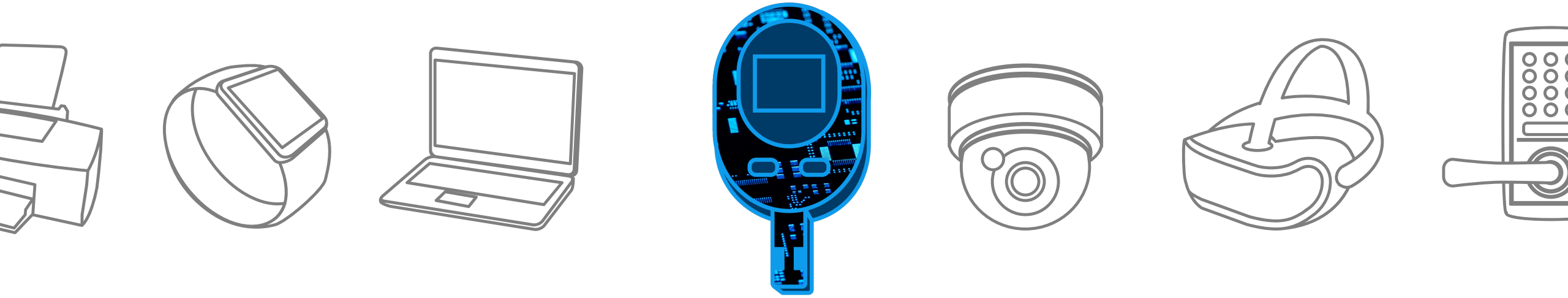
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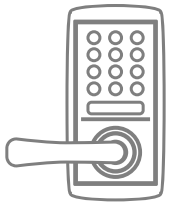
Blood Glucose Meter

