

LZ9FD34

DESCRIPTION

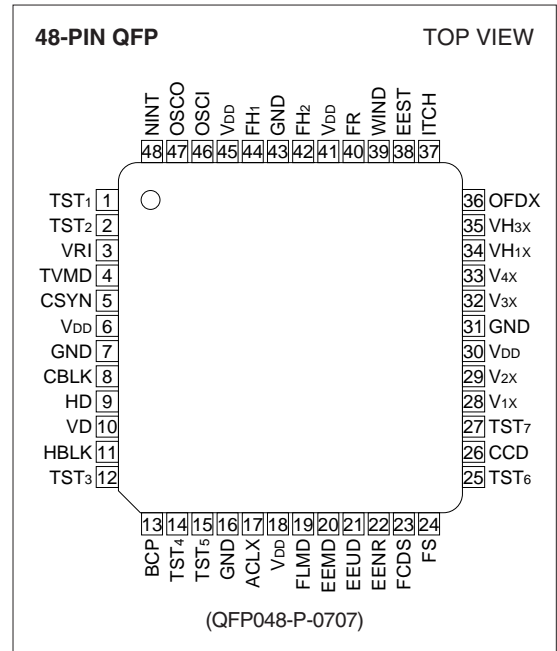
The LZ9FD34 is a CMOS single-chip driver IC which generates timing pulses for driving 270 k/320 k/410 k/470 k-pixel B/W CCD area sensors, synchronous pulses for TV signals and processing for video signals.

FEATURES

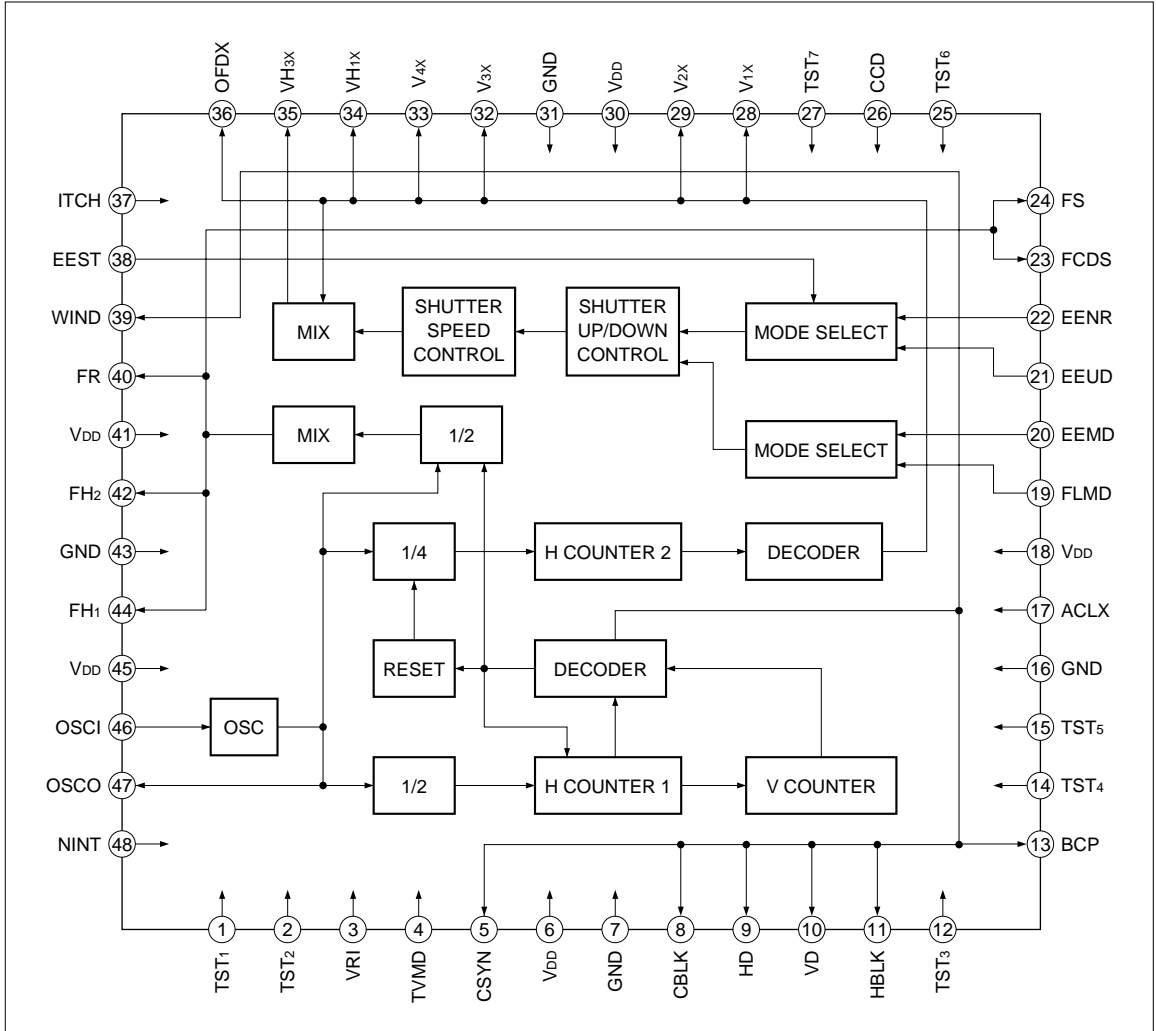
- Designed for B/W CCD area sensors with 270 k/320 k/410 k/470 k-pixel
- Switchable between EIA and CCIR modes
- Electronic shutter and EE control are possible
- Maximum shutter speed is 1/100 000 s
- Flicker-less function
- Non-interlace mode is possible
- External synchronization is possible
- Single +5 V power supply
- Field accumulation mode and frame accumulation mode are possible
- Package :
48-pin QFP (QFP048-P-0707) 0.5 mm pin-pitch

