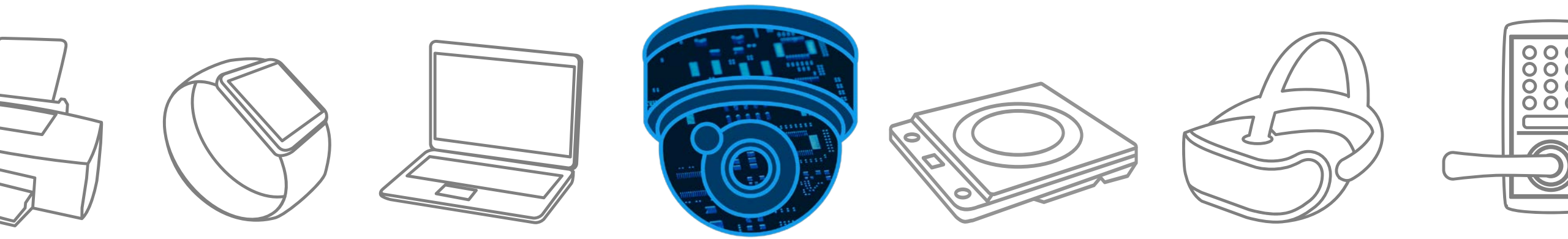
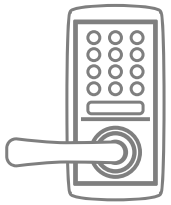
TOSHIBA