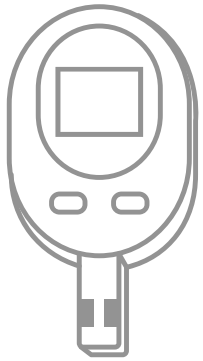
Solution Proposal by Toshiba



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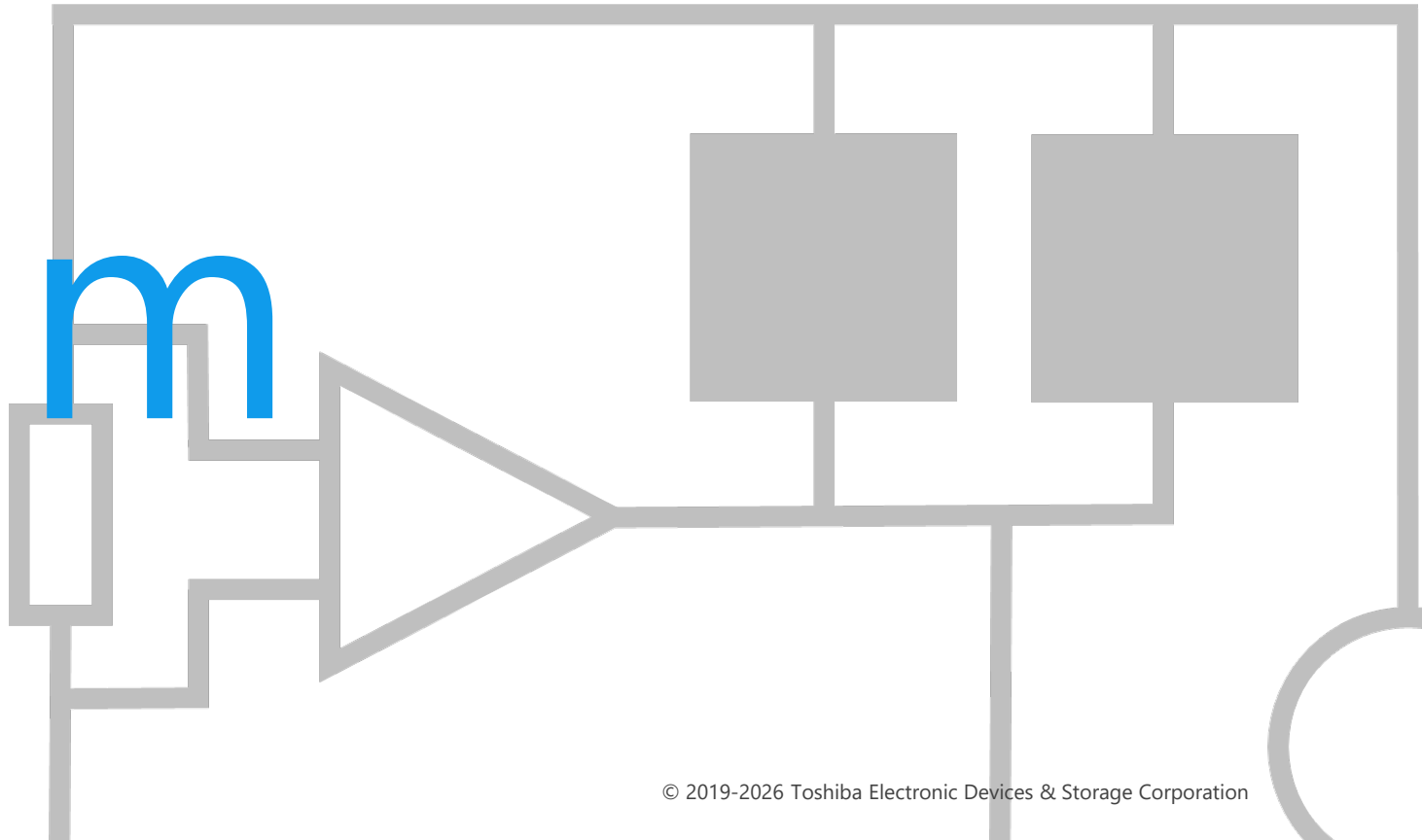
Toshiba Electronic Devices & Storage Corporation provides comprehensive device solutions to customers developing new products by applying its thorough understanding of the systems acquired through the analysis of basic product designs.





