

# M52959FP

## PSD ON CHIP DISTANCE DETECTION SIGNAL PROCESSOR

### DESCRIPTION

M52959FP is a semiconductor integrated circuit built-in PSD(Position Sensitive Device) and distance detection signal processor for 3V supply voltage.

This device transforms each signal current(I1 and I2) from PSD sensor to the voltage, and outputs it as the 4 Zone data after doing calculation of  $I1/(I1+I2)$ .

### FEATURES

- PSD on chip (Sensor size=0.5mm x 0.7mm)
- Wide operating supply voltage range  $V_{cc}=2.0V$  to 5.5V
- Built-in clamp circuit

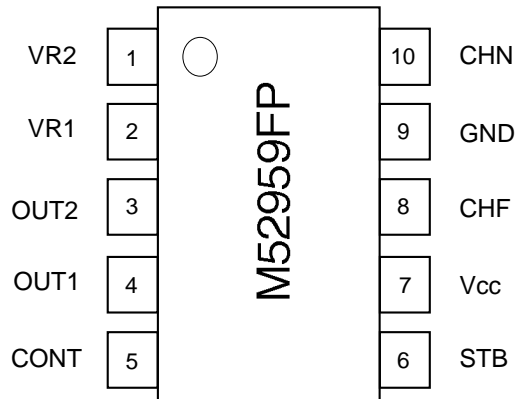
### APPLICATION

Auto focus control for the CAMERA  
Sensor for short distance etc

### RECOMMENDED OPERATING CONDITION

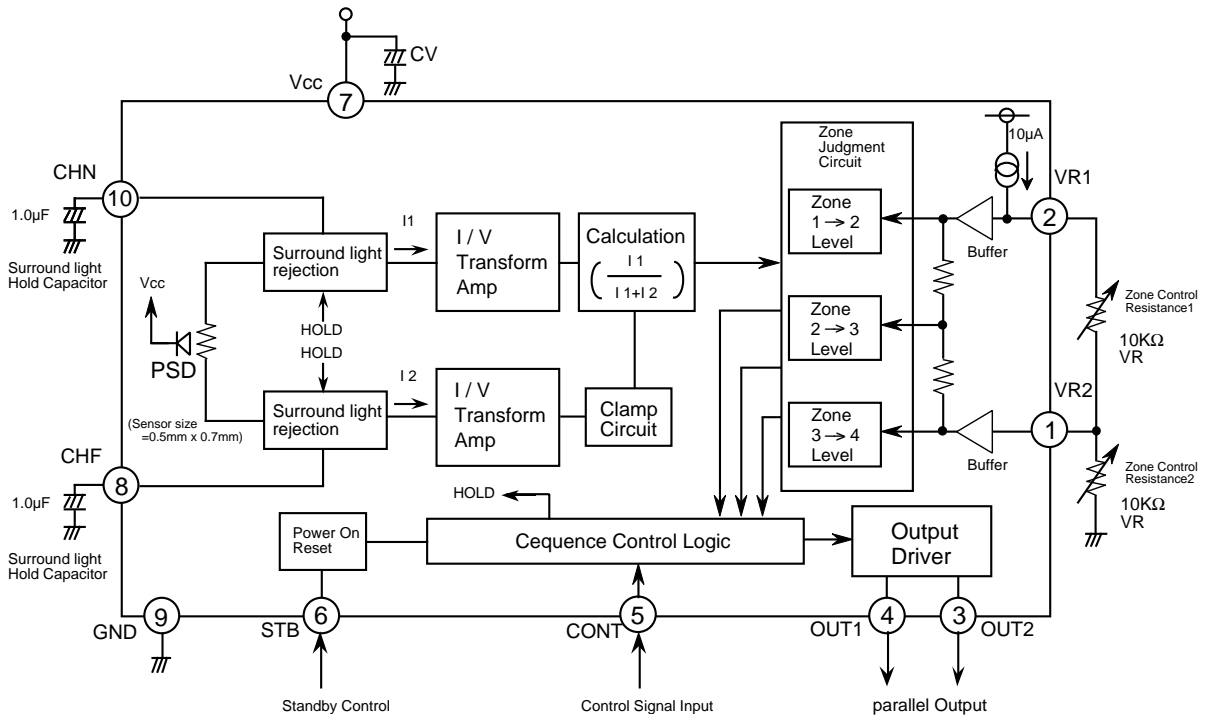
Supply voltage ..... 2.0 to 5.5V  
Rated suooly voltage ..... 3.0V