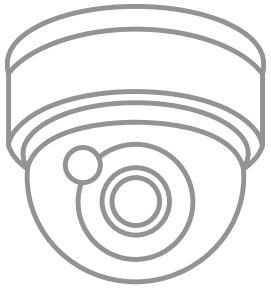
R18

Surveillance Camera

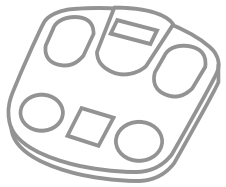
Solution Proposal by Toshiba



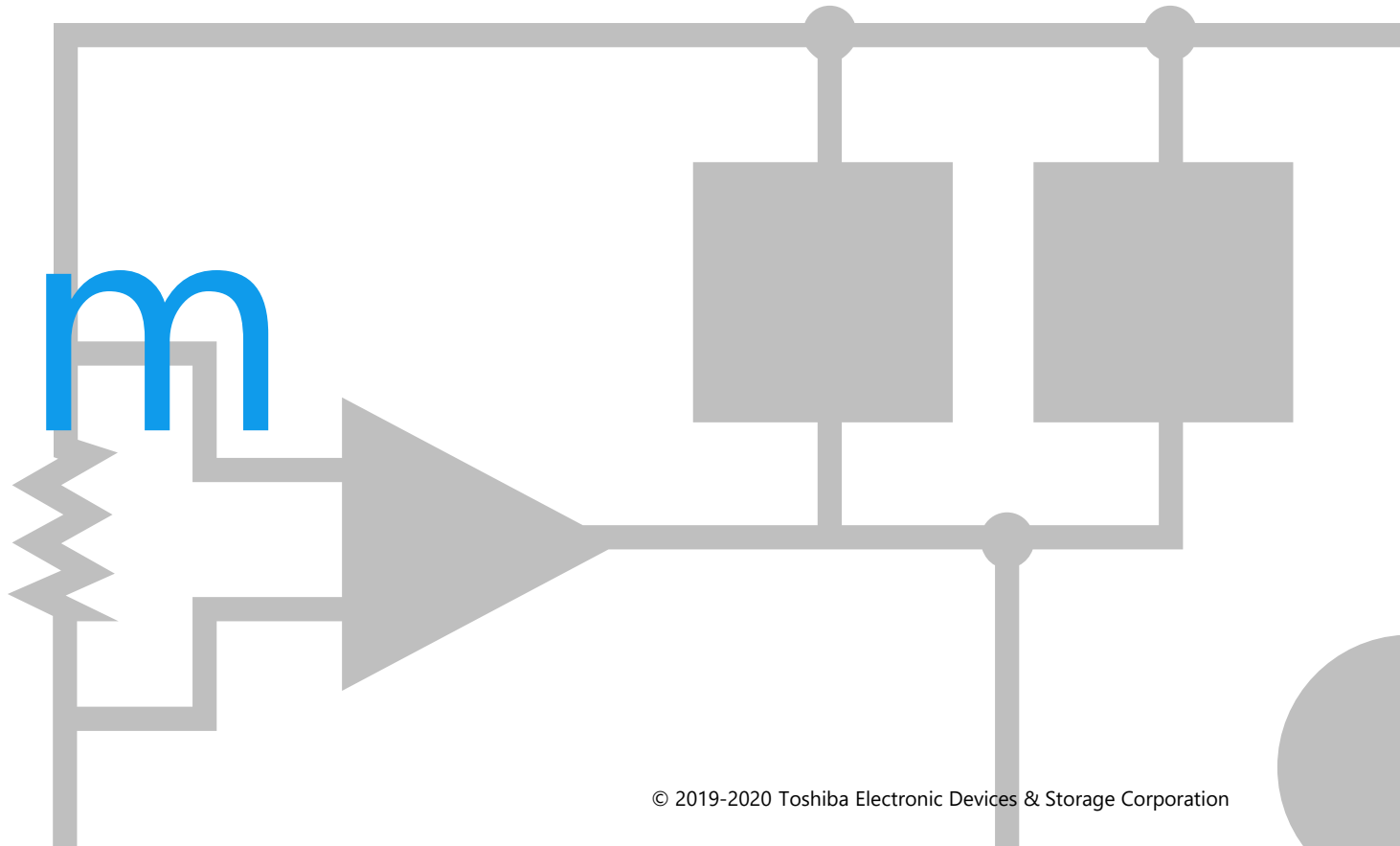




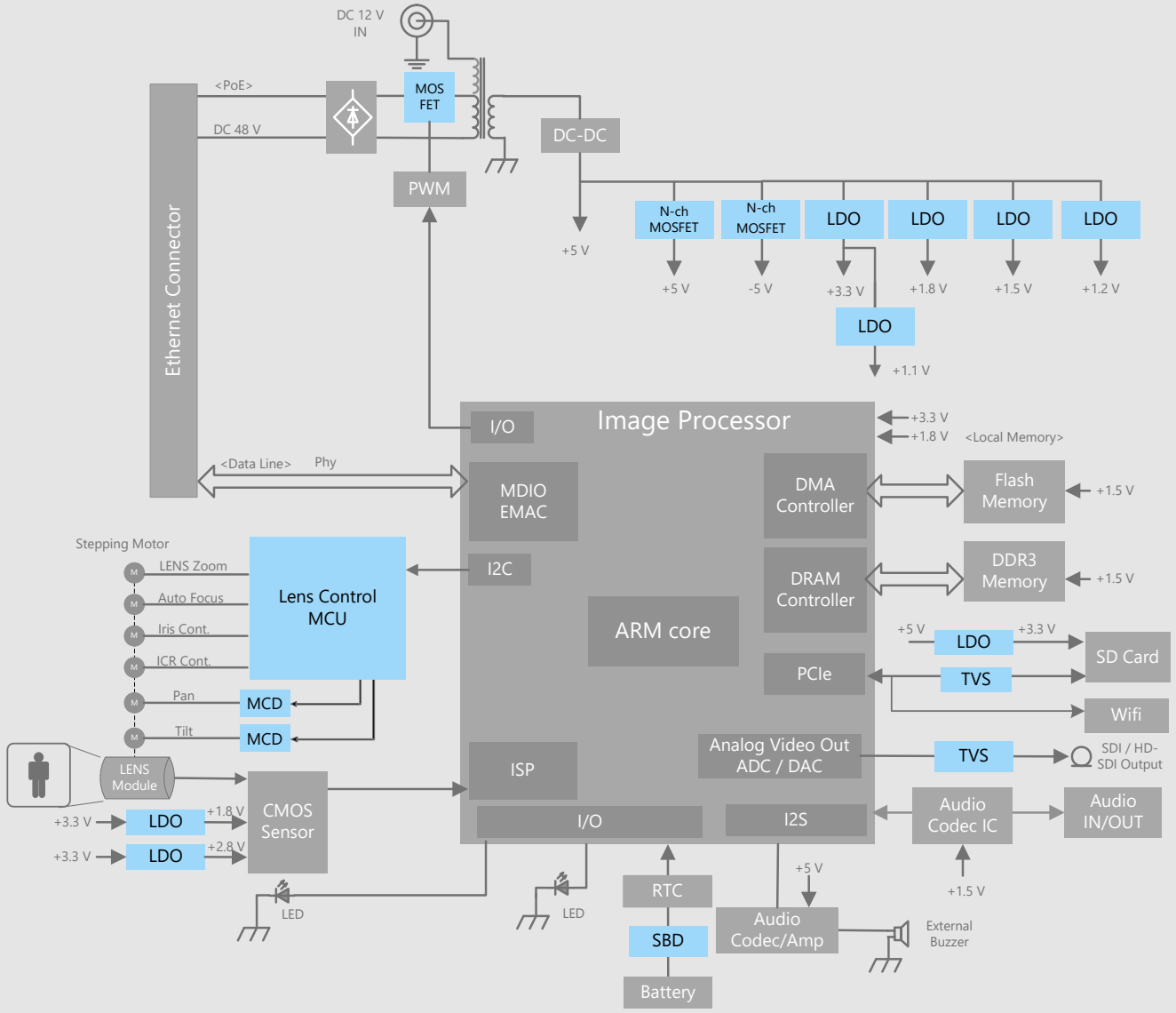
Toshiba Electronic Devices & Storage Corporation provides comprehensive device solutions to customers developing new products by applying its thorough understanding of the systems acquired through the analysis of basic product designs.

