AK9232NK/33NK/34NK
Application notes

This document shows circuit and layout diagrams of the AK9232/33/34 as the reference design.

■ Circuit Diagram

It shows compositions of power supply decoupling capacitors and analog input filters.

Peripheral Parts/Pattern Details

R1,R2,C1,C2,C3 : Low-pass Filter of the AIN0
R3,R4,C4,C5,C6 : Low-pass Filter of the AIN1
C7,C8 : Decoupling Capacitor for HVDD
C9,C10 : Decoupling Capacitor for DRVDD
C11,C12 : Decoupling Capacitor for VREFP-VREFN
C13,C14 : Decoupling Capacitor for VDD0
C15,C16 : Decoupling Capacitor for VDD1

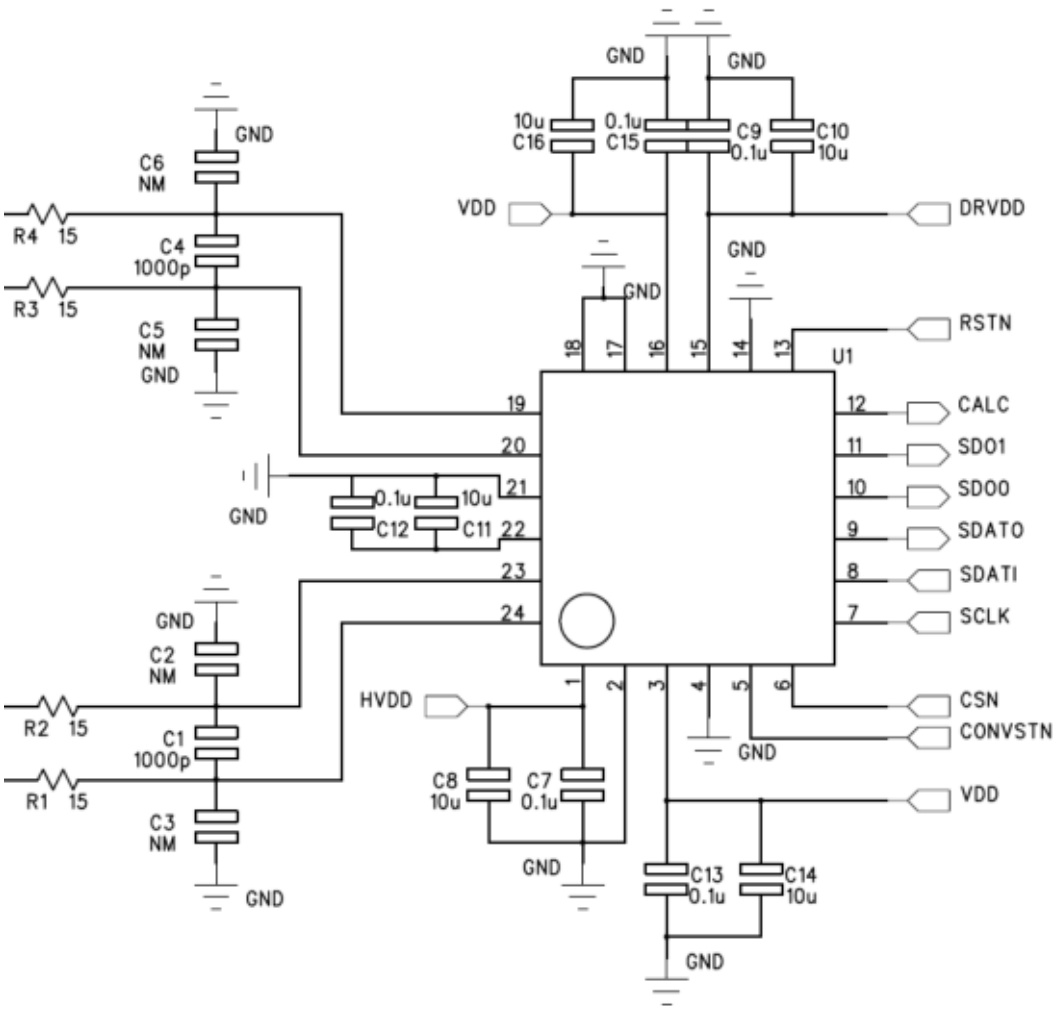


Figure 1 Circuit Diagram

■ Layout

Four layered printing board is used. The second layer is for the ground and the third layer is for power supply. HVDD and DRVDD are separated on the power supply layer.
All areas except parts and wirings are GND in the first and the fourth layers.
All used chip parts here are located as 1005 (1.0mm x 0.5mm) size layout.

