

16-BIT SINGLE-CHIP MICROCONTROLLER

The 78K0R/Kx3-C products are 16-bit single-chip microcontrollers of the 78K0R series. These microcontrollers feature Single-voltage Self-programming Flash memory and many peripherals.

FEATURES

- 78K0R 16-bit CPU core
- Flash Memory and RAM sizes

| Product Number | Item | Flash Memory | RAM |
|-----------------------|-----------------|--------------|----------|
| 78K0R/KF3-C (80-pin) | μ PD78F1846 | 96K bytes | 6K bytes |
| | μ PD78F1847 | 128K bytes | 8K bytes |
| 78K0R/KG3-C (100-pin) | μ PD78F1848 | 96K bytes | 6K bytes |
| | μ PD78F1849 | 128K bytes | 8K bytes |

Minimum instruction cycle

0.05 μ s (20MHz@2.7V to 5.5V)

Clock

- HIGH SPEED CLOCK
 - High-speed internal oscillator
8MHz, 20MHz (Typ.)
 - Ceramic/Crystal Oscillator/External CLK
2MHz to 20MHz
- LOW SPEED CLOCK
 - Low-speed internal oscillator for WDT
Clock speed : 30KHz(Typ.)
- SUB CLOCK Crystal Oscillator 32.768KHz

Function

- Self-programming
- On-Chip debugging
- HDMI-CEC transmission controller/ reception circuit
- Remote controller reception circuit
- On-Chip Power-On-Clear (POC) circuit
- Low-Voltage Detector (LVI) circuit
- On-Chip multiplier(16 bits x 16 bits)
- On-Chip divider (32 bits \div 32 bits)
- On-Chip key interrupt function
- On-Chip clock output/buzzer output controller
- On-Chip BCD adjustment
- DMA

• Timer

- 16bit Timer 11ch
- Watchdog Timer
- Real-time Counter

• Serial Interface

- CSI: 2 channels/UART: 1 channel
- CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel
- CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel
- I2C: 1channel

• A/D CONVERTER

- 10-bit resolution A/D converter
12ch(KF3-C), 16ch(KG3-C)

• I/O PORT

- CMOS I/O : 62 (KF3-C), 80 (KG3-C)
- CMOS Output : 1
- CMOS Input : 4
- N-ch Open Drain I/O : 4

Operation Voltage

2.7V to 5.5V

Operating ambient temperature

T_A = - 40 to +85°C

Package

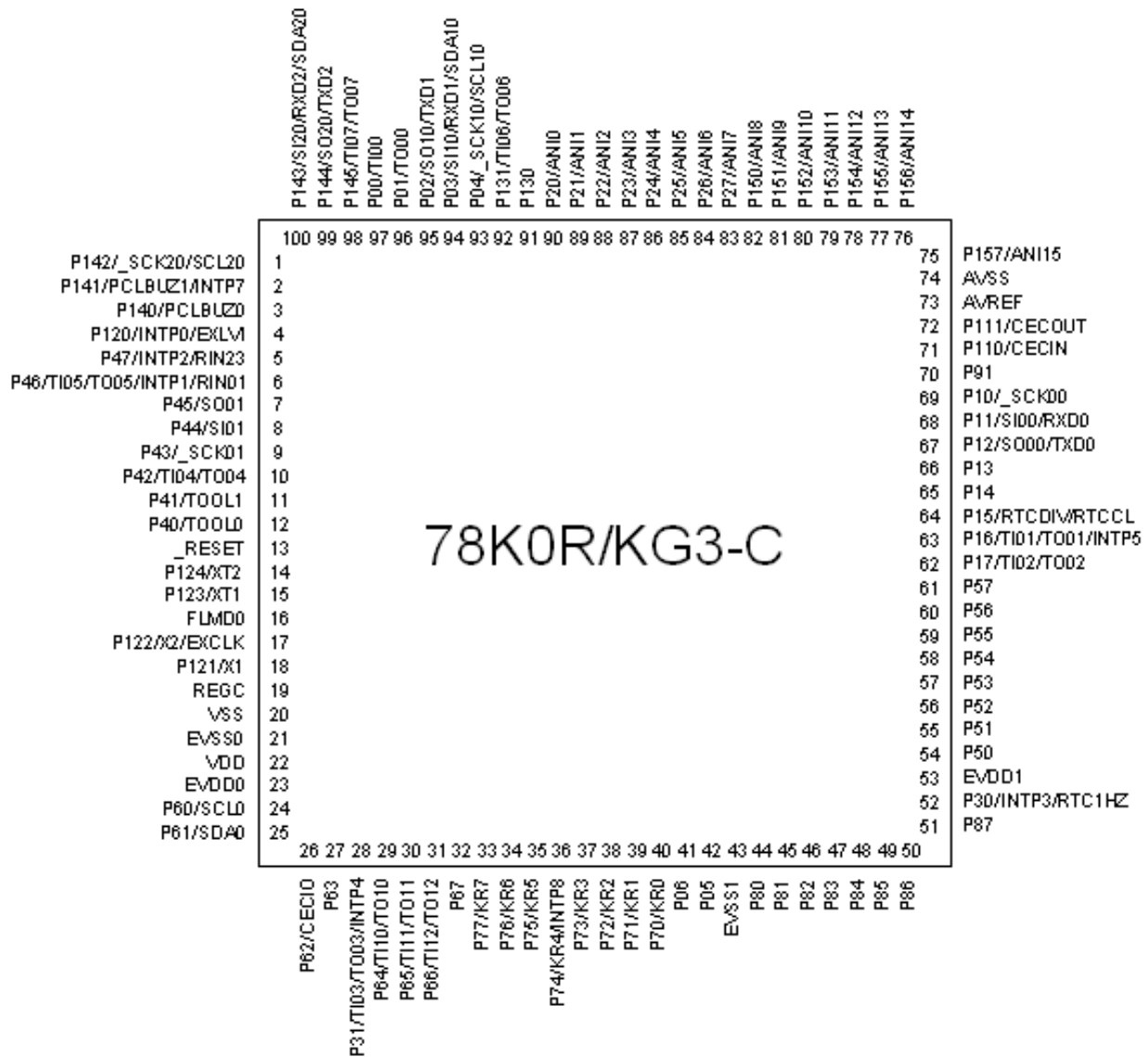
- 80-pin LQFP (12mm x 12mm) (KF3-C)
- 100-pin LQFP (14mm x 14mm) (KG3-C)

