

TX09 Series

32bit

Under Development

**TMPA901CMXBG**

177pin

## High-performance 32-bit RISC microcontroller with a USB host controller

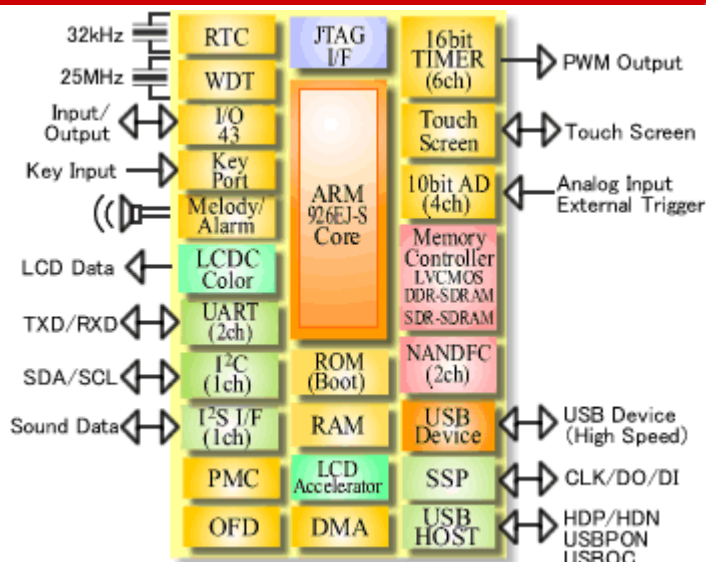
### Features

#### ● ARM926EJ-S™ CPU Core

- Operating voltage:  
Internal: 1.4 to 1.6 V I/O: 1.7 to 1.9 V, 3.0 to 3.6 V
- Minimum instruction execution time:  
5 ns (200 MHz internal, 0 to 70°C)  
6.67 ns (150 MHz internal, -20 to 85°C)
- Data cache: 16 Kbytes
- Instruction cache: 16 Kbytes
- Internal ROM: 16 Kbytes (Boot)
- Internal RAM: 32 Kbytes
- External data bus width: Up to 16 bits

#### ● On-chip Functions

- Color LCD controller (16-bit TFT/STN) : 1 channel
- LCD data process accelerator
- Memory controller
  - Static memory
  - SDR SDRAM
  - LVC MOS DDR SDRAM
- NAND Flash controller : 2 channels
- USB (High-speed) device controller : 1 channel
- USB (Full-Speed) host controller : 1 channel
- DMA controller : 8 channels
- SSP (SPI/MicroWire mode) : 1 channels
- RTC : 1 channel



- UART : 2 channels
- I²C : 1 channels
- I²S interface : 1 channels
- 10-bit AD converter : 4 channels
- 16-bit timer : 6 channels
- Touch-screen interface : 1 channel
- JTAG interface
- Power management circuit (PMIC)
- Oscillation frequency detection (OFD)

### Package Information

#### ● Pin Assignments

- Package name:  
FBGA177-P-1313-0.8C4

Top View

|    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |
|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | A13 | A14 | A15 | A16 | A17 |
| B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 | B14 | B15 | B16 | B17 |
| C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 | C17 |
| D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | D16 | D17 |
| E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 | E13 | E14 | E15 | E16 | E17 |
| F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 | F12 | F13 | F14 | F15 | F16 | F17 |
| G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | G9 | G10 | G11 | G12 | G13 | G14 | G15 | G16 | G17 |
| H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 | H17 |
| J1 | J2 | J3 | J4 | J5 | J6 | J7 | J8 | J9 | J10 | J11 | J12 | J13 | J14 | J15 | J16 | J17 |
| K1 | K2 | K3 | K4 | K5 | K6 | K7 | K8 | K9 | K10 | K11 | K12 | K13 | K14 | K15 | K16 | K17 |
| L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | L9 | L10 | L11 | L12 | L13 | L14 | L15 | L16 | L17 |
| M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 |
| N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 | N9 | N10 | N11 | N12 | N13 | N14 | N15 | N16 | N17 |
| P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 | P13 | P14 | P15 | P16 | P17 |
| R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 | R16 | R17 |
| T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | T12 | T13 | T14 | T15 | T16 | T17 |
| U1 | U2 | U3 | U4 | U5 | U6 | U7 | U8 | U9 | U10 | U11 | U12 | U13 | U14 | U15 | U16 | U17 |