### PIN CONFIGURATION (TOP VIEW)



10Pin Clear Plastic Mold Package (10C2F) or  
10Pin Infrared Permeation Plastic Mold Package (10B2F)

### BLOCK DIAGRAM



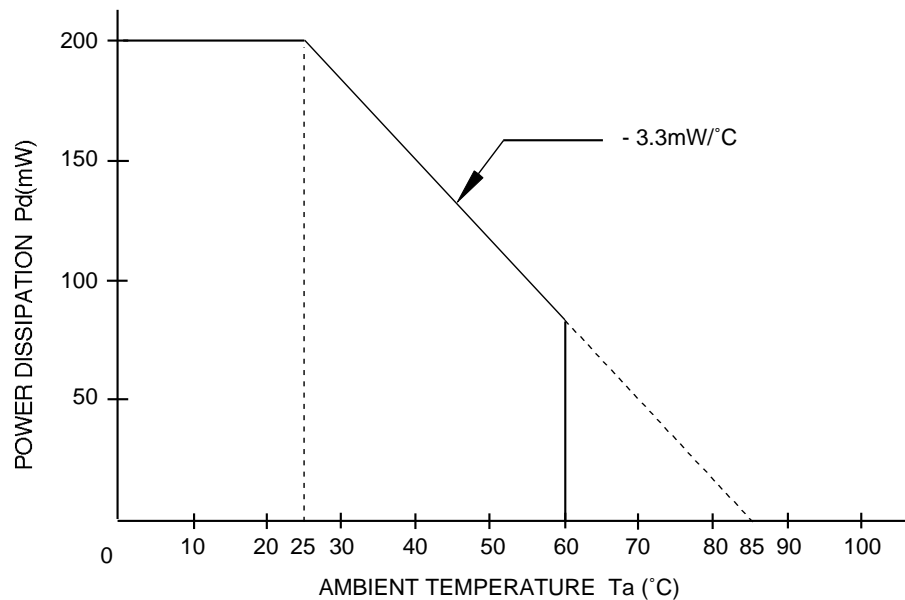
**ABSOLUTE MAXIMUM RATINGS** (Ta=25°C ,unless noted)

| Parameter                 | Symbol | Ratings          | Unit  | Remark             |
|---------------------------|--------|------------------|-------|--------------------|
| Supply voltage            | Vcc    | 7.0              | V     | note 1             |
| Power dissipation         | Pd     | 200              | mW    | Ta = 25°C          |
| Thermal derating          | Kθ     | 3.3              | mW/°C | Ta ≥ 25°C          |
| Pin input voltage         | VIF    | 7.0              | V     | Pin3,4,5,6         |
| Another pin input voltage | VI/O   | - 0.3 to Vcc+0.3 | V     | note 2             |
| Output pin inflow current | Isout  | 0.5              | mA    | NPN open collector |
| Operating temperature     | Topr   | - 10 to 60       | °C    |                    |
| Storage temperature       | Tstg   | - 30 to 85       | °C    |                    |
| Surge voltage             | Vsurge | ±1000V over      |       | C=100PF<br>R=1.5KΩ |

