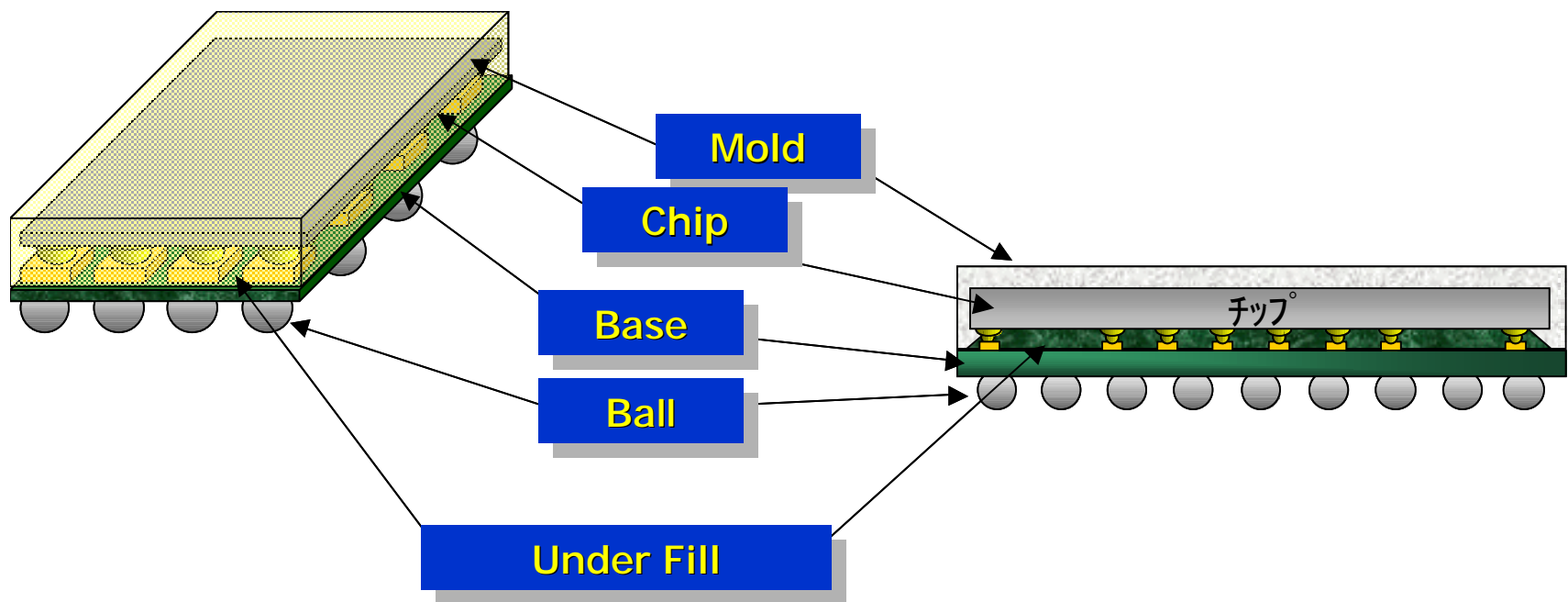
Soft-Start (Step-up&Inverter)