## ● Pin Numbers and Names (1/2)

|   | 1                               | 2                               | 3                                 | 4                           | 5                           | 6                             | 7                             | 8             |
|---|---------------------------------|---------------------------------|-----------------------------------|-----------------------------|-----------------------------|-------------------------------|-------------------------------|---------------|
| A | A1<br>DVSSCOM                   | A2<br>SM3/XT2                   | A3<br>SM2/XT1                     | A4<br>PU3/NDD3/<br>LD3      | A5<br>PU2/NDD2/<br>LD2      | A6<br>PU1/<br>NDD1/LD         | A7<br>PU0/<br>NDD0/LD0        | A8<br>SE5/A5  |
| B | B1<br>SP0/TCK                   | B2<br>PC2/PWE                   | B3<br>PC3/MLDA<br>LM/PWM1 O<br>UT | B4<br>PU7/NDD7/<br>LD7      | B5<br>PU6/NDD6/<br>LD6      | B6<br>PU5/<br>NDD5/LD         | B7<br>PU4/<br>NDD4/LD4        | B8<br>SF3/A11 |
| C | C1<br>SP4/RTCK                  | C2<br>SP1/TMS                   | C3<br>PC4/<br>FSOUT/<br>PWM3OUT   | C4<br>PV3/<br>NDCE/<br>LD11 | C5<br>PV2/<br>NDAL/<br>LD10 | C6<br>PV1/<br>NDME/<br>LD9    | C7<br>PV0/<br>NDRE/<br>LD8    | C8<br>SG0/A16 |
| D | D1<br>SP5/TDO                   | D2<br>SP2/TDI                   | D3<br>PC6/<br>I2C0CL/<br>USBPON   | D4<br>PV7/LD15              | D5<br>PV6/<br>NDRB/LD1      | D6<br>PV5/<br>NDCE1n/<br>LD13 | D7<br>PV4/<br>NDCE0n/<br>LD12 | D8<br>SG4/A20 |
| E | E1<br>DVCC3IO                   | E2<br>SP3/TRSTn                 | E3<br>PC7/<br>I2C0DA/<br>INT9     | E4<br>DVCC3IO               | E5<br>DVSSCOM               |                               |                               |               |
| F | F1<br>DVCC1B                    | F2<br>DVCC3IO                   | F3<br>DVCC3IO                     | F4<br>DVCC3IO               |                             |                               |                               |               |
| G | G1<br>DVSSCOM                   | G2<br>DVSSCOM                   | G3<br>DVSSCOM                     | G4<br>DVSSCOM               |                             |                               |                               |               |
| H | H1<br>DVCC1A                    | H2<br>DVCC1A                    | H3<br>DVCC1A                      | H4<br>DVCC1A                |                             |                               |                               |               |
| J | J1<br>AVCC3AD                   | J2<br>VREFH                     | J3<br>VREFL                       | J4<br>DVCC1B                |                             |                               |                               |               |
| K | K1<br>PD4/AN4/<br>MX            | K2<br>PD5/AN5/<br>MY            | K3<br>AVSS3AD                     | K4<br>DVCC3IO               |                             |                               |                               |               |
| L | L1<br>PD6/<br>INTACTS1)/<br>AN6 | L2<br>PD7/INTB/<br>AN7          | L3<br>DVCC3IO                     | L4<br>SM6/AM0               |                             |                               |                               |               |
| M | M1<br>DVCC3IO                   | M2<br>DVCC3IO                   | M3<br>PA0/KI0                     | M4<br>PA2/KI2               | M5<br>DVSSCOM               | M6<br>AVSS3C                  | M7<br>DVCC1A                  | M8<br>DVCC3IO |
| N | N1<br>SM4/<br>RESETn            | N2<br>PND/<br>U0TXD/<br>SIR0OUT | N3<br>PA1/KI1                     | N4<br>PA3/KI3               | N5<br>DVSSCOM               | N6<br>AVCC3C                  | N7<br>AVCC3T1                 | N8<br>AVCC3T0 |
| P | P1<br>PNI/<br>U0RXD/<br>SIR0IN  | P2<br>SM7/AM1                   | P3<br>DVCC1C                      | P4<br>DVSS1C                | P5<br>DVSSCOM               | P6<br>SR3/<br>REXT            | P7<br>AVSS3T2                 | P8<br>AVSS3T1 |
| R | R1<br>DVSSCOM                   | R2<br>SM0/X1                    | R3<br>SM1/X2                      | R4<br>DVCC1C                | R5<br>SR4/<br>VSENS         | R6<br>AVSS3T3                 | R7<br>SR1/DDM                 | R8<br>SR0/DDP |
|   | 1                               | 2                               | 3                                 | 4                           | 5                           | 6                             | 7                             | 8             |