Single-chip Driver IC for 270 k/320 k/ 410 k/470 k-pixel B/W CCDs







PIN CONNECTIONS









BLOCK DIAGRAM



PIN DESCRIPTION

| PIN NO. | SYMBOL | I/O | POLARITY | PIN NAME | DESCRIPTION | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------------|--------|--------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------|-------------------------|------|---|---|-----------------------------|-------|---|---|-------------------------------|-------|---|---|--------------------------|-------|---|---|--------------------------|-------|
| 1 | TST1 | ICD | – | Test pin 1 | A test pin. Set open or to L level in the normal mode. | | | | | | | | | | | | | | | | | | | | |
| 2 | TST2 | ICD | – | Test pin 2 | A test pin. Set open or to L level in the normal mode. | | | | | | | | | | | | | | | | | | | | |
| 3 | VRI | ICSU | – | Vertical reset input | An input pin for resetting internal vertical counter. The input pulse is VSYNC. (negative polarity) | | | | | | | | | | | | | | | | | | | | |
| 4 | TVMD | ICU | – | TV mode selection input | An input pin to select TV standards. L level : EIA mode H level or open : CCIR mode | | | | | | | | | | | | | | | | | | | | |
| 5 | CSYN | O |  | Composite synchronizing pulse output | An output pin of composite synchronous signal pulse. | | | | | | | | | | | | | | | | | | | | |
| 6 | VDD | – | – | Power supply | Supply of +5 V power. | | | | | | | | | | | | | | | | | | | | |
| 7 | GND | – | – | Ground | A grounding pin. | | | | | | | | | | | | | | | | | | | | |
| 8 | CBLK | O |  | Composite blanking pulse output | An output pin of composite blanking pulse. | | | | | | | | | | | | | | | | | | | | |
| 9 | HD | O |  | Horizontal drive pulse output | The pulse occurs at the start of every line. | | | | | | | | | | | | | | | | | | | | |
| 10 | VD | O |  | Vertical drive pulse output | The pulse occurs at the start of every field. | | | | | | | | | | | | | | | | | | | | |
| 11 | HBLK | O |  | Horizontal blanking pulse output | A pulse that corresponds to the cease period of the horizontal transfer pulse. | | | | | | | | | | | | | | | | | | | | |
| 12 | TST3 | ICD | – | Test pin 3 | A test pin. Set open or to L level in the normal mode. | | | | | | | | | | | | | | | | | | | | |
| 13 | BCP | O |  | Optical black clamp pulse output | A pulse to clamp the optical black signal. This pulse stays low during the absence of effective pixels within the vertical blanking. | | | | | | | | | | | | | | | | | | | | |
| 14 | TST4 | ICD | – | Test pin 4 | A test pin. Set open or to L level in the normal mode. | | | | | | | | | | | | | | | | | | | | |
| 15 | TST5 | ICD | – | Test pin 5 | A test pin. Set open or to L level in the normal mode. | | | | | | | | | | | | | | | | | | | | |
| 16 | GND | – | – | Ground | A grounding pin. | | | | | | | | | | | | | | | | | | | | |
| 17 | ACLX | ICU | – | All clear input | An input pin for resetting all internal circuits at power on. Connect VDD through the diode and through the capacitor. | | | | | | | | | | | | | | | | | | | | |
| 18 | VDD | – | – | Power supply | Supply of +5 V power. | | | | | | | | | | | | | | | | | | | | |
| 19 | FLMD | ICU | – | Electronic exposure and WIND pulse control input 1 | An input pin to control electronic exposure mode, flickerless mode and WIND (pin 39) pulse output. | | | | | | | | | | | | | | | | | | | | |
