

### LCD Driver

- Controls up to 128 segments (CP2400/1) or 64 segments (CP2402/3)
- Supports static, 2-mux, 3-mux, and 4-mux displays
- Supports 1/2 and 1/3 biasing
- On-chip bias generation with internal charge pump
- Low power blink capability

### GPIO Expander

- Expands GPIO count by up to 36 pins (CP2400/1) or 20 pins (CP2402/3)
- Up to 36 GPIO/port match wake-up sources
- 5 V Tolerant I/O

### Real Time Clock, SmartClock

- Precision time keeping with 32.768 kHz watch crystal; self-oscillate mode requires no external crystal; accepts external 32 kHz CMOS clock
- 36-hour programmable counter with wake up alarm
- Can wake up the host controller using interrupt pin

### 256 Bytes RAM

- General purpose RAM expands the memory available to host controller.

### 16-bit Timers

- Two general purpose 16-bit timers
- Wake up host controller upon overflow

### Clock Sources

- 20 MHz Internal oscillator
- Can be clocked from an external CMOS clock

### Digital Bus Interface

- 4-wire SPI Interface operates up to 2.5 Mbps with synchronous external clock or up to 1 Mbps with internal clock (CP2400/2)
- 2-wire SMBus/I<sup>2</sup>C Interface operates up to 400 kHz with internal clock (CP2401/3)
- Dedicated  $\overline{RST}$  and  $\overline{INT}$  pins
- Optional  $\overline{CLK}$  pin can be used as CMOS clock input
- Optional  $\overline{PWR}$  pin (SMBus/I<sup>2</sup>C devices only) places the device in a low power mode. SPI devices use the NSS pin to place the device in a low power mode.

### Low Power

- 1.8–3.6 V operation with integrated LDO
- Ultra-low power mode w/ LCD (1.7  $\mu$ A typical)
- Shutdown current (0.05  $\mu$ A typical)

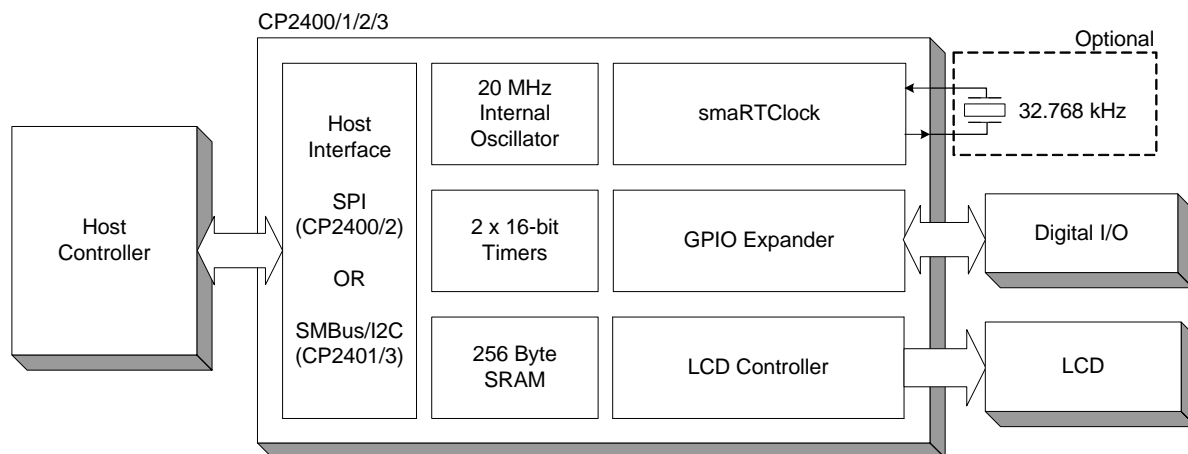
### Example Applications

- Handheld equipment
- Utility meters
- Thermostat display
- Home Security systems

### Package Options (RoHS-Compliant)

- Pb-free 48-pin QFN (7x7 mm)
- Pb-free 48-pin QFP (easy to hand-solder)
- Pb-free 32-pin QFN (5x5 mm)

### Temperature Range: -40 to +85 °C

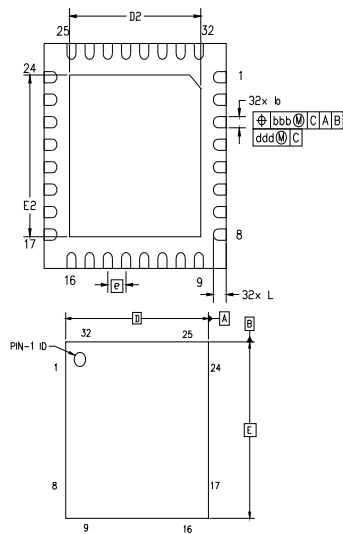


### Selected Electrical Specifications

( $T_A = -40$  to  $+85$  °C,  $V_{DD} = 1.8$  V unless otherwise specified.)

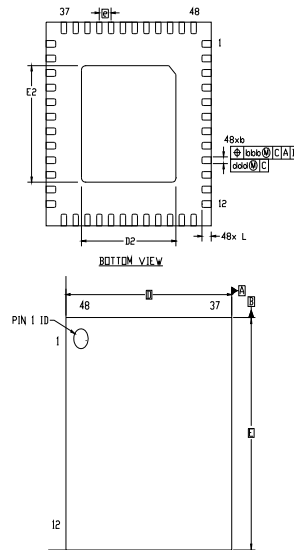
Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage	Normal operation	1.8	—	3.6	V
Supply Current	No load, 20 MHz clock	—	620	—	$\mu$ A
	No load, 14 kHz clock	—	1.7	—	$\mu$ A
	Shutdown mode	—	0.05	—	$\mu$ A
Clock Frequency	Internal oscillator	15	20	25	MHz
	Crystal oscillator	—	32	—	kHz
	External clock source	—	—	25	MHz
Baud Rate	SPI (4-wire)	—	—	1.5	Mbps
	I <sup>2</sup> C (2-wire)	—	—	750	kbps
Temperature	Normal operation	-40	—	85	°C

### Package Information: 32-Pin QFN



	MM		
	MIN	TYP	MAX
A	0.80	0.9	1.00
b	0.18	0.25	0.30
D	5.00 BSC		
D2	3.20	3.30	3.40
E	5.00 BSC		
E2	3.20	3.30	3.40
e	0.50 BSC		
L	0.30	0.40	0.50

### Package Information: 48-Pin QFN



	MM		
	MIN	TYP	MAX
A	0.80	0.9	1.00
b	0.18	0.23	0.30
D	7.00 BSC		
D2	3.90	4.00	4.10
E	7.00 BSC		
E2	3.90	4.00	4.10
e	0.50 BSC		
L	0.30	0.40	0.50

### Product Family

Part Number	Serial Buses	Package	LCD Segments	GPIO	RAM (bytes)	Timers (16-bit)	Internal Oscillaor
CP2400-GM	SPI	48p QFN	128	36	256	2	20 MHz
CP2400-GQ	SPI	48p QFP	128	36	256	2	20 MHz
CP2401-GM	SMBus/I <sup>2</sup> C	48p QFN	128	36	256	2	20 MHz
CP2401-GQ	SMBus/I <sup>2</sup> C	48p QFP	128	36	256	2	20 MHz
CP2402-GM	SPI	32p QFN	64	20	256	2	20 MHz
CP2403-GM	SMBus/I <sup>2</sup> C	32p QFN	64	20	256	2	20 MHz