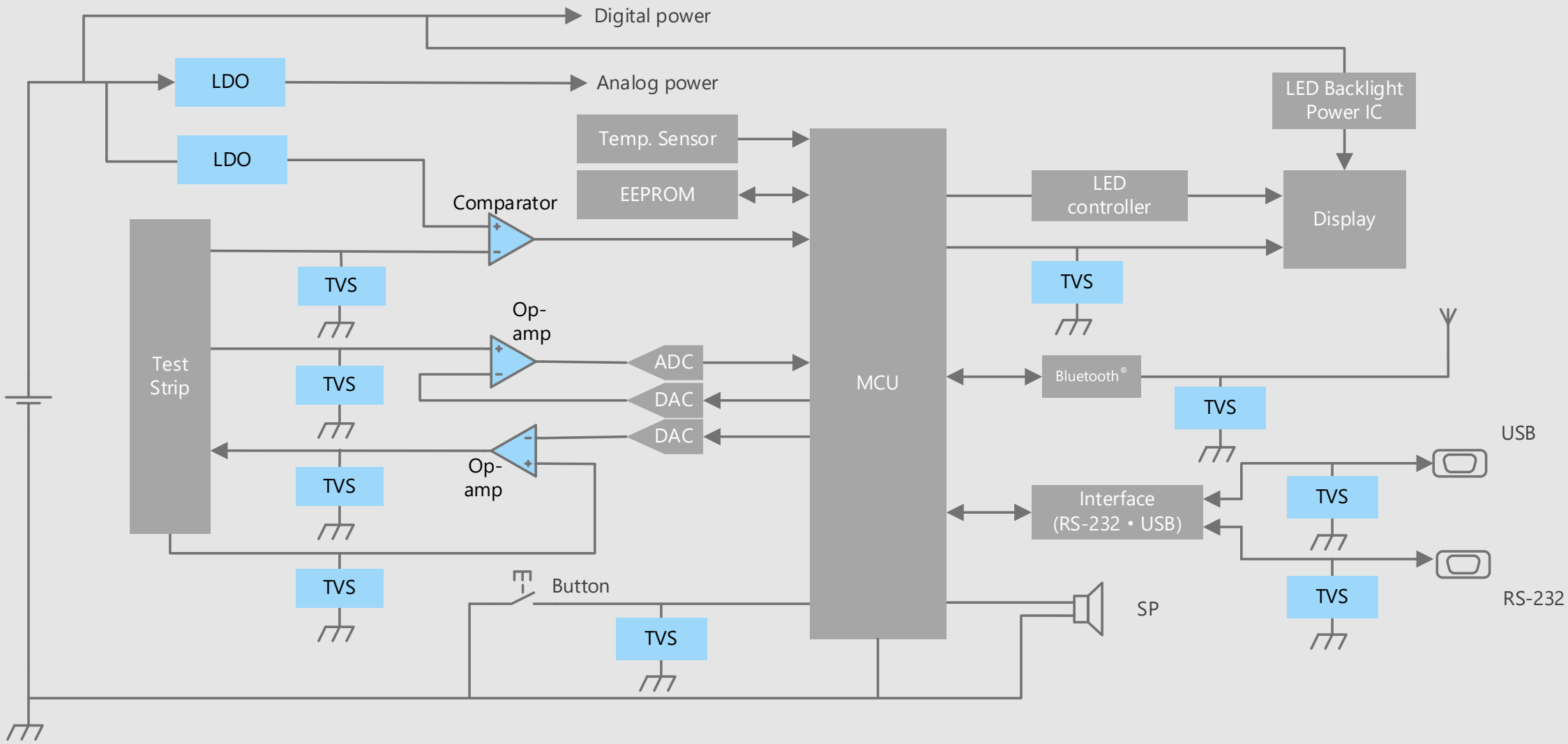
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Block Diagram



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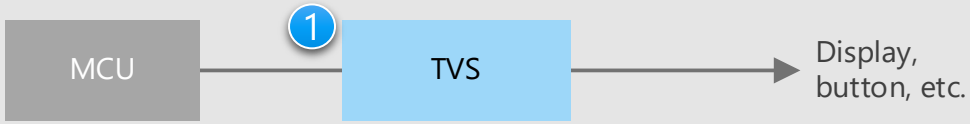
Blood Glucose Meter　Overall block diagram



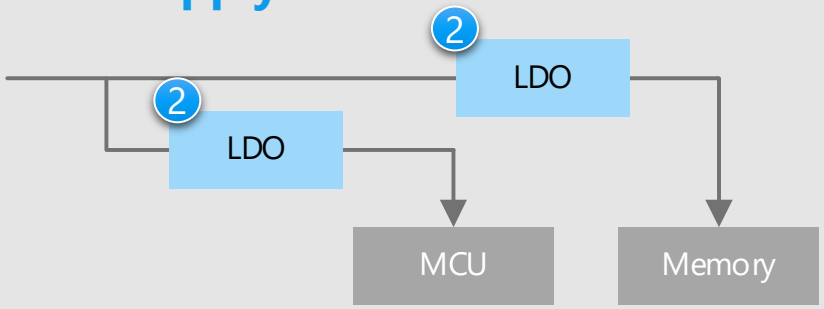
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Blood Glucose Meter　Detail of power supply unit

ESD protection



Control MCU power supply



* Click the number in the circuit diagram to jump to the detailed description page

Criteria for device selection

- It is necessary to protect devices against surge voltage such as Electrostatic Discharge (ESD) from external terminals.
- PSRR (Power Supply Rejection Ratio) is a key characteristic for power supply of microcontroller.