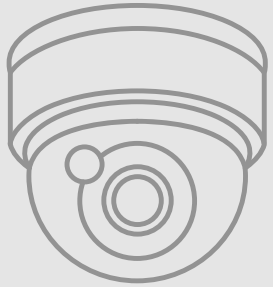


Block Diagram

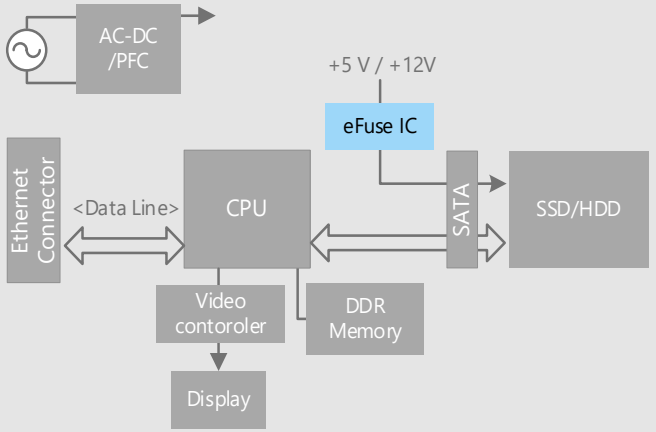


Surveillance Camera　Overall block diagram



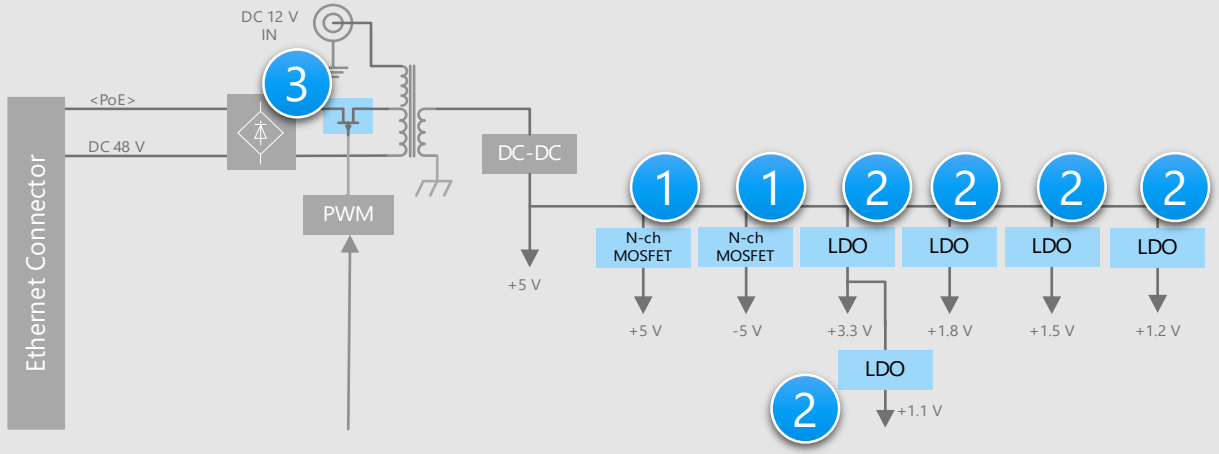


Recorder unit

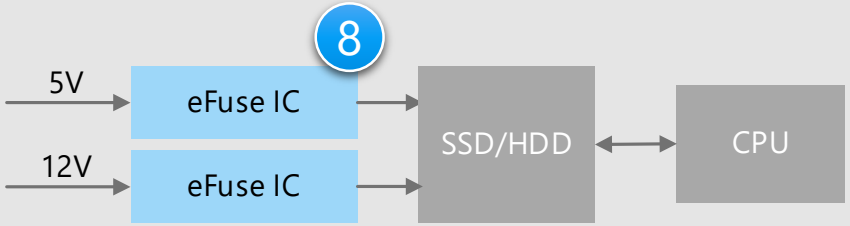


Surveillance Camera　Detail of power supply circuit (1)

Power supply



Power supply circuit of storage



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

Criteria for device selection

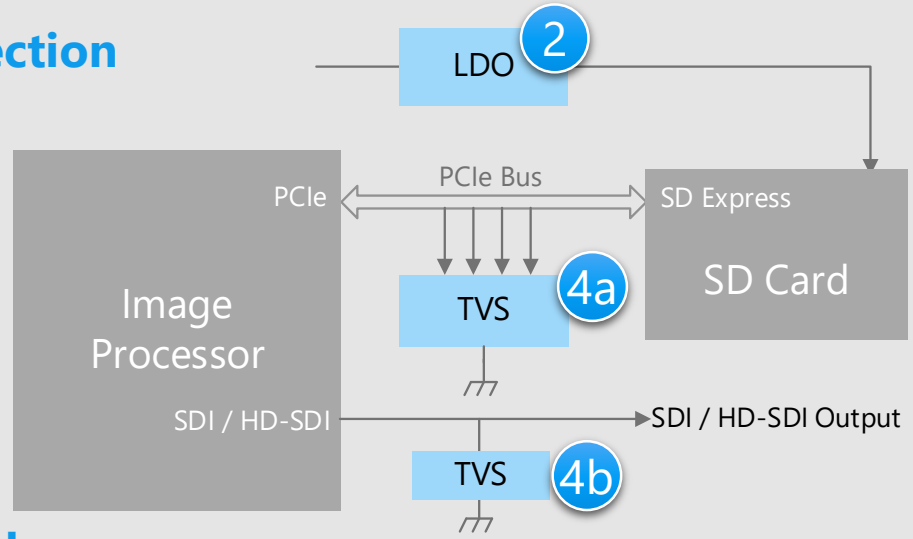
- V_{DSS} voltage is a key factor in selecting a MOSFET. Use at voltages exceeding V_{DSS} may cause MOSFET breakdown.
- The on-resistance ($R_{DS(ON)}$) of a MOSFET with high V_{DSS} is generally large.

