Simpler is Better

Compaq's Intelligent Battery Architecture (IBA)

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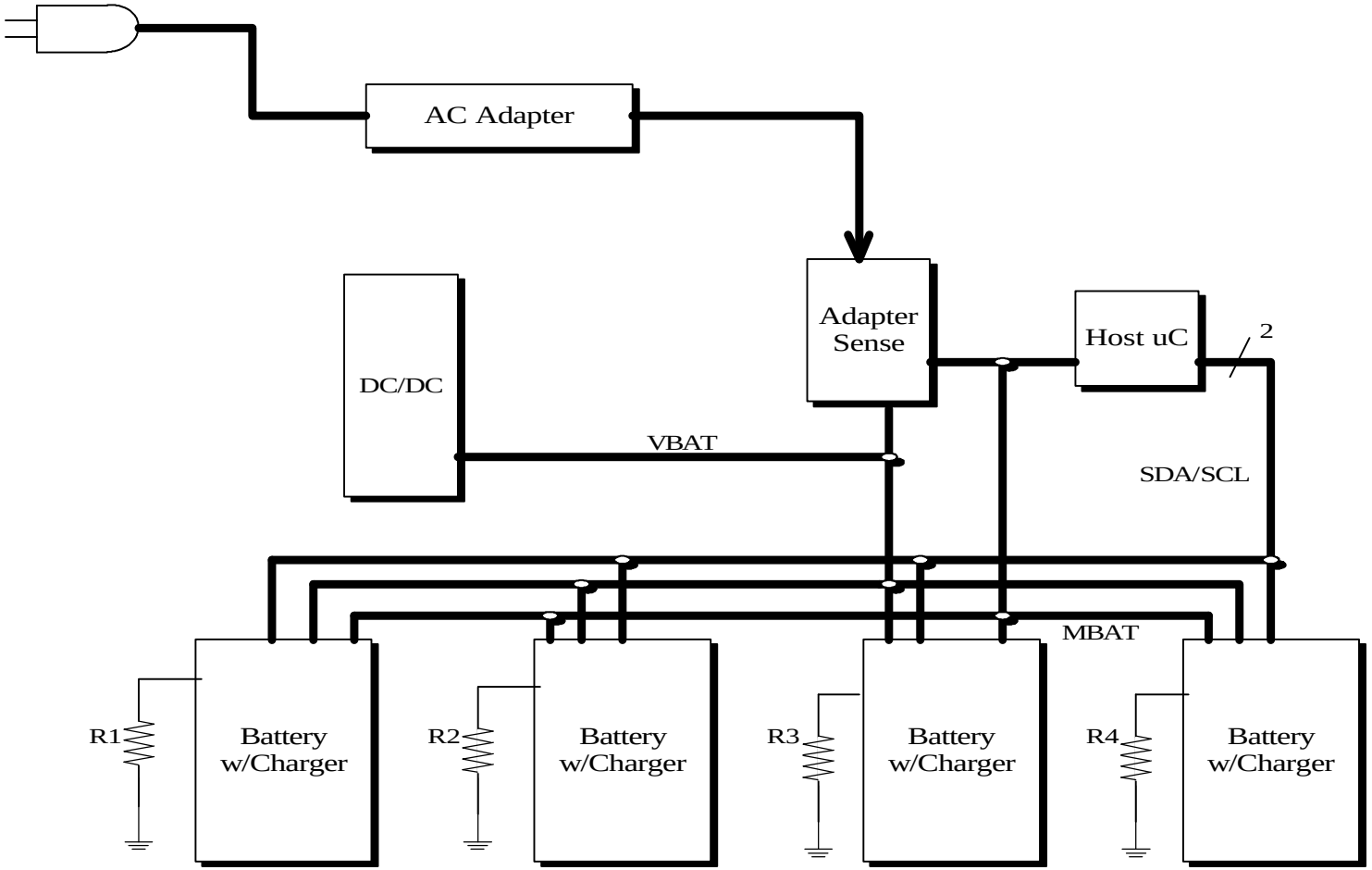
What is an IBA Battery?

- Intelligent battery with internal fuel gauge, charger and protection circuitry
- Fewer system side components required
- No selector required
- More cost effective
- Supports up to 8 batteries
- Charge balancing included (recommended for Li-Poly)
- Battery address identified by location resistor
- One power bus for all batteries
- Simple internal charger
- Simple load sharing method