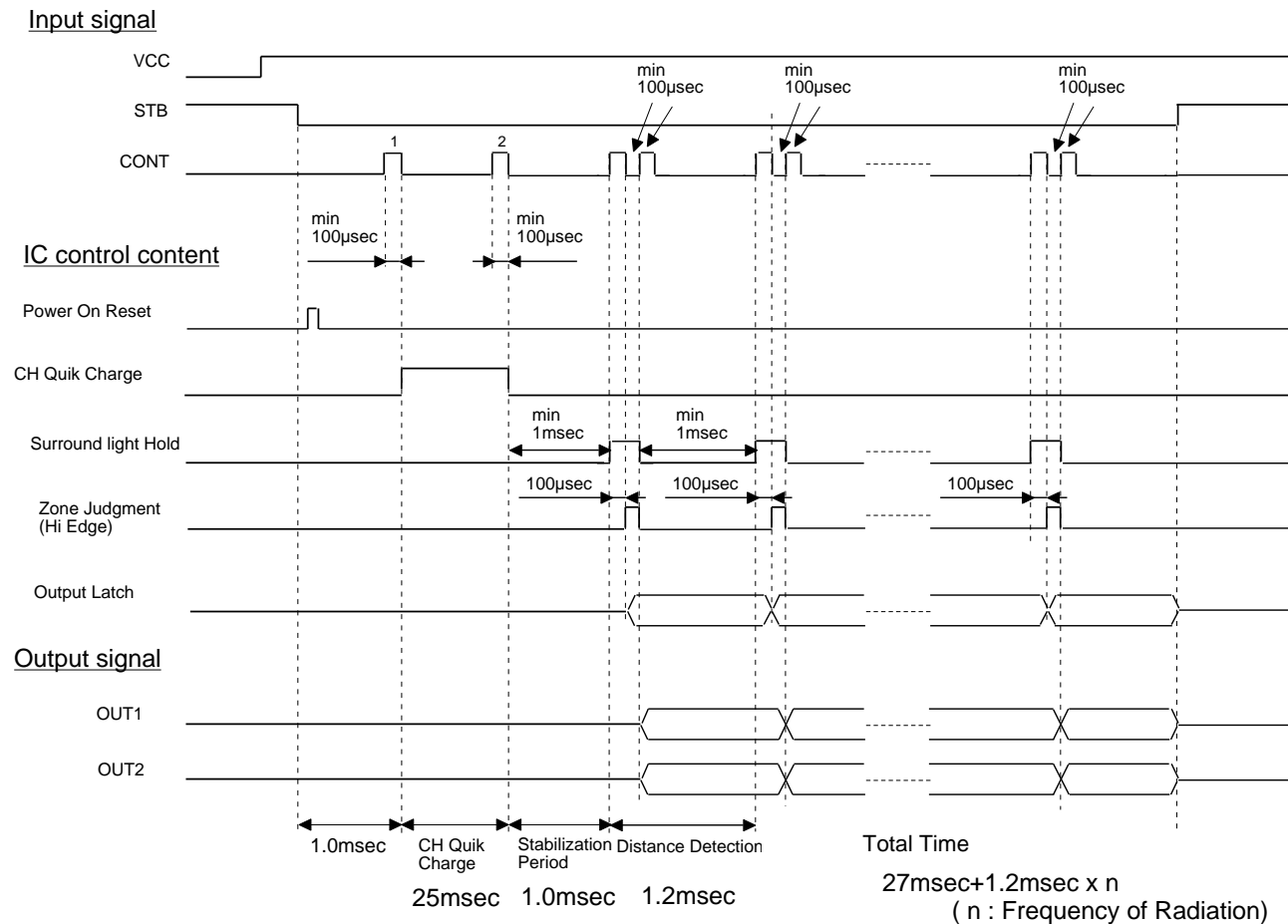
note 1 : As a principle,do not provide a supply voltage reversely.

note 2 : As a principle,do not provide over supply voltage or under ground voltage.