Proposals from Toshiba

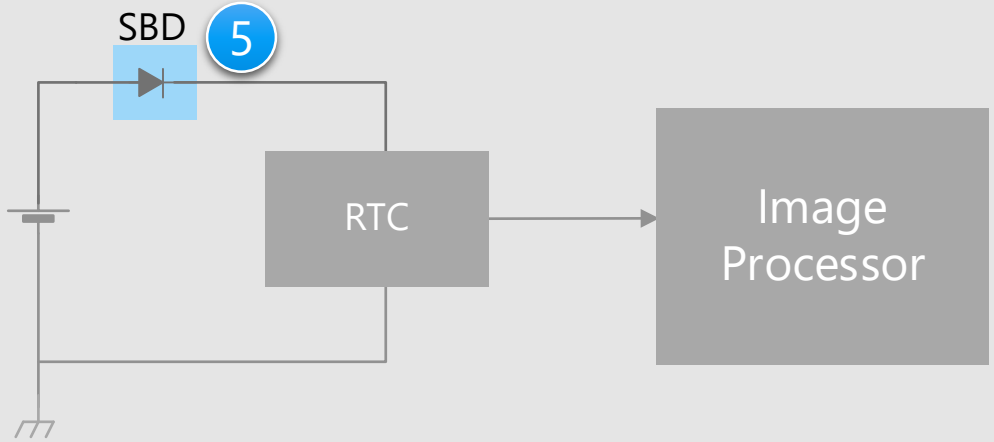
- **Realize a set with low power consumption by low on-resistance** 1
  U-MOS series MOSFET (Trench type)
- **Realize a compact surface-mounted power supply resistant to noise** 2
  LDO regulator
- **Optimal for high-efficiency power supply switching** 3
  DTMOS IV MOSFET (Super junction type)
- **Robust protection function** 8
  eFuse IC

Surveillance Camera　Detail of power supply circuit (2)

Interface section



Power supply



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

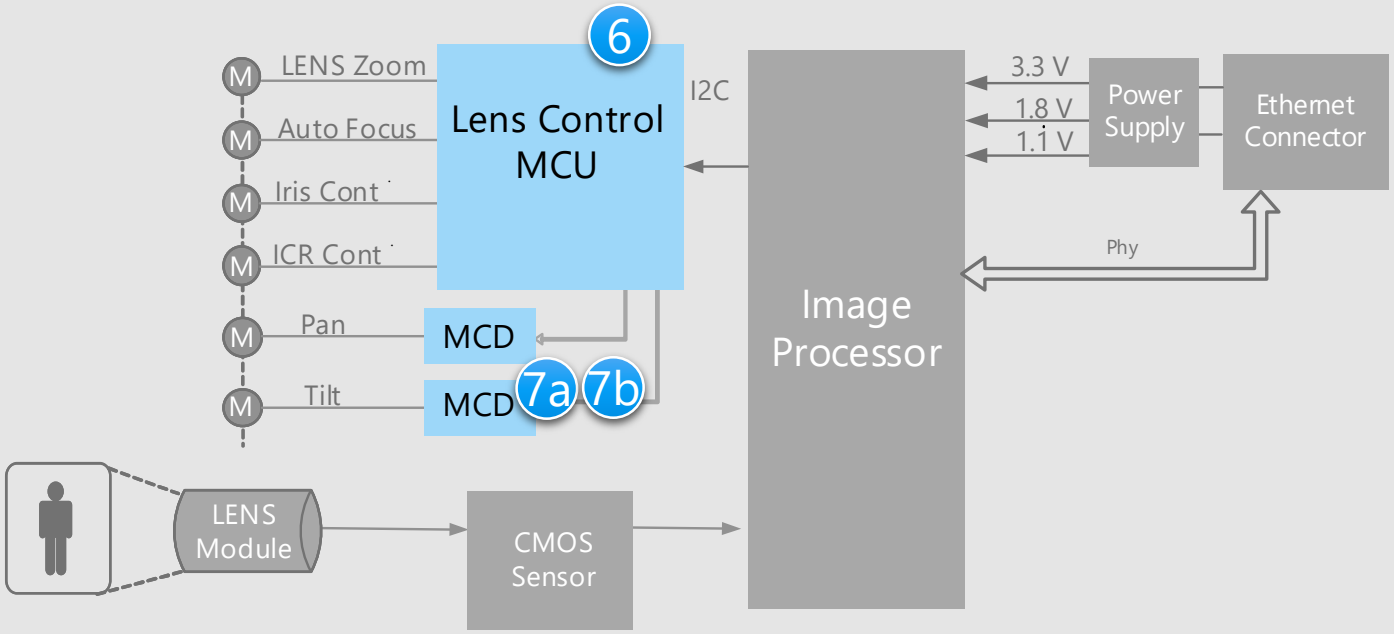
Criteria for device selection

- The PSRR of LDO is important for SD memory card I/F.
- TVS diode protects high-speed lines from external ESD.
- Low V_F and low I_R are required for SBD.

Proposals from Toshiba

- **Realize a compact surface-mounted power supply resistant to noise** 2
  LDO regulator
- **Absorbing static electricity (ESD) from external terminals to prevent device breakdown and circuit malfunction** 4
  TVS diode
- **High speed, low loss, compact surface mounting** 5
  Schottky barrier diode (SBD)

Surveillance Camera　Detail of camera motion section



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

Criteria for device selection

-Two or more motors can be driven at the same time by using lens control specialized MCU.

-The board area can be reduced by using small size package products.