0V Ramp Soft-start

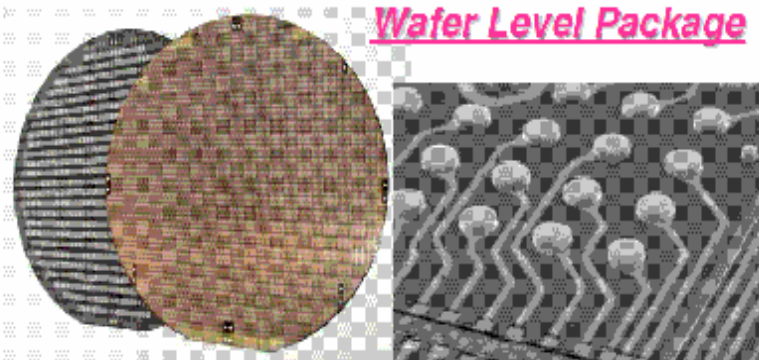
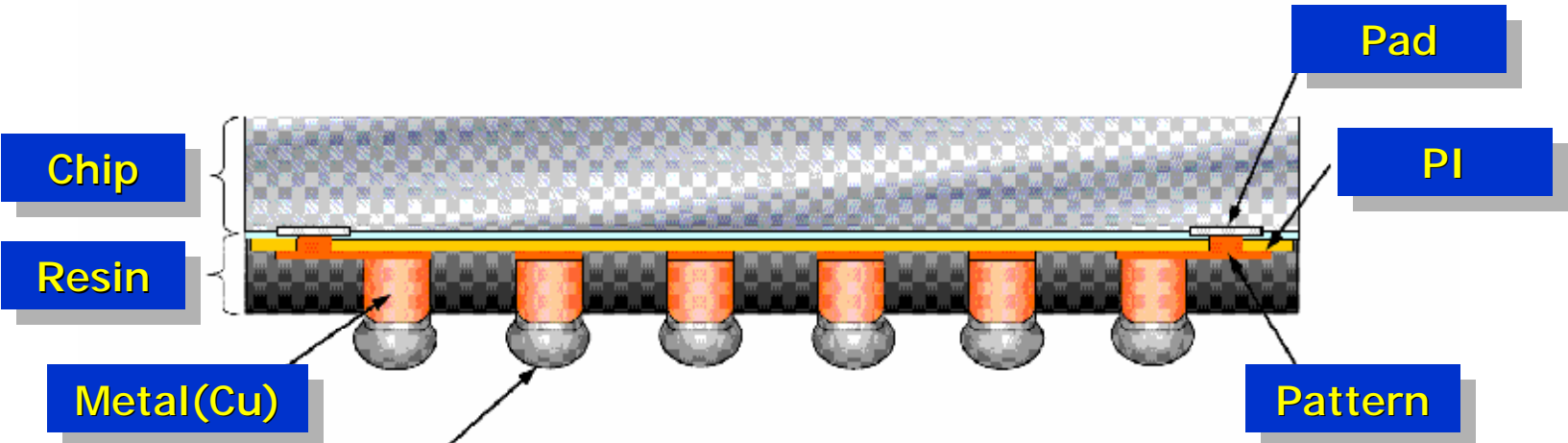
Small Package Technology(Flip Chip Package)

<Package Image>



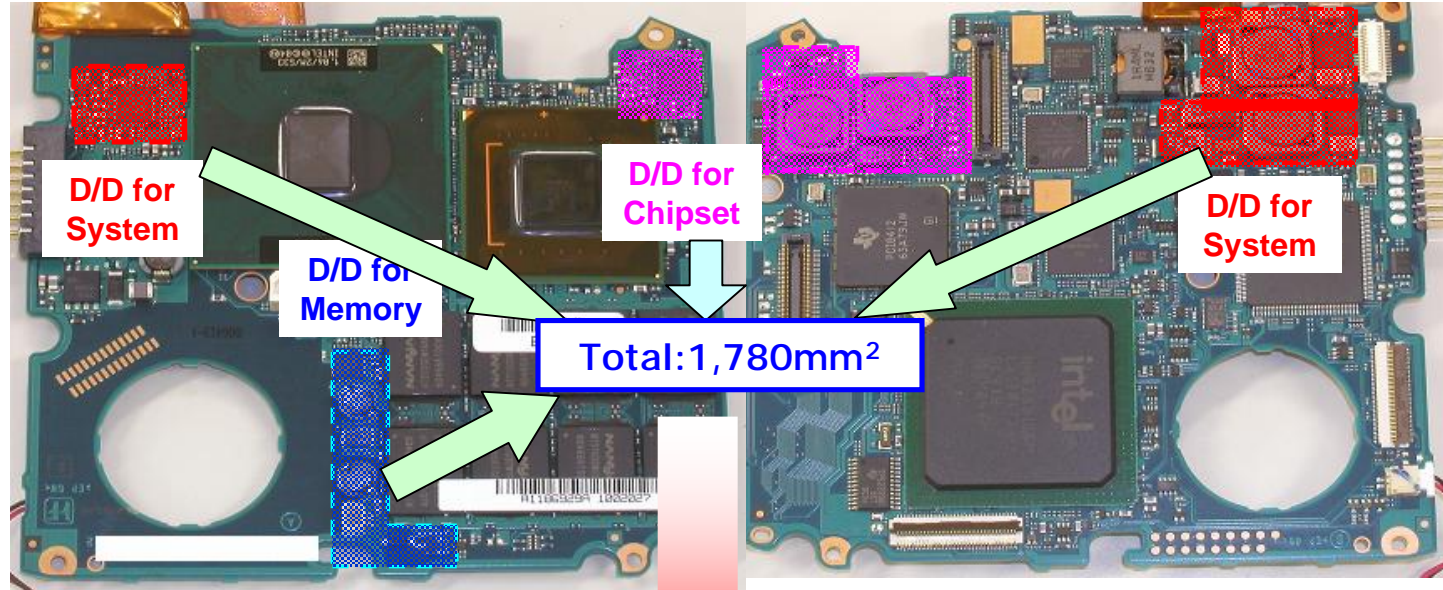
Small Package Technology(Wafer Level Package)