## ● Pin Numbers and Names (2/2)

| 9                       | 10                       | 11                                              | 12                                 | 13                                              | 14                                  | 15                                 |   |
|-------------------------|--------------------------|-------------------------------------------------|------------------------------------|-------------------------------------------------|-------------------------------------|------------------------------------|---|
| A9<br>SE4/A4            | A10<br>SE3/A3            | A11<br>SE2/A2                                   | A12<br>SE1/A1                      | A13<br>SE0/A0                                   | A14<br>SL2/<br>DMCAP                | A15<br>DVSSCOM                     | A |
| B9<br>SG7/A23           | B10<br>SF2/A10           | B11<br>SF1/A9                                   | B12<br>SF0/A8                      | B13<br>SE7/A7                                   | B14<br>SE6/A6                       | B15<br>SL1/<br>DMCGLKN             | B |
| C9<br>SF7/A15           | C10<br>SG6/A22           | C11<br>SF6/A14                                  | C12<br>SF5/A13                     | C13<br>SF4/A12                                  | C14<br>SK0/<br>DMCSDQMD<br>/        | C15<br>SL0/DMCDD<br>LKP/DMCSC      | C |
| D9<br>SG3/A19           | D10<br>SG2/A18           | D11<br>SG5/A21                                  | D12<br>SG1/A17                     | D13<br>SK4/<br>SMCWE <sub>n</sub>               | D14<br>SK1/<br>DMCSDQMI<br>/DMCDDMI | D15<br>SL6/<br>DMCGLKIN            | D |
|                         |                          |                                                 | E12<br>SK5/<br>SMCBE1 <sub>n</sub> | E13<br>S <sub>J</sub> 5/<br>DMCBA1              | E14<br>SE7/D15                      | E15<br>SB6/D14                     | E |
|                         |                          |                                                 | F12<br>S <sub>J</sub> 6/<br>DMCCKE | F13<br>S <sub>J</sub> 4/<br>DMCBA0              | F14<br>SB5/D13                      | F15<br>SB4/D12                     | F |
|                         |                          |                                                 | G12<br>DVCCM                       | G13<br>S <sub>J</sub> 3/<br>DMCCAS <sub>n</sub> | G14<br>SB3/D11                      | G15<br>SB2/D10                     | G |
|                         |                          |                                                 | H12<br>DVCCM                       | H13<br>S <sub>J</sub> 2/<br>DMCRAS <sub>n</sub> | H14<br>SB1/D9                       | H15<br>SB0/D8                      | H |
|                         |                          |                                                 | J12<br>DVCCM                       | J13<br>S <sub>J</sub> 1/<br>DMCWE <sub>n</sub>  | J14<br>SL5/<br>DMCDDQS1             | J15<br>SL4/<br>DMCDDQS0            | J |
|                         |                          |                                                 | K12<br>DVCC1A                      | K13<br>S <sub>J</sub> 0/<br>SMCCE <sub>n</sub>  | K14<br>SA7/D7                       | K15<br>SA6/D6                      | K |
|                         |                          |                                                 | L12<br>DVCC1B                      | L13<br>SH7/<br>DMCCS <sub>n</sub>               | L14<br>SA5/D6                       | L15<br>SA4/D4                      | L |
| M9<br>DVCC3I0           | M10<br>SN2/<br>SELJTAG   | M11<br>AVCC3H                                   | M12<br>SN1/<br>SELDVCCM            | M13<br>SH4/<br>SMCCS1 <sub>n</sub>              | M14<br>SA3/D3                       | M15<br>SA2/D2                      | M |
| N9<br>PE2/K02/<br>LCLFP | N10<br>PB1/K01/<br>LCLAC | N11<br>PT2/<br>SP000/<br>I2S0DATI               | N12<br>PT4/<br>UITXD/<br>USBPON    | N13<br>SH3/<br>SMCCS0 <sub>n</sub>              | N14<br>SA1/D1                       | N15<br>SA0/D0                      | N |
| P9<br>SND/SELM<br>EMC   | P10<br>PB0/K00/<br>LCLCP | P11<br>PT6/<br>UICTS <sub>n</sub> /<br>I2S0DATO | P12<br>PT1/<br>SP0CLK/<br>I2S0CLK  | P13<br>PT0/<br>SP0FSS/<br>I2S0WS                | P14<br>PT3/SP0CI/<br>I2S0MCLK       | P15<br>SH2/<br>SMCCE0 <sub>n</sub> | P |
| R9<br>AVSS3T0           | R10<br>PB3/K03/<br>LCLLP | R11<br>PT7/<br>X1USB/<br>SELNAND                | R12<br>PT5/<br>UIRXD/<br>USBDC     | R13<br>SN7/HDM                                  | R14<br>SN6/HDP                      | R15<br>DVSSCOM                     | R |
| 9                       | 10                       | 11                                              | 12                                 | 13                                              | 14                                  | 15                                 |   |

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