Proposals from Toshiba

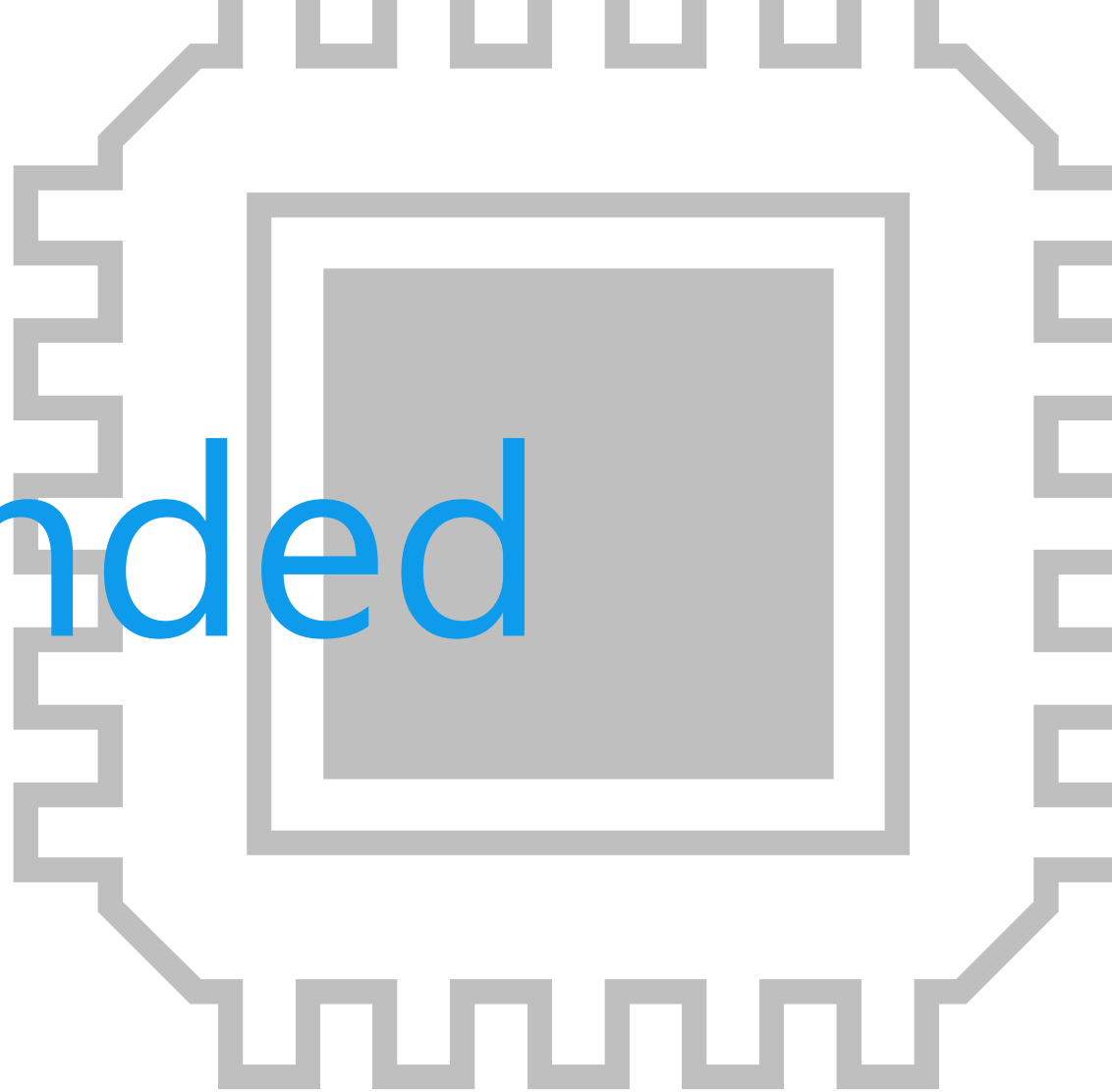
-Low power consumption Lens motor control MCU 6