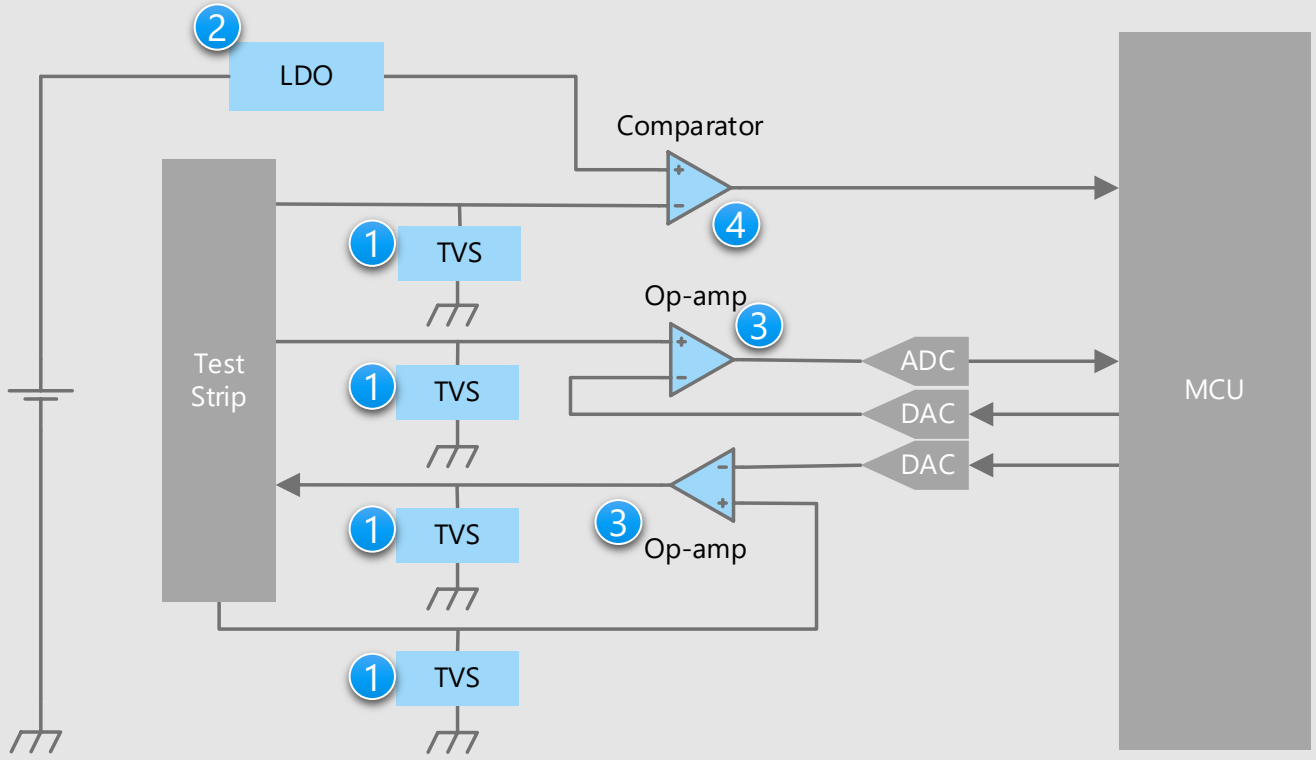
Proposals from Toshiba

- **Absorb ESD from external terminals to prevent circuit malfunction and device breakdown**
  TVS diode　1
- **Supply the power with low noise**
  Small surface mount LDO regulator　2

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Blood Glucose Meter　Detail of sensor unit

Sensor circuit



* Click the number in the circuit diagram to jump to the detailed description page

Criteria for device selection

- It is necessary to protect devices against surge voltage such as ESD from external terminals.
- PSRR is a key characteristic for power supply of sensor circuit.
- Low noise operational amplifiers are required to improve measurement accuracy.