| 20 | EEMD | ICU | – | Electronic exposure and WIND pulse control input 2 | <table border="1"> <thead> <tr> <th>FLMD</th> <th>EEMD</th> <th>Electronic Shutter mode</th> <th>WIND</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td>EIA : 1/60 s, CCIR : 1/50 s</td> <td>WIND1</td> </tr> <tr> <td>H</td> <td>L</td> <td>EIA : 1/100 s, CCIR : 1/120 s</td> <td>WIND1</td> </tr> <tr> <td>L</td> <td>H</td> <td>Electronic exposure mode</td> <td>WIND1</td> </tr> <tr> <td>H</td> <td>H</td> <td>Electronic exposure mode</td> <td>WIND2</td> </tr> </tbody> </table> | FLMD | EEMD | Electronic Shutter mode | WIND | L | L | EIA : 1/60 s, CCIR : 1/50 s | WIND1 | H | L | EIA : 1/100 s, CCIR : 1/120 s | WIND1 | L | H | Electronic exposure mode | WIND1 | H | H | Electronic exposure mode | WIND2 |
| | | | | | FLMD | EEMD | Electronic Shutter mode | WIND | | | | | | | | | | | | | | | | | |
| | | | | | L | L | EIA : 1/60 s, CCIR : 1/50 s | WIND1 | | | | | | | | | | | | | | | | | |
| | | | | | H | L | EIA : 1/100 s, CCIR : 1/120 s | WIND1 | | | | | | | | | | | | | | | | | |
| L | H | Electronic exposure mode | WIND1 | | | | | | | | | | | | | | | | | | | | | | |
| H | H | Electronic exposure mode | WIND2 | | | | | | | | | | | | | | | | | | | | | | |
| WIND1 : Vertical pulse | | | | | | | | | | | | | | | | | | | | | | | | | |
| WIND2 : Composite pulse (vertical and horizontal) | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

| PIN NO. | SYMBOL | I/O | POLARITY | PIN NAME | DESCRIPTION | | |
|---------|--------|-------|-------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------|
| 21 | EEUD | IC | - | Electronic exposure control input 1 | An input pin to control electronic exposure. | | |
| | | | | | EEUD | EENR | Shutter Speed |
| | | | | | H | L | up |
| | | | | | H | H | control stopped |
| L | H | down | | | | | |
| 22 | EENR | IC | - | Electronic exposure control input 2 | | | |
| 23 | FCDS | O4MA2 |  | CDS pulse output 1 | A pulse to clamp the feed-through level from CCD. | | |
| 24 | FS | O4MA2 |  | CDS pulse output 2 | A pulse to sample-hold the signal from CCD. | | |
| 25 | TST6 | ICD | - | Test pin 6 | A test pin. Set open or to L level in the normal mode. | | |
| 26 | CCD | ICU | - | CCD selection input | An input pin to select sensor type. H level or open : 410 k, 470 k pixel CCD L level : 270 k, 320 k pixel CCD | | |
| 27 | TST7 | ICD | - | Test pin 7 | A test pin. Set open or to L level in the normal mode. | | |
| 28 | V1X | O |  | Vertical transfer pulse output 1 | A vertical transfer pulse for CCD. Connect to V1AX pin of vertical driver IC. | | |
| 29 | V2X | O |  | Vertical transfer pulse output 2 | A vertical transfer pulse for CCD. Connect to V2AX pin of vertical driver IC. | | |
| 30 | VDD | - | - | Power supply | Supply of +5 V power. | | |
| 31 | GND | - | - | Ground | A grounding pin. | | |
| 32 | V3X | O |  | Vertical transfer pulse output 3 | A vertical transfer pulse for CCD. Connect to V3AX pin of vertical driver IC. | | |
| 33 | V4X | O |  | Vertical transfer pulse output 4 | A vertical transfer pulse for CCD. Connect to V4AX pin of vertical driver IC. | | |
| 34 | VH1X | O |  | Readout pulse output | A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH1AX pin or VH1BX pin of vertical driver IC. | | |
| 35 | VH3X | O |  | Readout pulse output | A pulse that transfers the charge of the photo-diode to the vertical shift register. Connect to VH3AX pin or VH3BX pin of the vertical driver IC. | | |
| 36 | OFDX | O |  | OFD pulse output | A pulse that sweeps the charge of the photo-diode for the electronic shutter. Connect to OFD pin of CCD through the vertical driver IC and DC offset circuit. Held at H level at normal mode. | | |
| 37 | ITCH | ICU | - | Accumulation mode selection input | An input pin to select accumulation mode. H level or open : Field accumulation mode L level : Frame accumulation mode | | |
| 38 | EEST | ICU | - | Electronic exposure control input 3 | An input pin to control electronic exposure using EEUD (pin 21) and EENR (pin 22). H level or open : Electronic exposure is operated. L level : Electronic exposure is stopped. | | |