MCU

-Low ON register high efficient stepping motor control 7a 7b

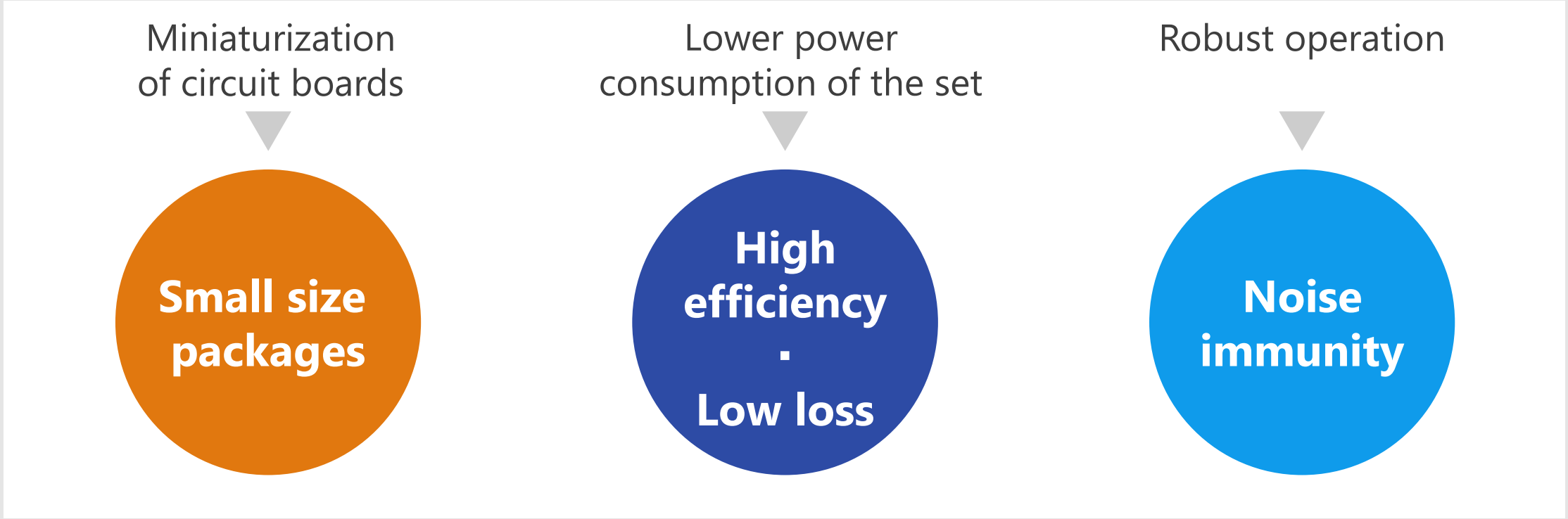
Motor control driver

Recommended Devices



Device solutions to address customer needs

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



Device solutions to address customer needs

	Small size packages	High efficiency · Low loss	Noise immunity
1 Small-signal MOSFET	●	●	
2 Small surface mount LDO regulator	●	●	●
3 Power MOSFET	●	●	●
4 TVS diode	●	●	●
5 Schottky barrier diode (SBD)	●	●	
6 LENS motor control MCU	●	●	
7 Motor control driver	●	●	
8 Electronic Fuse eFuse IC	●	●	

1 Small-signal MOSFET

SSM3K376R

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

Value provided

Suitable for power management switches and greatly contributes to miniaturization.

1 Low voltage drive

It drives at V_{GS} = 1.8 V.

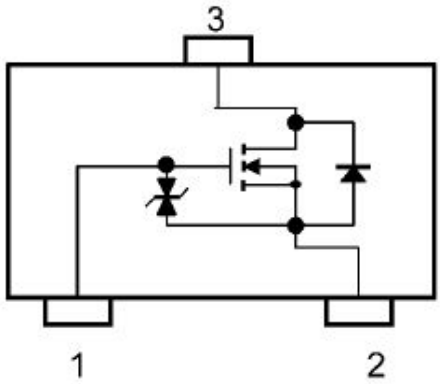
2 Low on-resistance

By reducing on-resistance between the source and drain, heat generation and power consumption can be kept low.

3 Compact package

Sealed in SOT-23F type packages.

SSM3K376R
Internal connection diagram



AEC-Q101 conformance
Please contact our sales representative for details.

Line up

Part number	SSM3K376R
Package	SOT-23F
Polarity	N-ch
V_{DSS} [V]	30
I_D [A]	4
P_D [W]	1
$R_{DS(ON)}$ (Max) [mΩ] @V_{GS} = 4.5 V	56

◆Return to Block Diagram TOP

2 Small surface mount LDO regulator

TCR2EF series

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

Value provided

Equipped overcurrent protection, high-speed load transient response and auto discharge functions.

1 Low dropout voltage

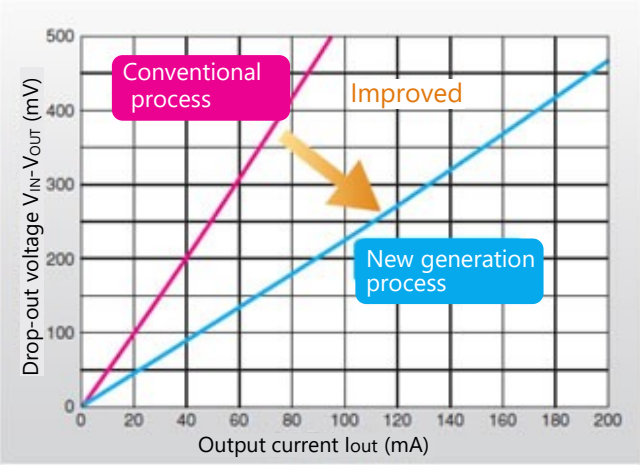
The drop-out characteristics is significantly improved by adopting newly developed new-generation process.

2 High ripple rejection

High ripple rejection R.R reject ripple effectively.

3 Can be used with ceramic capacitors

Improved drop-out characteristics enables to use ceramic capacitors for stabilization of operation.



Line up

Part number	TCR2EF series
Package	SMV 
V_{IN} (Max) [V]	6.0
I_{OUT} (Max) [mA]	200
Output voltage range [V]	1.0 to 5.0

◆Return to Block Diagram TOP

Value provided

Suitable for switching regulators and greatly contributes to miniaturization.

1 Fast switching speed

t_{on} (Typ.) = 14 [ns]
t_{off} (Typ.) = 19 [ns]

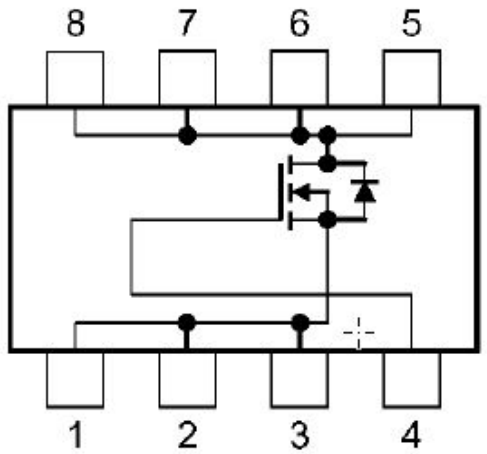
2 Low on-resistance

By reducing on-resistance between the source and drain, heat generation and power consumption can be kept low.