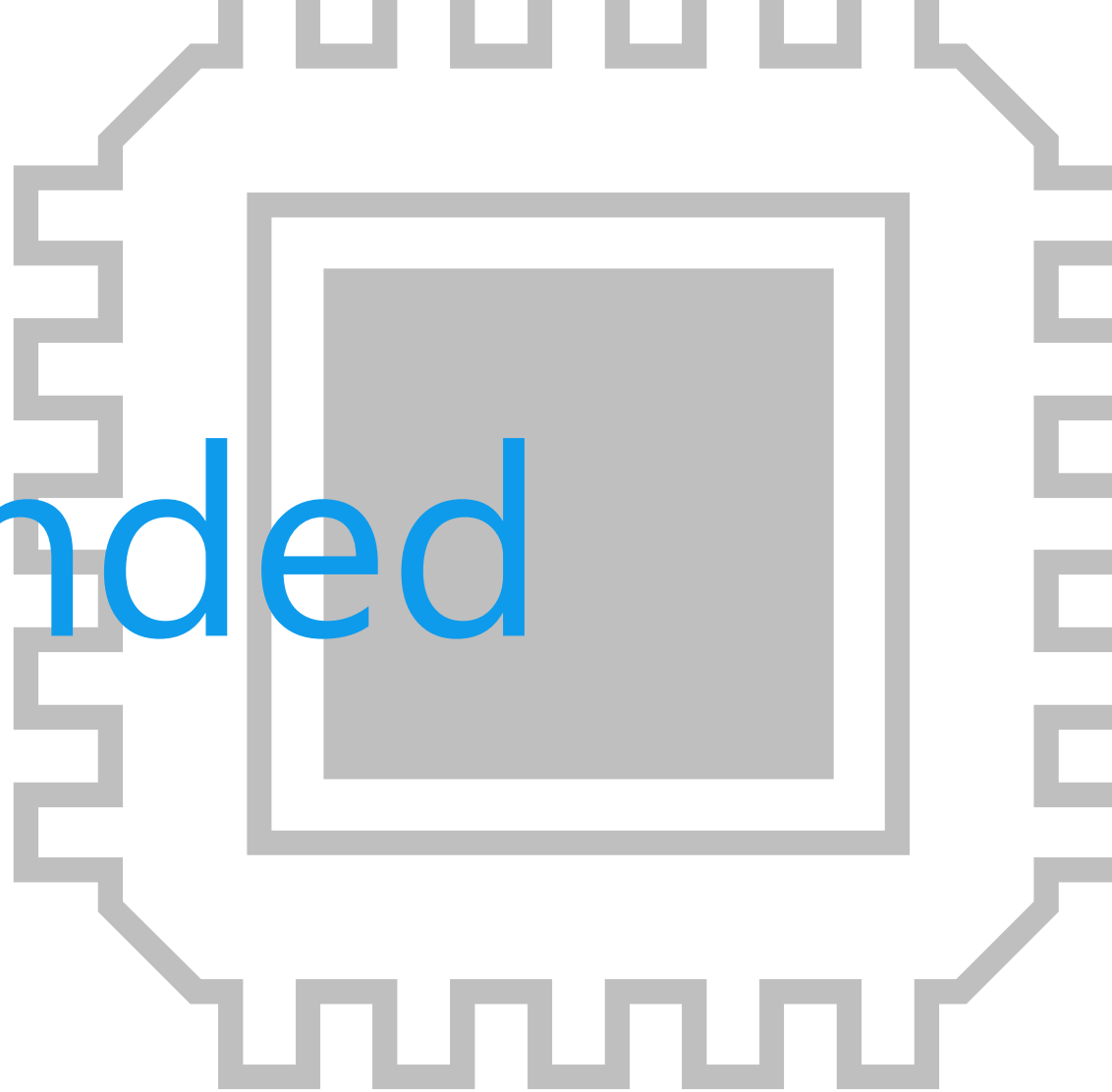
Proposals from Toshiba

- **Absorb ESD from external terminals to prevent circuit malfunction and device breakdown**
  TVS diode
- **Supply the power with low noise**
  Small surface mount LDO regulator
- **Amplify the detected small signal with low noise**
  Low noise operational amplifier
- **Low supply current and low input offset voltage**
  Comparator