**THERMAL DERATING (MAXIMUM RATING)**



## SEQUENTIAL TIME CHART EXAMPLE

Controls

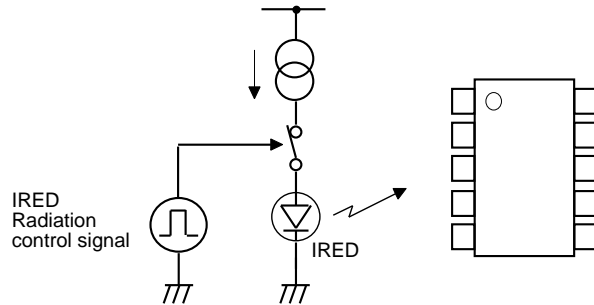
1. First, STB terminal set Low, then Power On Reset circuit operate. This Power On Reset circuit resets Built-in logic circuits.
2. After Power On Reset circuit stopped, Surround light Hold Capacitor quik charge between the first CONT pulse edge from High to Low and second CONT pulse edge from High to Low.
3. After quik charge, set Stabilization Period for about 1ms.
4. After quik charge, Surround light hold between the first CONT pulse edge from Low to High and second CONT pulse edge from Low to High.
5. After quik charge, Zone judges at the first CONT pulse edge from High to Low and output the Zone Data to OUT1, OUT2 terminals by 2bit at next CONT pulse edge from Low to High.
6. It can repeat distance detection by continuing control of 4 and 5.
7. It needs the signal synchronized with timing of Surround light hold as radiation control signal of IRED.

ELECTRICAL CHARACTERISTICS (Ta=25°C , Vcc=3.0V , dark situation , unless otherwise noted)

| Classification                | Parameter                               | Symbol | Test condition                          | Limit   |              |      | Unit | Note |
|-------------------------------|---|--------|---|---------|--------------|------|------|------|
|                               |   |        |   | Min.    | Typ.         | Max. |      |      |
|                               | Operating supply voltage range          | VCC    |   | 2.0     | 3.0          | 5.5  | V    |      |
| Consuming current             | Usual consuming current                 | ICC    |   | -       | 6.0          | 8.0  | mA   | *1   |
|                               | While Quick charge consuming current    | ICCQC  | While CH Quick charge consuming current | -       | 10.0         | 13.0 | mA   | *1   |
|                               | While STAND BY consuming current        | ICCS   |   | -       | -            | 1.0  | μA   | *1   |
| CONT terminal                 | CONT "H" input voltage                  | VCOH   |   | 1.1     | -            | 7.0  | V    |      |
|                               | CONT "L" input voltage                  | VCOL   |   | 0       | -            | 0.3  | V    |      |
|                               | CONT "H" input current                  | ICOH   | VIH=5.5V                                | -       | -            | 1.0  | μA   |      |
|                               | CONT "L" input current                  | ICOL   | VIL=0V                                  | -78     | -60          | -42  | μA   |      |
| STB terminal                  | STB "H" input voltage                   | VSTH   |   | VCC-0.3 | -            | 7.0  | V    |      |
|                               | STB "L" input voltage                   | VSYL   |   | 0       | -            | 0.3  | V    |      |
|                               | STB "H" input current                   | ISTH   | VIH=5.5V                                | -       | -            | 3.0  | μA   |      |
|                               | STB "L" input current                   | ISTL   | VIL=0V                                  | -150    | -100         | -50  | μA   |      |
| Surround light Hold Capacitor | CH Quick charge current                 | ICHQC  | VCH=0V                                  | -1200   | -800         | -400 | μA   | *1   |
|                               | CH stationary charge current            | ICHC   | VCH=0V                                  | -30     | -20          | -10  | μA   | *1   |
|                               | CH stationary discharge current         | ICHDC  | VCH=1.5V                                | 10      | 20           | 30   | μA   | *1   |
| Output circuit                | OUT leak current                        | IOUT   | VIN=5.5V                                | -       | -            | 1.0  | μA   | *1   |
|                               | OUT saturation voltage                  | VOUT   | IOUT=500μA                              | -       | -            | 0.3  | V    | *1   |
|                               | VR output current                       | IVR    | VVR=0V                                  | -13     | -10          | -7   | μA   | *1   |
| AF characteristics            | Far distance detection characteristics  | ST1    | No Signal                               |         | Nearest zone |      |      | *2   |
|                               | Near distance detection characteristics | ST2    | Signal = 100nA                          |         | Farther zone |      |      | *3   |
|                               | Clamp level                             | ICLAM  |   | 0.25    | 0.5          | 0.75 | nA   | *4   |
|                               | PSD resistance value                    | RPSD   |   | 84      | 140          | 196  | KΩ   | *4   |