<Package Image>

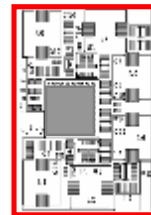


EX. System Power Management

Before



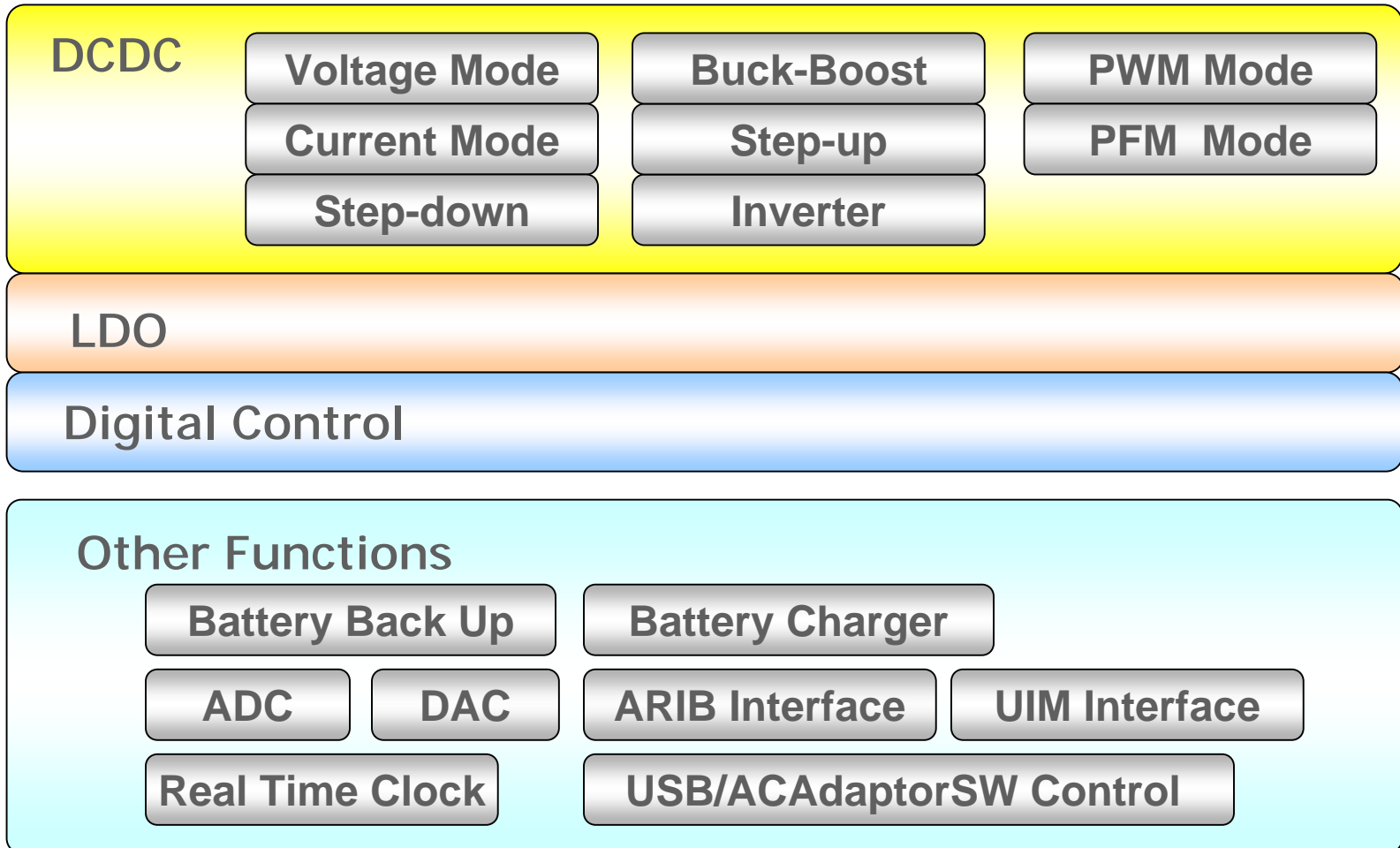
After



Total: 685mm²
-60%

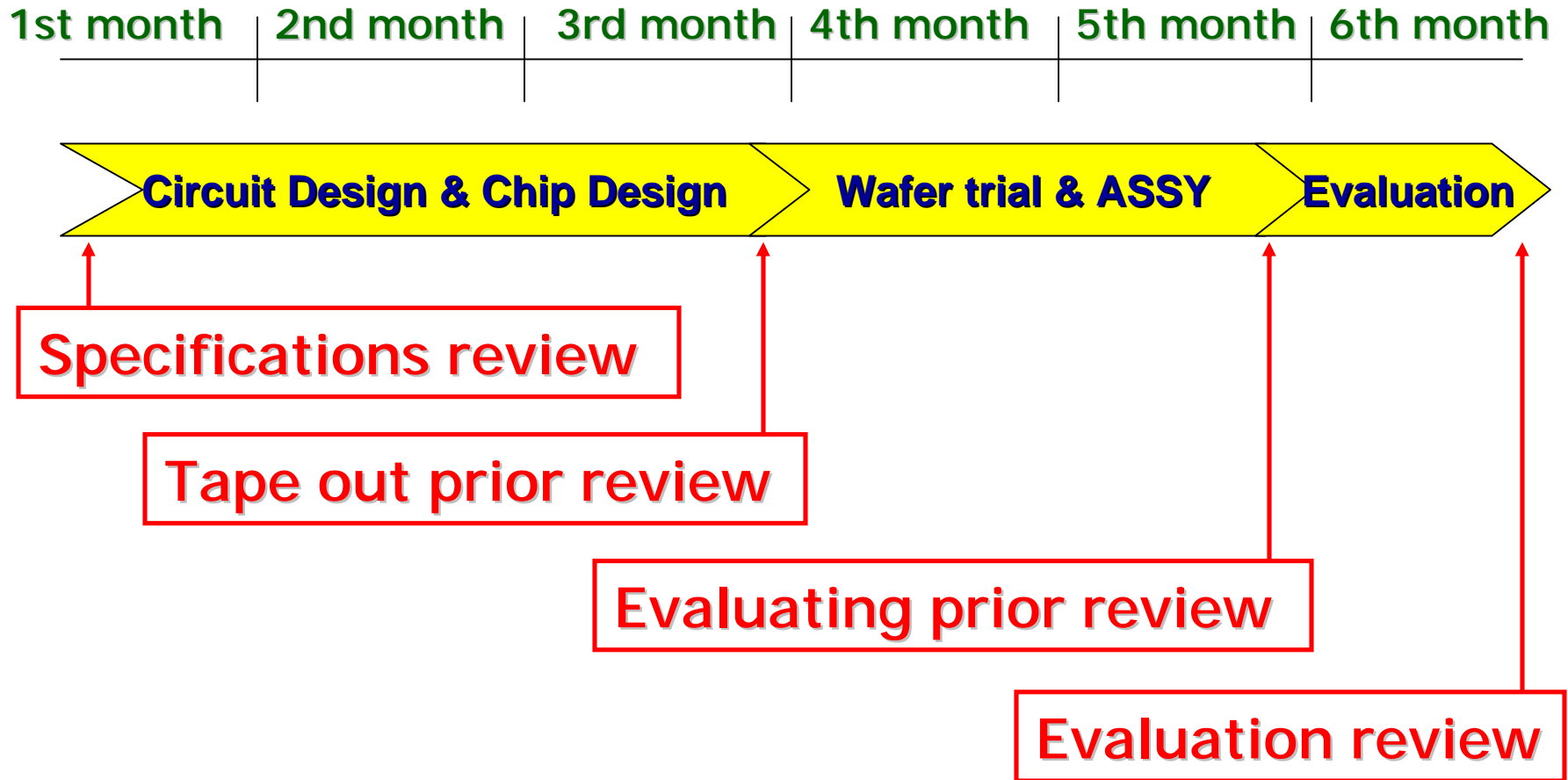