1
2
3
4

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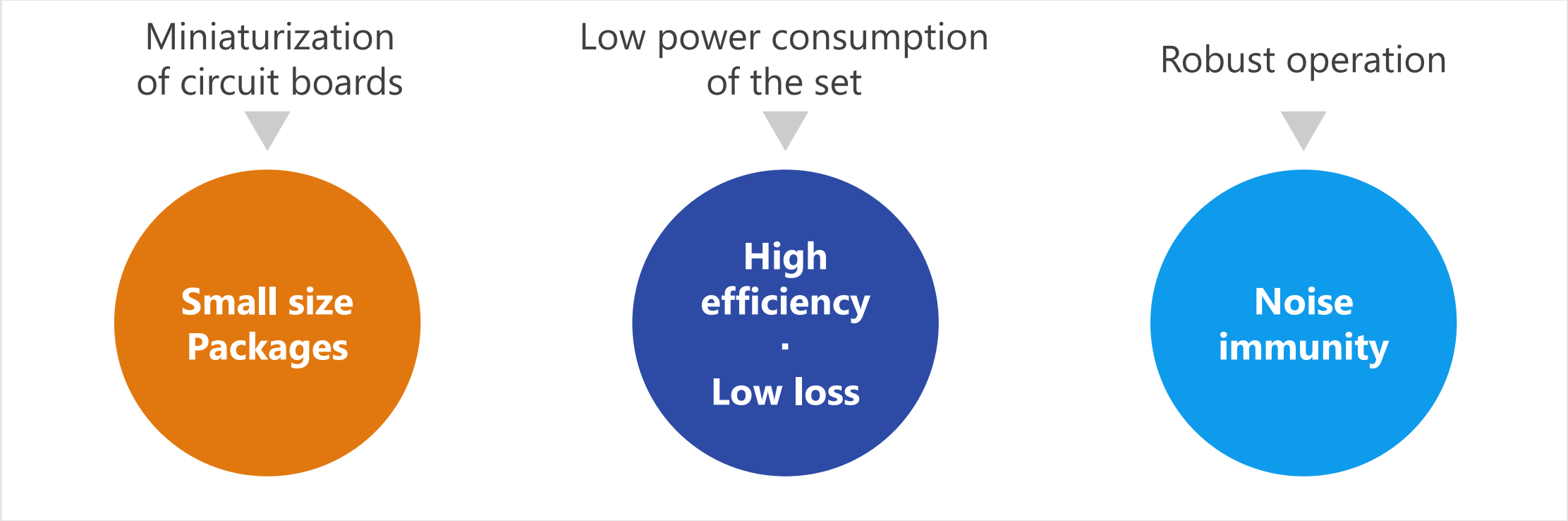
Recommended Devices



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Device solutions to address customer needs

As described above, in the design of a blood glucose meter, **“Miniaturization of circuit boards“**, **“Low power consumption of the set”** and **“Robust operation”** are important factors. Toshiba’s proposals are based on these three solution perspectives.



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Device solutions to address customer needs

	Small size Packages	High efficiency · Low loss	Noise immunity
1 TVS diode	●		●
2 Small surface mount LDO regulator	●	●	●
3 Low noise operational amplifier	●	●	
4 Comparator	●	●	●

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1 TVS diode

DF2B7ASL / DF2B5PCT / DF2B7PCT / DF2B7AFU

Small size Packages | High efficiency · Low loss | Noise immunity

Value provided

TVS diode absorbs static electricity (ESD) from external terminals, prevents circuit malfunction and protects devices.