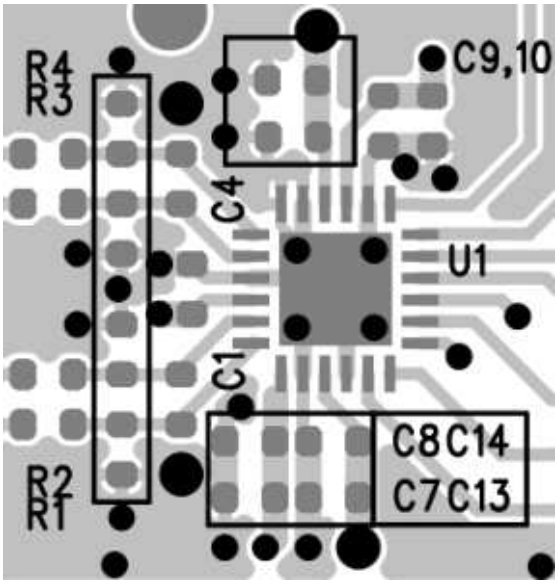


Figure 2 First Layer Layout

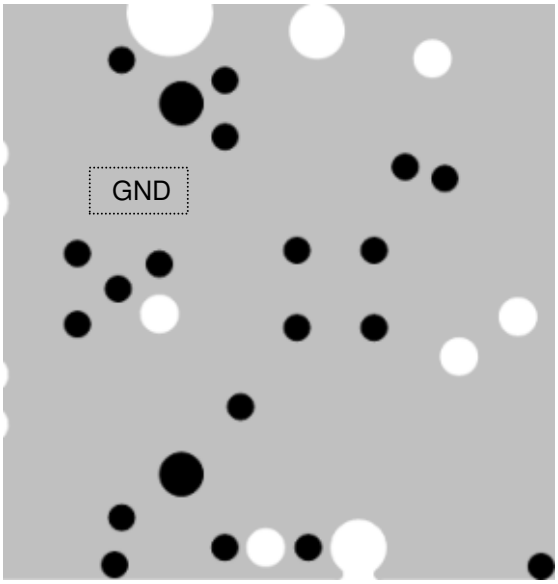


Figure 3 Second Layer Layout

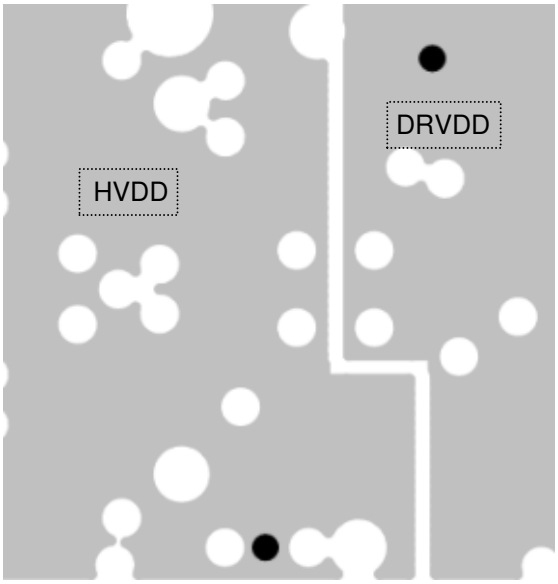


Figure 4 Third Layer Layout

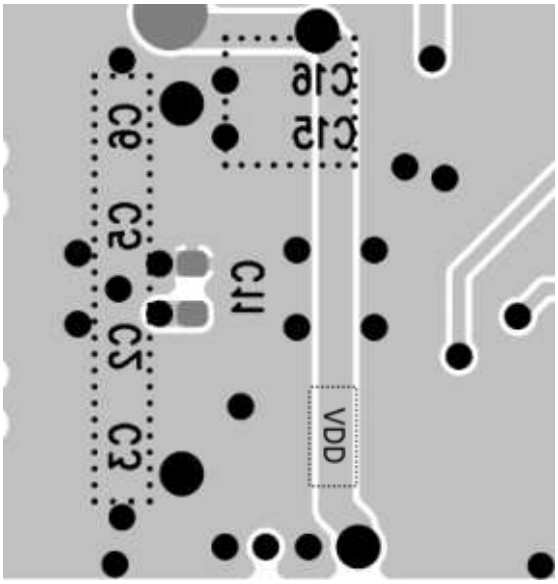


Figure 5 Fourth Layer Layout (Reverse Side)

Digital wiring reduction method for the AK9232/33/34 is shown in this document.