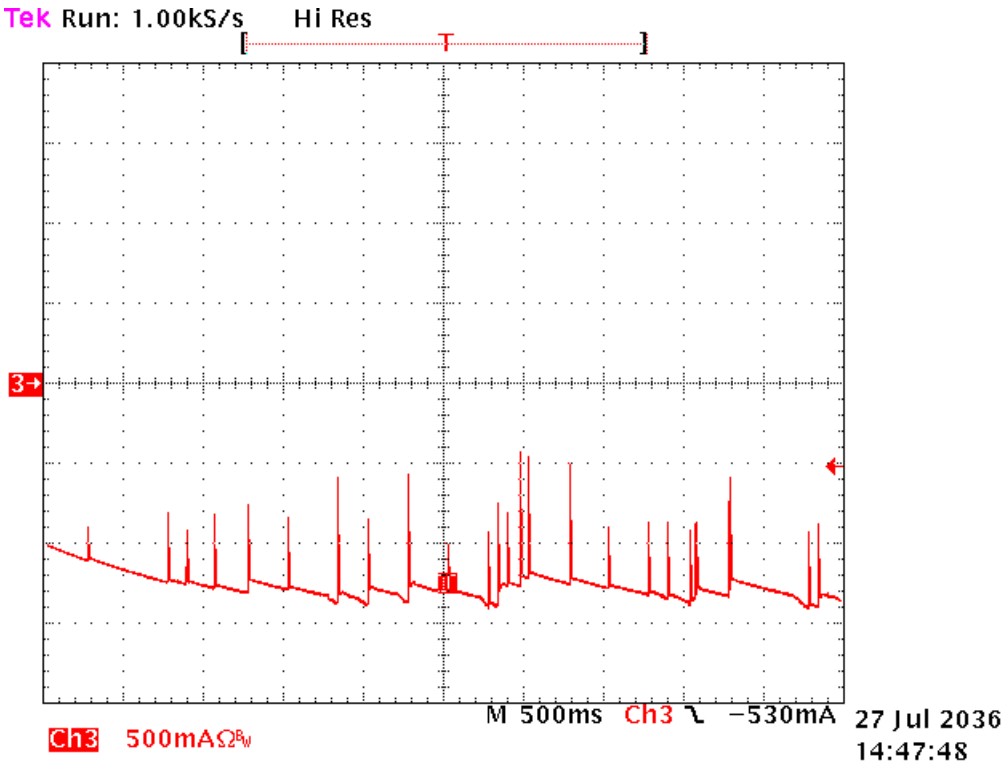
IBA Architecture



IBA Fine Points

- Two FET's within pack perform multiple functions
- Each battery has its own SMBUS address
- Batteries in expansion devices look the same
- One bus for all expansion batteries
- Master battery is picked by Host to provide power
- Master battery drives MBAT high
- Removal of master battery forces all sources to diode "or" onto the power bus
- Possible for battery to charge directly from AC adapter
- Second level of protection can be a three terminal fuse
- Load sharing accomplished by modulating MBAT when adapter current exceeds threshold

Load Sharing Event



SBS Compatibility

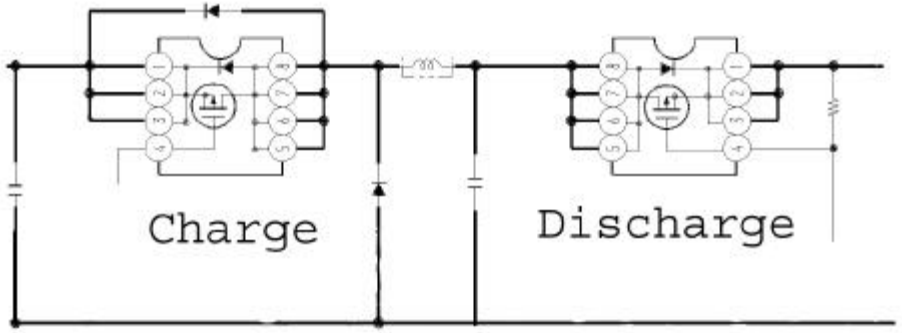
- 90% compatible with Data Spec.
- Obviously requires changes arbitrating between batteries
- Battery signals are different - MBAT, ID
- Selector functionality distributed between battery and manager.

The Simple Solution

- Two chip + FET's battery solution - controller, protector
- Total mulitiple battery solution uses much less silicon than today's SBS.
- No embedded host controller needed - possible to operate without host controller

IBA Pack Selection

- Two FET's (charge & discharge) within pack enable all functions



IBA Pack Selection

- FET's are operated in Four modes
  - OR mode – Discharge ON, Charge OFF, MBAT low
  - Charge mode – Charge 200KHz switching, Discharge ON, MBAT high
  - Discharge mode – Charge ON, Discharge ON, MBAT high
  - OFF mode – both FET's OFF, MBAT high
- Battery selection usually begins when MBAT drops
  - MBAT drops forcing all available sources into OR mode
  - Host arbitrates and assigns MASTER
  - MASTER drives MBAT high
  - MBAT going high switches all other sources OFF

IBA Pack Identification

- Pack detects its address from measurement of location resistor
- Each pack has its own unique address – all batteries are on the same bus
- ID resistor can be used to generate an interupt when first inserted
- Battery would next master the bus and alert the host of its address
- There is no selector – means lower cost and simpler operation

Slot #	Prefix	Postfix	Read	Write	Lower Value	Upper Value
Invalid					0	350
0	0011	000x	31	30	485	536
1	0011	001x	33	32	950	1050
2	0011	010x	35	34	1900	2100
3	0011	011x	37	36	2850	3150
4	0011	100x	39	38	3705	4095
5	0011	101x	3B	3A	4845	5355
6	0011	110x	3D	3C	6460	7140
7	0011	111x	3F	3E	8645	9555
Invalid					11000	Infinite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