| PIN NO. | SYMBOL | I/O | POLARITY | PIN NAME | DESCRIPTION | | | | | | | | | | | | | | | |
|---------|-----------------|-------------------------------|-----------------------------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----------|---|---|------------------------|---|---|------------------------|---|-------------------------|------------------------|---|---|------------------------|
| 39 | WIND | ON (N-ch Open Drain) |  | Window pulse output | <p>An output pin for window pulse.</p> <table border="1"> <thead> <tr> <th>EEMD</th> <th>FLMD</th> <th>WIND</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td rowspan="2">WIND1 (vertical pulse)</td> </tr> <tr> <td>L</td> <td>H</td> </tr> <tr> <td>H</td> <td>L</td> <td rowspan="2">WIND2 (composite pulse)</td> </tr> <tr> <td>H</td> <td>H</td> </tr> </tbody> </table> <p>WIND1 : When connected to EEST (pin 38), the operation of electronic exposure can be stopped at the upper side of monitor.</p> <p>WIND2 : A pulse that picks out the center of CCD output. At this time, set H level or open at EEST (pin 38). As the output circuit of WIND is N-ch open drain, connect to VDD with R ($\geq 47 \text{ k}\Omega$).</p> | EEMD | FLMD | WIND | L | L | WIND1 (vertical pulse) | L | H | H | L | WIND2 (composite pulse) | H | H | | |
| EEMD | FLMD | WIND | | | | | | | | | | | | | | | | | | |
| L | L | WIND1 (vertical pulse) | | | | | | | | | | | | | | | | | | |
| L | H | | | | | | | | | | | | | | | | | | | |
| H | L | WIND2 (composite pulse) | | | | | | | | | | | | | | | | | | |
| H | H | | | | | | | | | | | | | | | | | | | |
| 40 | FR | O4MA3 |  | Reset pulse output | <p>A pulse to reset the charge of output circuit. Connect to ϕ_R pin of CCD through the DC offset circuit.</p> | | | | | | | | | | | | | | | |
| 41 | VDD | - | - | Power supply | Supply of +5 V power. | | | | | | | | | | | | | | | |
| 42 | FH ₂ | O4MA3 |  | Horizontal transfer pulse output 2 | <p>A pulse to drive horizontal CCD shift register. Connect to ϕ_{H2} pin of CCD.</p> | | | | | | | | | | | | | | | |
| 43 | GND | - | - | Ground | A grounding pin. | | | | | | | | | | | | | | | |
| 44 | FH ₁ | O4MA3 |  | Horizontal transfer pulse output 1 | <p>A pulse to drive horizontal CCD shift register. Connect to ϕ_{H1} pin of CCD.</p> | | | | | | | | | | | | | | | |
| 45 | VDD | - | - | Power supply | Supply of +5 V power. | | | | | | | | | | | | | | | |
| 46 | OSCI | OSCI | - | Clock input | <p>An input pin for reference clock oscillation. Connect to OSCO (pin 47) with R. The frequencies are as follows :</p> <table border="1"> <thead> <tr> <th>TVMD</th> <th>CCD</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td>19.0699 MHz (1 212 fH)</td> </tr> <tr> <td>L</td> <td>H</td> <td>28.6364 MHz (1 820 fH)</td> </tr> <tr> <td>H</td> <td>L</td> <td>19.3125 MHz (1 236 fH)</td> </tr> <tr> <td>H</td> <td>H</td> <td>28.3750 MHz (1 816 fH)</td> </tr> </tbody> </table> <p>fH = Horizontal frequency</p> | TVMD | CCD | Frequency | L | L | 19.0699 MHz (1 212 fH) | L | H | 28.6364 MHz (1 820 fH) | H | L | 19.3125 MHz (1 236 fH) | H | H | 28.3750 MHz (1 816 fH) |
| TVMD | CCD | Frequency | | | | | | | | | | | | | | | | | | |
| L | L | 19.0699 MHz (1 212 fH) | | | | | | | | | | | | | | | | | | |
| L | H | 28.6364 MHz (1 820 fH) | | | | | | | | | | | | | | | | | | |
| H | L | 19.3125 MHz (1 236 fH) | | | | | | | | | | | | | | | | | | |
| H | H | 28.3750 MHz (1 816 fH) | | | | | | | | | | | | | | | | | | |
| 47 | OSCO | OSC3M | - | Clock output | <p>An output pin for reference clock oscillation. The output is the inverse of OSCI (pin 46).</p> | | | | | | | | | | | | | | | |