Each model has a CONVSTN, CSN, SDATI, SDATO, SDO0, SDO1, and CALC pins. Wirings can be reduced according to the application and the environment. Maximum four digital wirings can be eliminated.

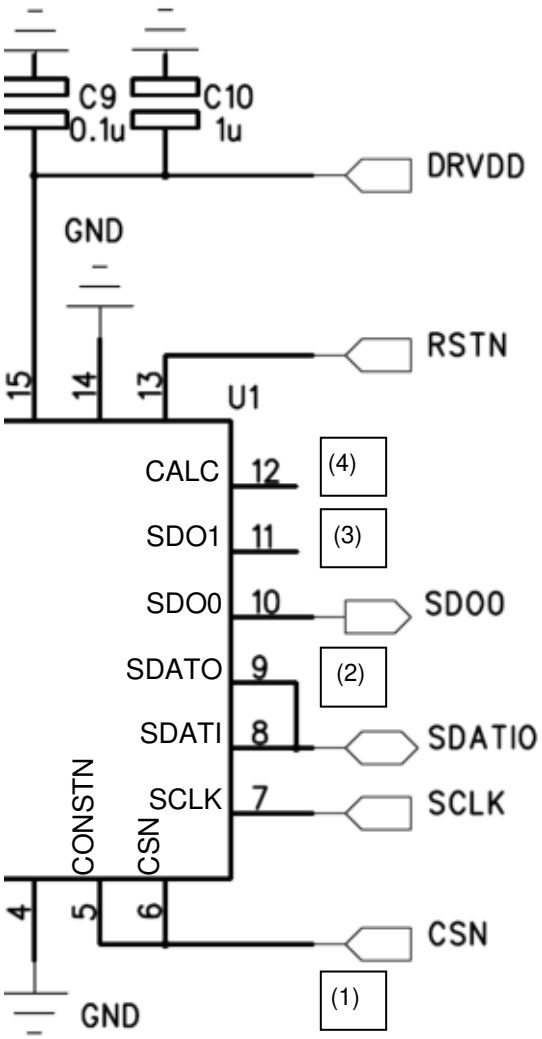


Figure 6. Circuit Diagram

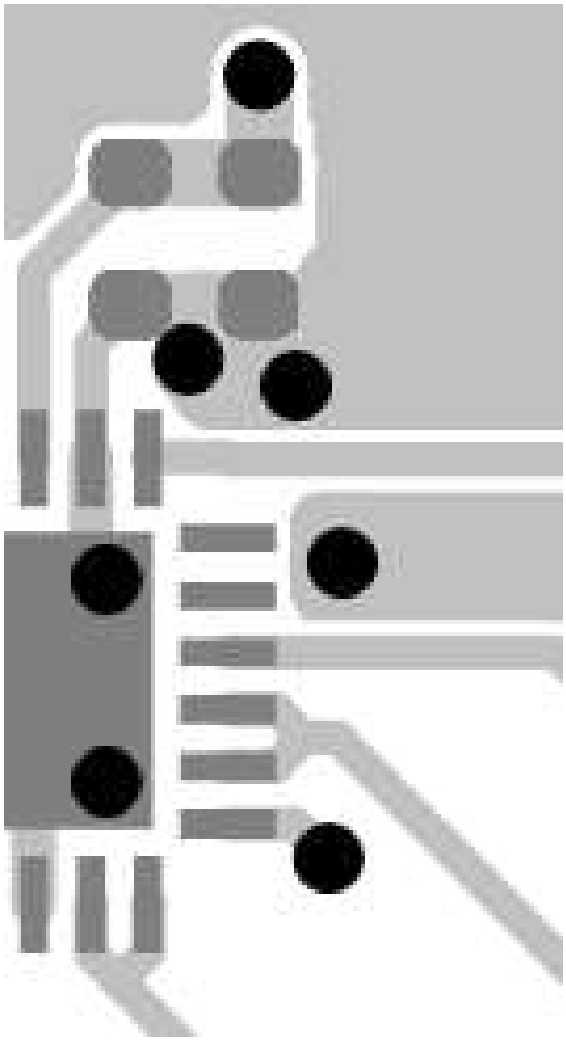


Figure 7. Layout

(1) Short of CONVSTN/CSN Pins

The CONVSTN pin and the CSN pin can be shorted and used as a common pin.
Data sampled on a falling edge of the CONVSTN/CSN pin will be output from the SDOx pin on the next falling edge of the CONVSTN/CSN pin.
The SCLK pin must be set to “H” when setting the CSN pin to “L”.