PSD ON CHIP DISTANCE DETECTION SIGNAL PROCESSOR

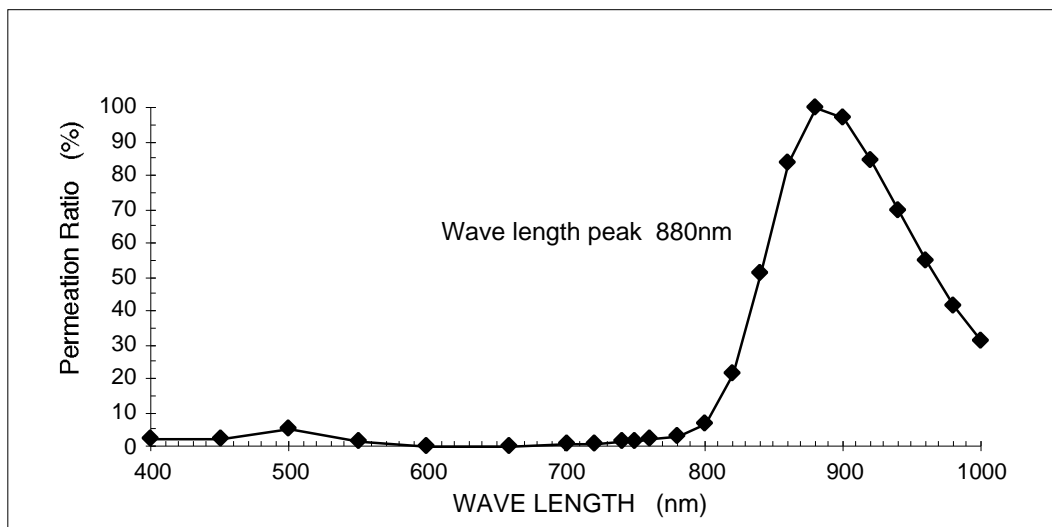
- \*1 Set up the logic control terminal, correspond to the parameter.
- \*2 This measuring have to put DUT box under dark condition.
- \*3 Regulate IRED driving current so that PSD output will become equivalent to 100nA and irradiate IC with synchronizing IRED radiation.  
Set zone resistance  $VR1 = VR2 = 2K\Omega$



- \*4 Reference value

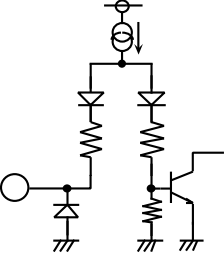
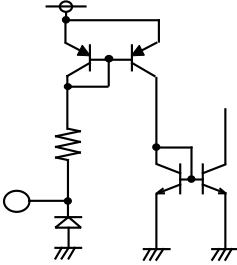
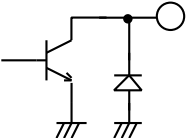
PSD SPECTRAL RESPONSIVITY CHARACTERISTICS