1 Low dynamic resistance

For some products, both low dynamic resistance and low capacitance are realized and ensures high signal protection performance and signal quality.

2 Suppress ESD energy by low clamp voltage

Protect the connected circuits and devices using Toshiba's own technology.

3 Suitable for high density mounting

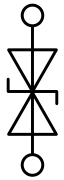
A variety of small size packages are available.

Unidirectional



Suitable for paths such as logic signals. There are lineups of 1in1, 2in1, 4in1, 5in1, 7in1.

Bidirectional



Suitable for paths with both polar signals such as audio signals.

Lineup

Part number	DF2B7ASL	DF2B5PCT	DF2B7PCT	DF2B7AFU
Package	SOD-962 (SL2)  Bottom view	SOD-882 (CST2)  Top view  Bottom view		SOD-323 (USC)  Top view
V_{ESD} [kV]	±30	±30	±30	±30
V_{RWM} (Max) [V]	5.5	3.6	5.5	5.5
C_t (Typ.) [pF]	8.5	41	45	8.5
R_{DYN} (Typ.) [Ω]	0.2	0.1	0.1	0.2

[Note] This product is an ESD protection diode and cannot be used for purposes other than ESD protection.

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2 Small surface mount LDO regulator

TCR15AG / TCR8BM / TCR5FM / TCR5RG / TCR3RM / TCR3U / TCR3LM / TCR3D / TCR3EM / TCR1HF Series

Small size Packages | High efficiency · Low loss | Noise immunity

Value provided

Wide lineup from general purpose type to WCSP (Wafer Level Chip Size Package) type are provided. Contribute to realize a stable power supply.

1 Low dropout voltage

Low dropout voltage characteristic has been realized by the originally developed process.

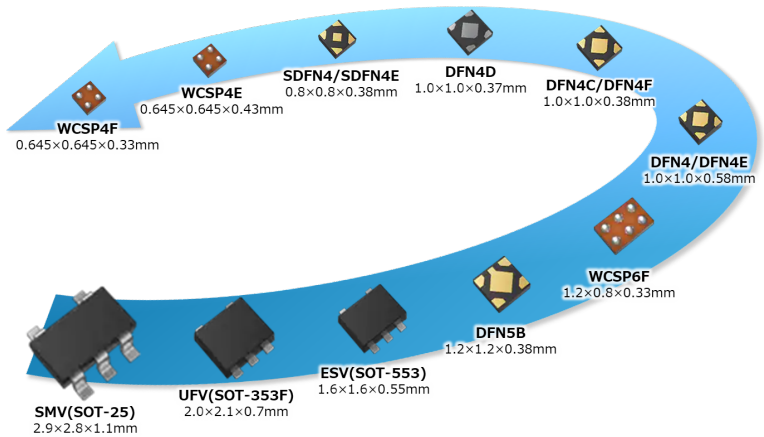
2 High PSRR Low output noise voltage

Many product series that realize both high PSRR (Power Supply Rejection Ratio) and low output noise voltage characteristics are provided. They are suitable for stable power supply for analog circuit.

3 Low current consumption

$I_{B(ON)}$ of 0.34 μA (typ.) @I_{OUT} = 0 mA, V_{OUT} ≦ 1.5 V is realized by utilizing CMOS process and unique circuit technology. (TCR3U Series)

Rich package lineup



Lineup

Part number	TCR15AG Series	TCR8BM Series	TCR5FM Series	TCR5RG Series	TCR3RM Series	TCR3U Series	TCR3LM Series	TCR3D Series	TCR3EM Series	TCR1HF Series
Features	Low dropout voltage High PSRR		High PSRR Low noise Low current consumption			Low current consumption		Standard type		36 V Input voltage
I_{OUT} (Max) [A]	1.5	0.8	0.5		0.3					0.15
PSRR (Typ.) [dB] @f = 1 kHz	95	98	91	100	100	70	-	72	68	70
I_B (Typ.) [μA]	25	20	10	7	7	0.34	1	86	35	170

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3 Low noise operational amplifier

TC75S67TU

Small size Packages | High efficiency · Low loss | Noise immunity

Value provided

Small signals detected by various sensors can be amplified with low noise.