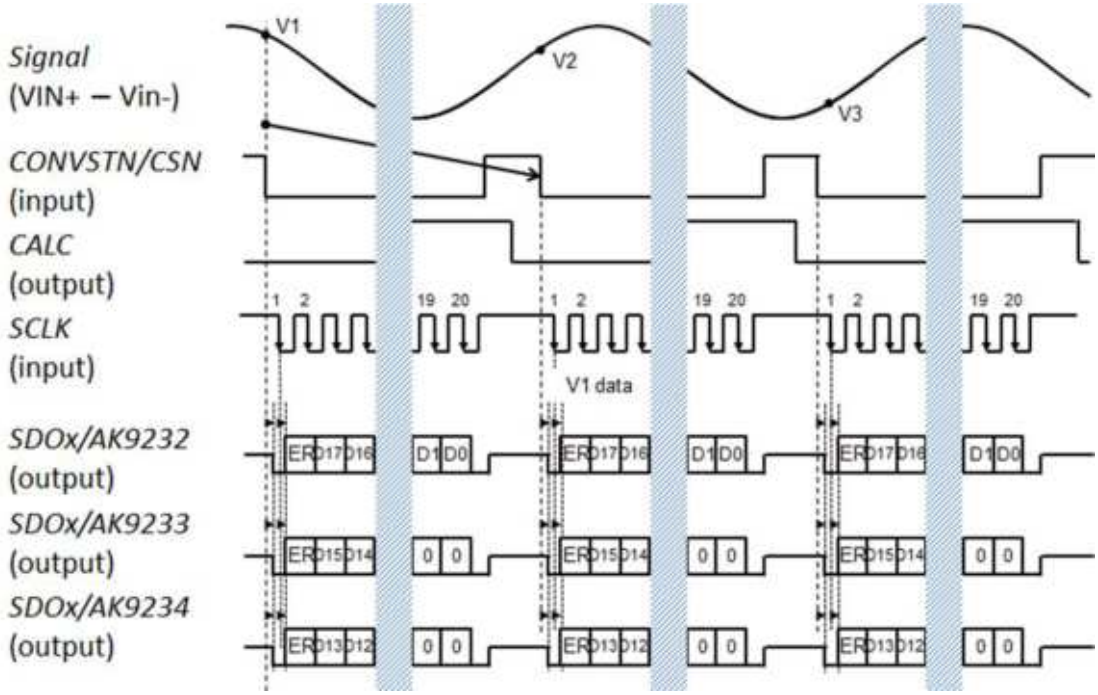


Figure 8. Data Output Timing (CONVSTN, CSN Common)

(2) Short of SDATO/SDATI Pins (SDATI/O)

Register writing and reading via 3-wire serial interface (CSN, SCLK and SDATI/SDATO pins) are enabled by shorting the SDATO pin and the SDATI pin.
In this case, the pin of a connected device to the AK923X should be I/O pin.
The SCLK pin must be set to “H” when setting the CSN pin to “L”.