Characteristic at using Infrared Permeation Plastic Mold Package



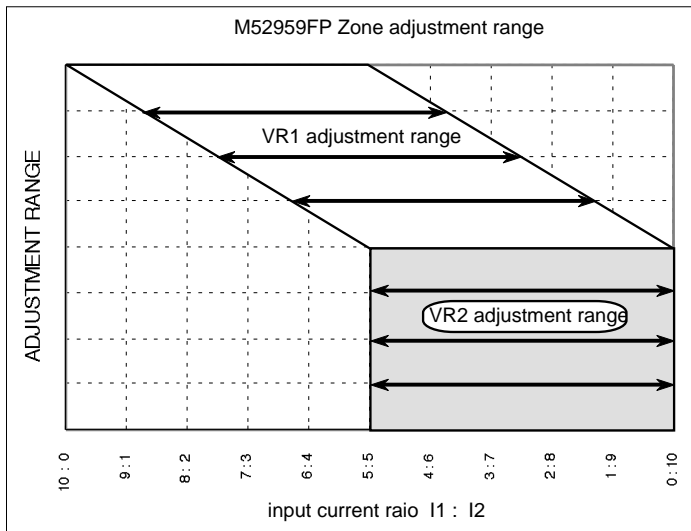
Interface

Ta=25°C, VCC=3.0V, dark condition

| Terminal name | Circuit diagram   | Parameter          | Limit   |      |      | Unit | Test conditions and note |
|---------------|---|--------------------|---------|------|------|------|--------------------------|
|               |   |                    | Min.    | Typ. | Max. |      |                          |
| CONT          |    | "H" input voltage  | 1.1     | —    | 7.0  | V    |                          |
|               |   | "L" input voltage  | 0       | —    | 0.3  |      |                          |
|               |   | "H" input current  | —       | —    | 1.0  | μA   |                          |
|               |   | "L" input current  | -78     | -60  | -42  |      |                          |
| STB           |   | "H" input voltage  | VCC-0.3 | —    | 7.0  | V    |                          |
|               |   | "L" input voltage  | 0       | —    | 0.3  |      |                          |
|               |   | "H" input current  | —       | —    | 3.0  | μA   |                          |
|               |   | "L" input current  | -150    | -100 | -50  |      |                          |
| OUT           |  | "L" output current | —       | —    | 0.3  | V    | IOL=500μA                |
|               |   | "H" leak current   | —       | —    | 1.0  | μA   | VIN=5.5V                 |

ADJUSTMENT RANGE OF ZONE SETTING RESISTANCE AND OUTPUT FUNCTION

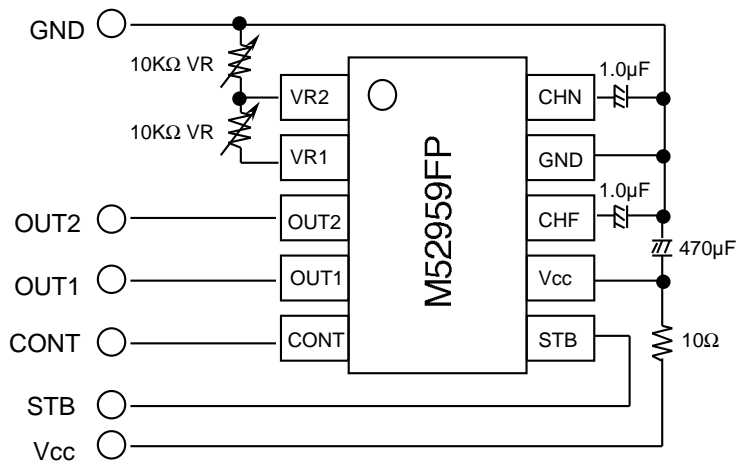
In case of using volume 10KΩ for the setting resistance VR1 and VR2, the adjustment range becomes the bottom figure.



Zone Decision result is outputted as mentioned in the bottom figure by the digital style from OUT1 and OUT2.

|                  |        | OUT1 | OUT2 |
|------------------|--------|------|------|
| near<br>↓<br>far | Zone 1 | L    | L    |
|                  | Zone 2 | H    | L    |
|                  | Zone 3 | L    | H    |
|                  | Zone 4 | H    | H    |

APPLICATION EXAMPLE



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