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Outline of Functions

| | | 78K0R/KF3-C | | | |
|---|--------------------------|---|--------|--|--------|
| Internal memory | Flash Memory | 96 KB | 128 KB | 96 KB | 128 KB |
| | RAM | 6 KB | 8 KB | 6 KB | 8 KB |
| Main system clock | Ceramic/Crystal/External | 2 to 20 MHz (V _{DD} = 2.7 to 5.5 V) | | | |
| | Internal oscillator | 8 MHz (TYP.) or 20 MHz (TYP.) | | | |
| Subsystem clock | | 32.768 kHz (V _{DD} = 2.7 to 5.5 V) | | | |
| Low Speed internal oscillator (For WDT) | | Clock speed : 30KHz (TYP.) | | | |
| Minimum instruction cycle | | 0.05 μ s (Ceramic/ Crystal/External Operation f _{XH} = 20 MHz V _{DD} = 2.7 to 5.5 V) | | | |
| I/O | Total | 71 | | 89 | |
| | CMOS I/O | 62 | | 80 | |
| | CMOS Output | 1 | | 1 | |
| | CMOS Input | 4 | | 4 | |
| | N-ch Open Drain I/O | 4 | | 4 | |
| Interrupt | External | 9ch | | 9ch | |
| | Internal | 35ch | | 35ch | |
| Timer | | - 16 Bit Timer : 11ch, - Watch Dog Timer : 1ch, - Real-time Counter : 1ch | | | |
| | Timer outputs | 11 (PWM outputs: timer array unit 0: 7, timer array unit 1: 2) | | | |
| | RTC outputs | 2 - 1 Hz (Subsystem clock: f _{SUB} = 32.768 kHz) - 512 Hz or 16.384 kHz or 32.768 kHz (Subsystem clock: f _{SUB} = 32.768 kHz) | | | |
| Serial Interface | | - CSI: 2 channels/UART: 1 channel - CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel - CSI: 1 channel/UART: 1 channel/simplified I2C: 1 channel - I2C: 1 channel | | | |
| A/D Converter | | 10bit x 12ch | | 10bit x 16ch | |
| CEC transmission/reception function | | Available | | | |
| Remote controller reception function | | Available | | | |
| On Chip Debug Function | | Available | | | |
| Voltage Range | | V _{DD} = 2.7 to 5.5 V | | | |
| Operation temperature | | Ta = -40°C to +85°C | | | |
| Package | | 80-pin LQFP (GC) Thickness: 1.4 mm 12 mm x 12 mm Pitch: 0.5 mm | | 100-pin LQFP (GC) Thickness: 1.4 mm 14 mm x 14 mm Pitch: 0.5 mm | |