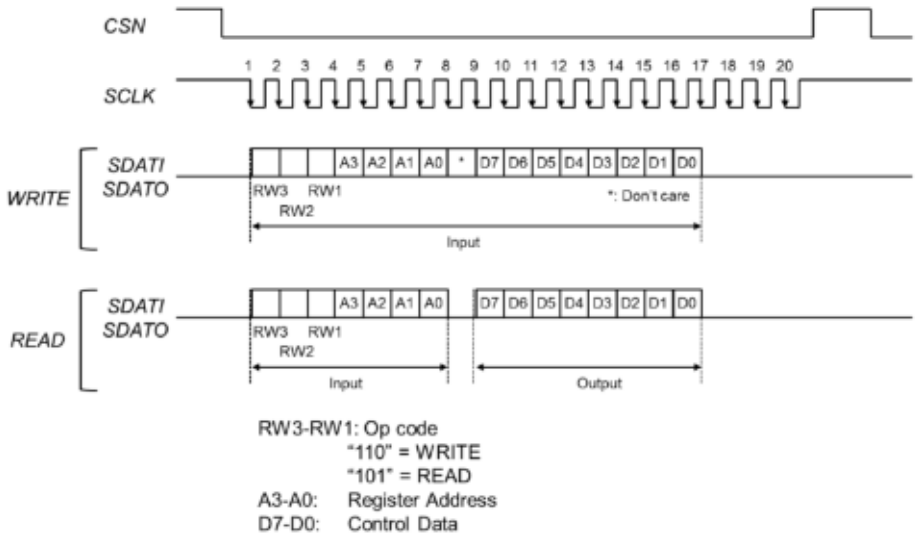


Figure 9. Serial I/F Timing (SDATI, SDATO Common)

(3) Wiring Reduction of SDO0 or SDO1

By setting CONT bit = “1” (serial output mode) by register access, the A/D conversion result of the CH1 is output from the SDO0 pin after outputting the A/D conversion result of the CH0 (the A/D conversion result of the CH0 is output from the SDO1pin after outputting the A/D conversion result of the CH1). In this case, clock should be input continuously for 39 cycles to the SCLK pin while the CSN pin is “L”. “L” signal is output from SDOX pins when the 40th or more clock cycles are input.

The SCLK pin must be set to “H” when setting the CSN pin to “L”.

* The maximum conversion rate is 0.93MSPS in serial output mode.