3 Enhancement

Enhancement MOSFET for easy handle

TPH5900CNH
Internal connection diagram



Line up

Part number	TPH5900CNH
Package	SOP Advance
Polarity	N-ch
V_{DSS} [V]	150
I_D [A]	9
P_D [W]	42
$R_{DS(ON)}$ (Max) [mΩ] @V_{GS} = 10 V	59

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4a TVS diode
DF10G5M4N / DF10G6M4N

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

Value provided

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

1 Improved ESD pulse absorption

Improved ESD absorption compared to conventional products. (50 % reduction in operating resistance) Both low operating resistance and low capacitance are realized and ensures high signal protection performance and signal quality.

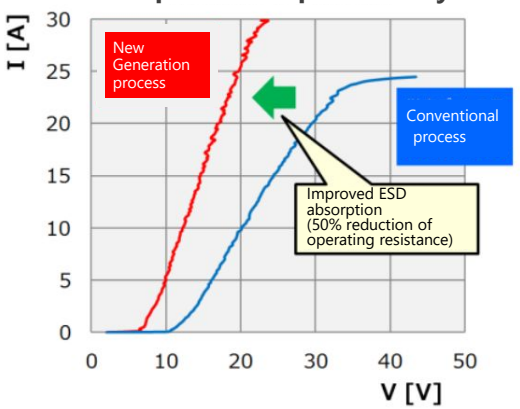
2 Suppress ESD energy by low clamp voltage

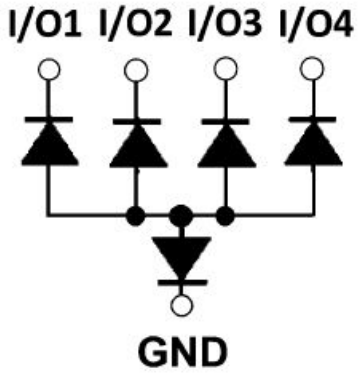
Secure protection of connected circuits/devices was realized by using proprietary technology.

3 Optimal for high-density mounting

Four circuits on one chip contributes to saving of circuit board space.

ESD pulse absorption ability





Line up

Part number	DF10G5M4N	DF10G6M4N
Package	DFN10 	DFN10 
V_{ESD} [kV]	±20	±20
V_{RWM} (Max) [V]	3.6	5.5
C_T (Typ.) [pF]	0.2	0.2
R_{DYN} (Typ.) [Ω]	0.5	0.5

(NOTE) : This product is designed for ESD protection purpose and cannot be used for purposes other than ESD protection (including but not limited to voltage regulation applications).

◆Return to Block Diagram TOP

4b TVS diode

DF2B5M4ASL / DF2B6M4ASL

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

Value provided

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

1 Improved ESD pulse absorption

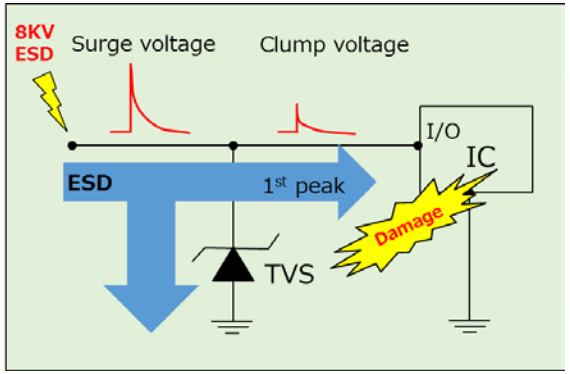
Both low operating resistance and low capacitance can realize and ensure high signal protection performance and signal quality.

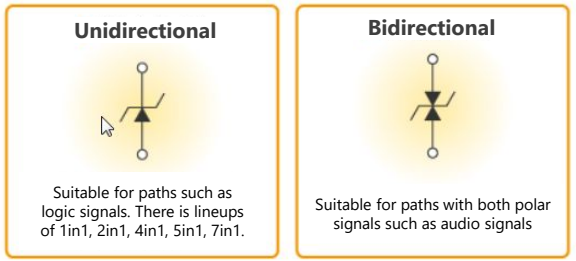
2 Suppress ESD energy by low clamp voltage

Secure protection of connected circuits/devices was realized by using proprietary technology.

3 Optimal for high-density mounting

A variety of compact packages are available.





Line up

Part number	DF2B5M4ASL	DF2B6M4ASL
Package	SL2 	
V_{ESD} (Max) [kV]	±16	±15
V_{RWM} (Max) [V]	3.6	5.5
C_T (Typ.) [pF]	0.15	0.15
R_{dyn} (Typ.) [Ω]	0.7	0.7

(NOTE) : This product is designed for ESD protection purpose and cannot be used for purposes other than ESD protection (including but not limited to voltage regulation applications).

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5 Schottky barrier diode (SBD)

CUS10F30 / CTS05F40

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

Value provided

Applied to various applications which requires high speed and low loss, and greatly contributes to miniaturization.