1 Low noise
V_{NI} = 6.0 nV/√Hz (Typ.) @f = 1 kHz

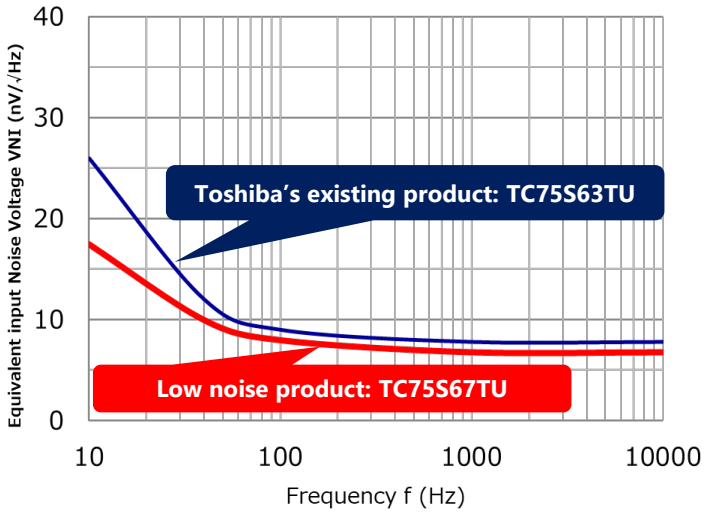
Small signals detected by various sensors [Note] are amplified with low noise using CMOS operational amplifier by optimizing the processing. We achieved low input equivalent noise voltage.

[Note] Sensor types: vibration detection sensor, shock sensor, accelerometer, pressure sensor, infrared sensor, temperature sensor, etc.

2 Low current consumption
I_{DD} = 430 µA (Typ.)

Low current consumption characteristics are realized by using the CMOS process.

Noise characteristics
(Toshiba internal comparison)



Lineup

Part number	TC75S67TU
Package	SOT-353F (UFV)  Top view  Bottom view
$V_{DD,SS}$ (Max) [V]	±2.75
$V_{DD,SS}$ (Min) [V]	±1.1
I_{DD} (Typ.) [µA]	430
V_{NI} (Typ.) [nV/√Hz] @f = 1 kHz	6.0

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Value provided

A general purpose single comparator using a CMOS process featuring low supply voltage operation and low current consumption.

1 Low power supply voltage operation

V_{DD} = ±0.9 to ±3.5 V or 1.8 to 7.0 V.

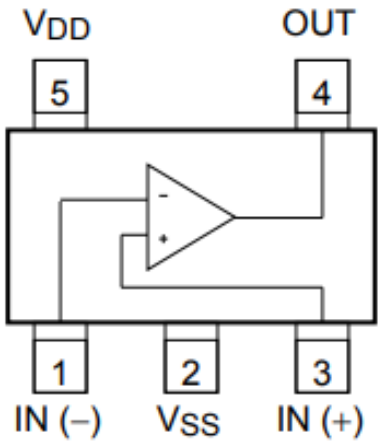
2 Low supply current I_{DD} = 10 µA (Typ.)

Can be used for wide applications because of its low supply current characteristic.

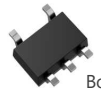
3 Low input offset voltage V_{IO} = ± 1.0 mV (Typ.)

Since the input offset voltage is low, the accuracy of the comparison result can be improved.

TC75S56FU pin connection



Lineup

Part number	TC75S56FU
Package	SOT-353 (USV)  Top view  Bottom view
V_{DD} (Max) [V]	± 3.5
V_{SS} (Max) [V]	± 3.5
I_{DD} (Typ.) [µA]	10
V_{IO} (Typ.) [mV]	±1.0

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