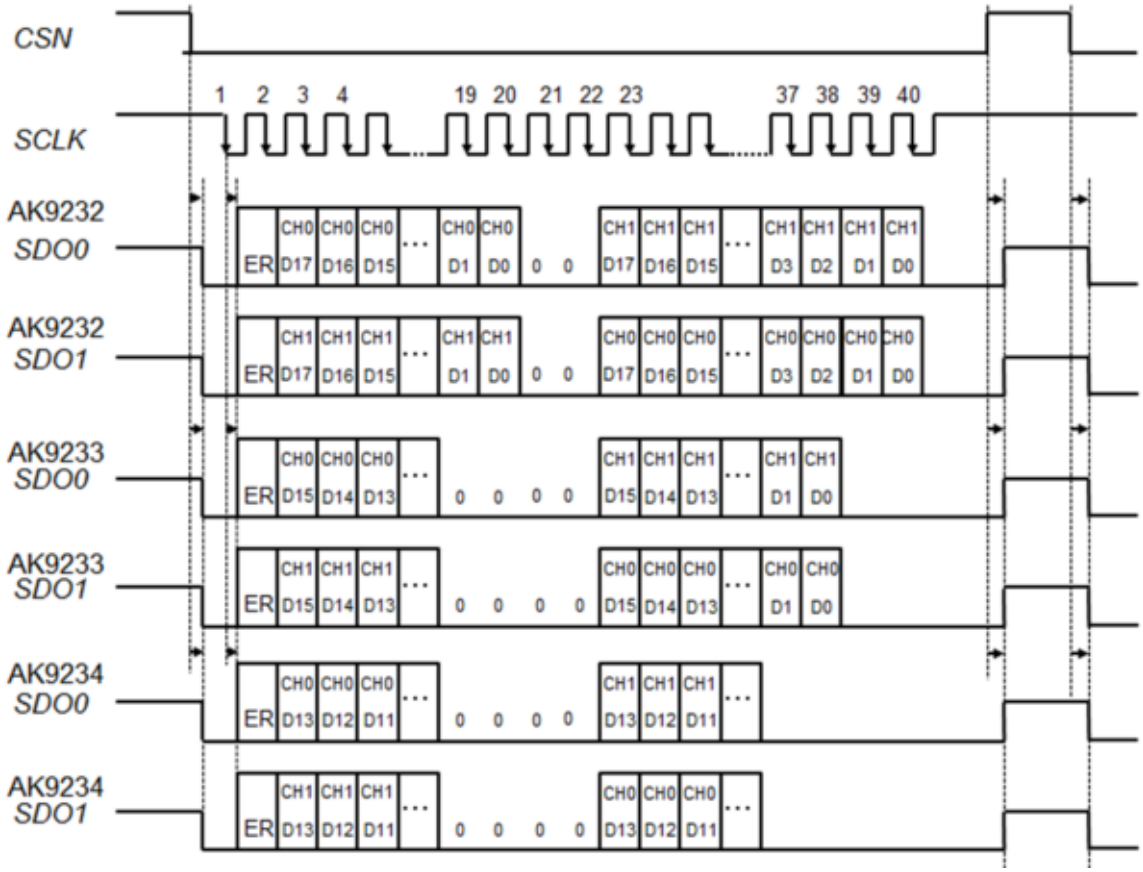


Figure 10. Data Output Timing in Serial Output Mode

(4) Wiring Reduction of the CALC Pin

Monitoring by the CALC pin is not necessary in following two cases.

1. In case of receiving data on a falling edge "↓" of CSN after tDD (max) from a falling edge "↓" of CONVSTN.

Parameter	Symbol	Min.	Max.	Unit
Throughput Rate	fCYC	0.05	1.1	MHz
Conversion Time	tCYC	0.91	20	µs
Conversion Pulse Width	tCVS	62.1	-	ns
CONVSTN Low to CALC High Delay	tDCC	-	310	ns
CALC High Time	tCALC	-	559	ns
CONVSTN Low to Data Valid Delay * 10	tDD	-	870	ns
CALC Low to CSN Low Delay	tDCCS	0	-	ns

* 10. Guaranteed by design. This value is not tested in mass production.

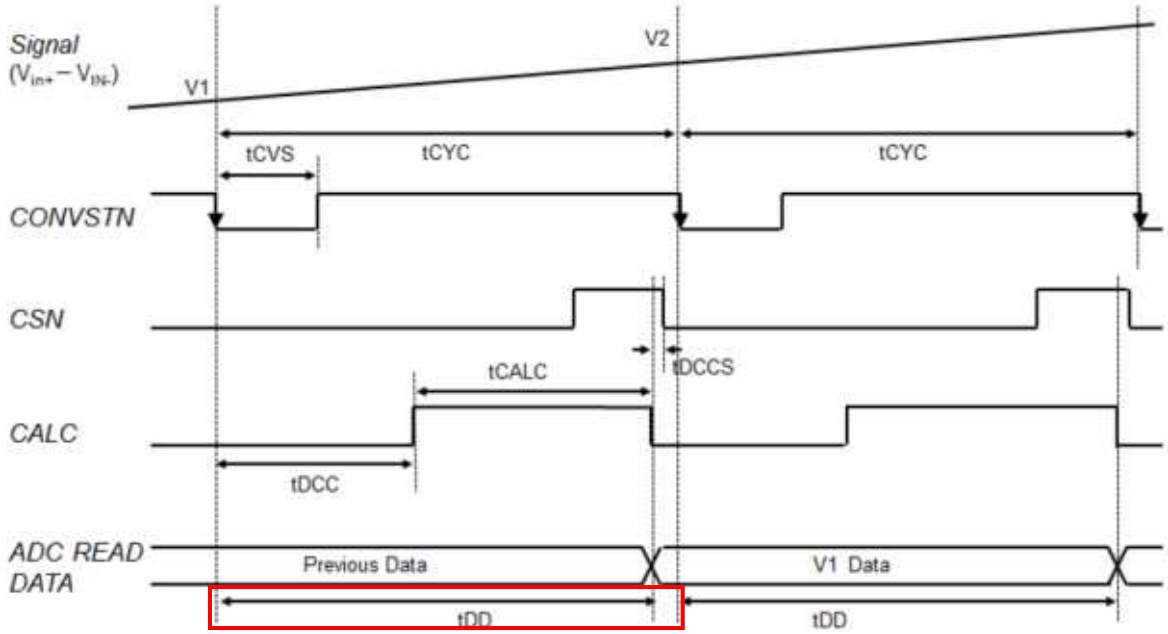


Figure 11. Conversion Timing

2. In case of "(1)", shorting the CONVSTN/CSN pins

Disclaimer

Please note that this document is written for reference only and it does not guarantee any information written in this document. Asahi Kasei Microdevices Corporations assumes no responsibility for any damages or losses resulting from the use of this document.

Inquiry

For any inquiries about this application note, please contact us from the link below.

<http://www.akm.com/akm/en/support/inquires>