Short Development T.A.T. in 6month

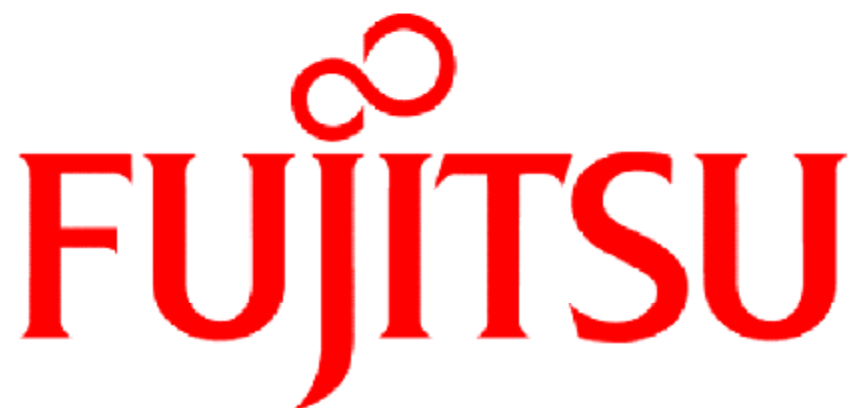
Prepared Macro for System Power Management IC



Short Development T.A.T. in 6month

One example of development schedule





FUJITSU

THE POSSIBILITIES ARE INFINITE