| PIN NO. | SYMBOL | I/O | POLARITY | PIN NAME | DESCRIPTION | | | | | | | | | |
|---------|--------|----------------|----------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|----------------|---|-----|------|---|-----|------|
| 48 | NINT | ICD | — | Non-interlace selection input | An input pin to select non-interlace mode. L level or open : Interlace mode H level : Non-interlace mode Period of field (at non-interlace mode) <table border="1"> <thead> <tr> <th>TVMD</th> <th>Field</th> <th>Number of Line</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>ODD</td> <td>262H</td> </tr> <tr> <td>H</td> <td>1st</td> <td>312H</td> </tr> </tbody> </table> | TVMD | Field | Number of Line | L | ODD | 262H | H | 1st | 312H |
| TVMD | Field | Number of Line | | | | | | | | | | | | |
| L | ODD | 262H | | | | | | | | | | | | |
| H | 1st | 312H | | | | | | | | | | | | |

IC : Input pin (CMOS level)

ICU : Input pin (CMOS level with pull-up resistor)

ICSU : Input pin (CMOS schmitt-trigger level with pull-up resistor)

ICD : Input pin (CMOS level with pull-down resistor)

O : Output pin

O4MA2 : Output pin

O4MA3 : Output pin

ON : Output pin (N-ch open drain)

OSCI : Input pin for oscillation

OSC3M : Output pin for oscillation

SUPPLEMENTARY EXPLANATION

Shutter speed changes at electronic exposure control mode.

| EIA | | | CCIR | | |
|-----|-------------------|--------------------|------|------------------|--------------------|
| No. | Charge Time | Shutter Speed | No. | Charge time | Shutter Speed |
| 0 | 262H or 263H | $\cong 1/60$ s | 0 | 312H or 313H | $\cong 1/50$ s |
| 1 | $252H + \alpha$ | $\cong 1/62$ s | 1 | $302H + \beta$ | $\cong 1/52$ s |
| • | (by 10H step) | | • | (by 10H step) | |
| 19 | $72H + \alpha$ | $\cong 1/220$ s | 24 | $72H + \beta$ | $\cong 1/220$ s |
| • | (by 4H step) | | • | (by 4H step) | |
| 30 | $28H + \alpha$ | $\cong 1/555$ s | 35 | $28H + \beta$ | $\cong 1/550$ s |
| • | (by 2H step) | | • | (by 2H step) | |
| 37 | $14H + \alpha$ | $\cong 1/1100$ s | 42 | $14H + \beta$ | $\cong 1/1090$ s |
| • | (by 1H step) | | • | (by 1H step) | |
| 44 | $7H + \alpha$ | $\cong 1/2140$ s | 49 | $7H + \beta$ | $\cong 1/2125$ s |
| • | (by 0.5H step) | | • | (by 0.5H step) | |
| 50 | $4H + \alpha$ | $\cong 1/3610$ s | 55 | $4H + \beta$ | $\cong 1/3590$ s |
| • | (by 0.25H step) | | • | (by 0.25H step) | |
| 62 | $1H + \alpha$ | $\cong 1/11570$ s | 67 | $1H + \beta$ | $\cong 1/11550$ s |
| • | (by 0.125H step) | | • | (by 0.125H step) | |
| 69 | $0.125H + \alpha$ | $\cong 1/32450$ s | 74 | $0.125H + \beta$ | $\cong 1/32690$ s |
| 70 | 0.280H | $\cong 1/56090$ s | 75 | 0.275H | $\cong 1/56800$ s |
| 71 | 0.155H | $\cong 1/101430$ s | 76 | 0.152H | $\cong 1/102720$ s |