100-pin plastic LQFP (14mm x 14mm), pin pitch = 0.5mm



Pin Identification

78K0R/KF3-C

80-pin plastic LQFP (12mm x 12mm), pin pitch = 0.5mm

| | | | |
|---------------------------|---|----------------------------|--|
| ANI0-ANI11 | : Analog Input | PCLBUZ0, PCLBUZ1 | : Programmable Clock Output / Buzzer Output |
| AVREF | : Analog Reference Voltage | | |
| AVSS | : Analog Ground | REGC | : Regulator Capacitance |
| CECIN | : Consumer Electronics Control Input | RESET | : Reset |
| CECIO | : Consumer Electronics Control Input/Output | RIN01 | : Remote Control Input |
| | | RIN23 | : Remote Control Input |
| CECOUT | : Consumer Electronics Control Output | RTC1HZ | : Real-time Counter Correction Clock (1 Hz) Output |
| EVDD | : Power Supply for Port | | |
| EVSS | : Ground for Port | RTCCL | : Real-time Counter Clock (32 kHz Original Oscillation) Output |
| EXCLK | : External Clock Input (Main System Clock) | | |
| | | RTCDIV | : Real-time Counter Clock (32 kHz Divided Frequency) Output |
| EXLVI | : External Potential Input for Low-voltage Detector | | |
| | | RxD0-RxD2 | : Receive Data |
| FLMD0 | : Flash Programming Mode | SCK00, SCK01, SCK10, SCK20 | : Serial Clock Input/Output |
| INTP0-INTP5, INTP7, INTP8 | : External Interrupt Input | SCL0, SCL10, SCL20 | : Serial Clock Input/Output |
| KR0-KR7 | : Key Return | SDA0, SDA10, SDA20 | : Serial Data Input/Output |
| P02-P06 | : Port 0 | SI00, SI01, SI10, SI20 | : Serial Data Input |
| P10-P17 | : Port 1 | SO00, SO01, SO10, SO20 | : Serial Data Output |
| P20-P27 | : Port 2 | | |
| P30, P31 | : Port 3 | TI00-TI07, TI10-TI12 | : Timer Input |
| P40-P47 | : Port 4 | TO00-TO07, TO10-TO12 | : Timer Output |
| P50-P55 | : Port 5 | TOOL0 | : Data Input/Output for Tool |
| P60-P67 | : Port 6 | TOOL1 | : Clock Output for Tool |
| P70-P77 | : Port 7 | TxD0-TxD2 | : Transmit Data |
| P90-P91 | : Port 9 | VDD | : Power Supply |
| P110, P111 | : Port 11 | VSS | : Ground |
| P120-P124 | : Port 12 | X1, X2 | : Crystal Oscillator (Main System Clock) |
| P130 | : Port 13 | | |
| P140, P142-P144 | : Port 14 | | |
| P150-P153 | : Port 15 | XT1, XT2 | : Crystal Oscillator (Subsystem Clock) |

78K0R/KG3-C

100-pin plastic LQFP (14mm x 14mm), pin pitch = 0.5mm

| | | | |
|---------------------------|---|----------------------------|--|
| ANI0-ANI15 | : Analog Input | PCLBUZ0, PCLBUZ1 | : Programmable Clock Output / Buzzer Output |
| AVREF | : Analog Reference Voltage | REGC | : Regulator Capacitance |
| AVSS | : Analog Ground | RESET | : Reset |
| CECIN | : Consumer Electronics Control Input | RIN01 | : Remote Control Input |
| CECIO | : Consumer Electronics Control Input/Output | RIN23 | : Remote Control Input |
| CECOUT | : Consumer Electronics Control Output | RTC1HZ | : Real-time Counter Correction Clock (1 Hz) Output |
| EVDD0, EVDD1 | : Power Supply for Port | RTCCL | : Real-time Counter Clock (32 kHz Original Oscillation) Output |
| EVSS0, EVSS1 | : Ground for Port | RTCDIV | : Real-time Counter Clock (32 kHz Divided Frequency) Output |
| EXCLK | : External Clock Input (Main System Clock) | RxD0-RxD2 | : Receive Data |
| EXLVI | : External Potential Input for Low-voltage Detector | SCK00, SCK01, SCK10, SCK20 | : Serial Clock Input/Output |
| FLMD0 | : Flash Programming Mode | SCL0, SCL10, SCL20 | : Serial Clock Input/Output |
| INTP0-INTP5, INTP7, INTP8 | : External Interrupt Input | SDA0, SDA10, SDA20 | : Serial Data Input/Output |
| KR0-KR7 | : Key Return | SI00, SI01, SI10, SI20 | : Serial Data Input |
| P00-P06 | : Port 0 | SO00, SO01, SO10, SO20 | : Serial Data Output |
| P10-P17 | : Port 1 | TI00-TI07, TI10-TI12 | : Timer Input |
| P20-P27 | : Port 2 | TO00-TO07, TO10-TO12 | : Timer Output |
| P30, P31 | : Port 3 | TOOL0 | : Data Input/Output for Tool |
| P40-P47 | : Port 4 | TOOL1 | : Clock Output for Tool |
| P50-P57 | : Port 5 | TxD0-TxD2 | : Transmit Data |
| P60-P67 | : Port 6 | VDD | : Power Supply |
| P70-P77 | : Port 7 | VSS | : Ground |
| P80-P87 | : Port 8 | X1, X2 | : Crystal Oscillator (Main System Clock) |
| P91 | : Port 9 | XT1, XT2 | : Crystal Oscillator (Subsystem Clock) |
| P110, P111 | : Port 11 | | |
| P120-P124 | : Port 12 | | |
| P130, P131 | : Port 13 | | |
| P140-P145 | : Port 14 | | |
| P150-P157 | : Port 15 | | |

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