$$\alpha = 0.360H$$

$$\beta = 0.353H$$

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | RATING | UNIT |
|-----------------------|------------------|-------------------------------|------|
| Supply voltage | V _{DD} | -0.3 to +6.0 | V |
| Input voltage | V _I | -0.3 to V _{DD} + 0.3 | V |
| Output voltage | V _O | -0.3 to V _{DD} + 0.3 | V |
| Operating temperature | T _{OPR} | -30 to +70 | °C |
| Storage temperature | T _{STG} | -55 to +150 | °C |

ELECTRICAL CHARACTERISTICS

DC Characteristics

(V_{DD} = 5.0±0.5 V, T_{OPR} = -30 to +70 °C)

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT | NOTE |
|------------------------|-----------------------------------|----------------------------------|------|------|------|------|------|
| Input "Low" voltage | V _{IL} | | | | 1.5 | V | 1 |
| Input "High" voltage | V _{IH} | | 3.5 | | | V | |
| Input "Low" voltage | V _{T+} | | | | 3.7 | V | 2 |
| Input "High" voltage | V _{T-} | | 1.0 | | | V | |
| Hysteresis voltage | V _{T+} - V _{T-} | | 0.2 | | | V | |
| Input "Low" current | I _{IL1} | V _I = 0 V | | | 2.0 | μA | 3 |
| Input "High" current | I _{IH1} | V _I = V _{DD} | | | 2.0 | μA | |
| Input "Low" current | I _{IL2} | V _I = 0 V | 8.0 | | 75 | μA | 4 |
| Input "High" current | I _{IH2} | V _I = V _{DD} | | | 2.0 | μA | |
| Input "Low" current | I _{IL3} | V _I = 0 V | | | 2.0 | μA | 5 |
| Input "High" current | I _{IH3} | V _I = V _{DD} | 8.0 | | 75 | μA | |
| Output "Low" voltage | V _{OL1} | I _{OL} = 3 mA | | | 0.4 | V | 6 |
| Output "High" voltage | V _{OH1} | I _{OH} = -3 mA | 4.0 | | | V | |
| Output "Low" voltage | V _{OL2} | I _{OL} = 4 mA | | | 0.4 | V | 7 |
| Output "High" voltage | V _{OH2} | I _{OH} = -2 mA | 4.0 | | | V | |
| Output "Low" voltage | V _{OL3} | I _{OL} = 8 mA | | | 0.4 | V | 8 |
| Output "High" voltage | V _{OH3} | I _{OH} = -6 mA | 4.0 | | | V | |
| Output "Low" voltage | V _{OL4} | I _{OL} = 12 mA | | | 0.4 | V | 9 |
| Output "High" voltage | V _{OH4} | I _{OH} = -9 mA | 4.0 | | | V | |
| Output "Low" voltage | V _{OL5} | I _{OL} = 4 mA | | | 0.4 | V | 10 |
| Output leakage current | I _{OZ} | High-Z | | | 1.0 | μA | |

NOTES :

1. Applied to inputs (IC, ICD, ICU, OSC1).
2. Applied to input (ICSU).
3. Applied to inputs (IC, OSC1).
4. Applied to inputs (ICU, ICSU).
5. Applied to input (ICD).
6. Applied to output (OSC3M). (Output (OSC3M) measures on condition that input (OSCI) level is 0 V or V_{DD}.)
7. Applied to output (O).
8. Applied to output (O4MA2).
9. Applied to output (O4MA3).
10. Applied to output (ON).

PACKAGE

(Unit : mm)

48 QFP (QFP048-P-0707)