1 Fast switching

Suitable for fast switching applications.

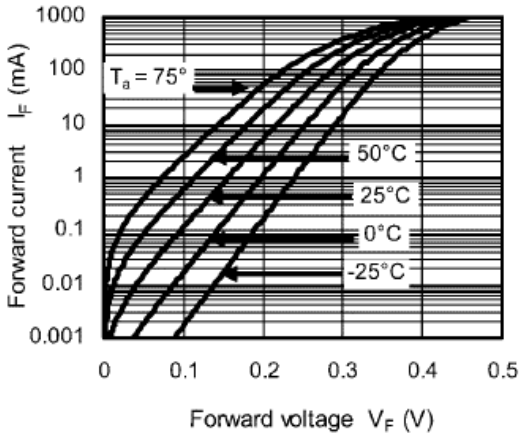
2 Be resistant to reverse voltage

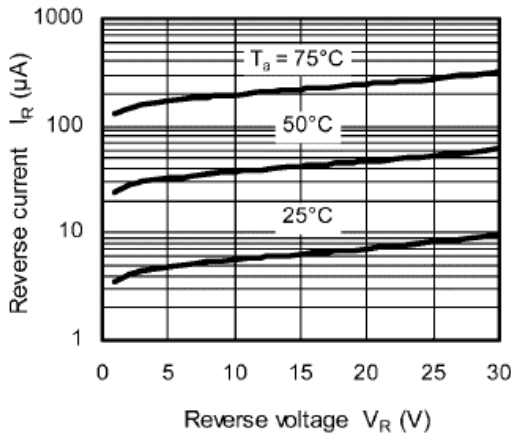
Reverse voltage V_R can be applied up to 40 V.

3 Compact

Sealed in USC/CTS2B type packages.

CUS10F30 Characteristics





Line up

Part number	CUS10F30	CTS05F40
Package	USC 	CST2 
I_O (Max) [A]	1.0	0.5
V_R (Max) [V]	30	40
V_F (Typ.) [V] @ I_F = 0.1 A	0.43	0.74
I_R (Max) [μA] @ V_R = 10 V	50	15

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6 LENS control MCU

TMPM342FYXBG / TMPM343FXXBG

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

Value provided

LENS control specialized MCU at small package and low power consumption

1 All in one solution for LENS control

- Silent & high speed multi-channel motor control
- Minimizing PCB area and number of components

2 Low power consumption

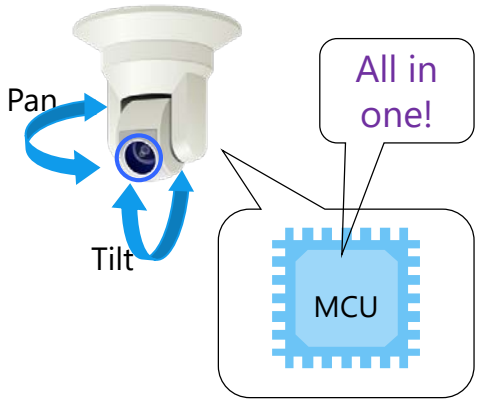
- Built-in Arm® Cortex® M3 and PSC co-processor
- Operation frequency reduction by distributed processing

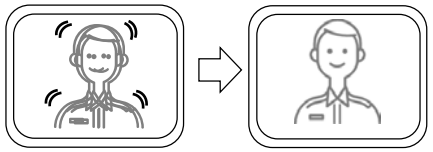
*PSC: Programmable Servo Controller

3 High quality OIS control

- Packaging USC/CTS2B type. OIS supports over 20 Hz.
- User friendly sample software and evaluation board

*OIS: Optical Image Stabilizer





OIS image

Line up

Part number	TMPM342FYXBG	TMPM343FxXBG
Package	VFBGA142	VBGA162
Package size [mm]	7 x 7 0.5 pitch	
CPU	Arm® Cortex®-M3, Max operation f 40 MHz	Arm® Cortex®-M3, Max operation f 50 MHz
Memory	Flash ROM 256 KB SRAM 32 KB	Flash ROM 512 KB / 1 MB SRAM 48 KB+32 KB / 64 KB+32 KB
Features	7bit resolution micro step function, PSC（342: 1 unit, 343: 4 unit）, 2-phase pulse counter (342: 2 ch, 343: 3 ch）, H-SW driver(342: 7.5 ch, 343: 8 ch）, μstep unit（342: 2 unit, 343: 3 unit）	

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7a PWM chopper type dual stepping motor driver

TC78S121FNG/FTG, TC78S122FNG/FTG

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

Value provided

Possible to drive 2ch of bipolar type stepping motor

1 4 products line up

There are 2 control types , clock input and phase signal input as the I/F. Also there are two package type, SSOP and QFN, respectively.

2 Abnormality detection

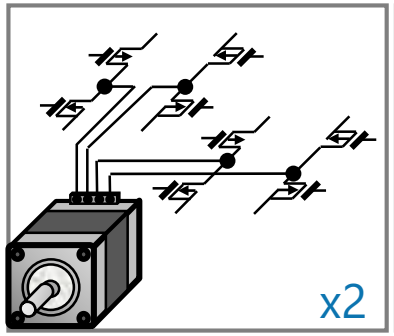
Various abnormality detection such as over limit current detection, over heat detection and power on reset contribute safety motor control.

3 3 selectable operation mode

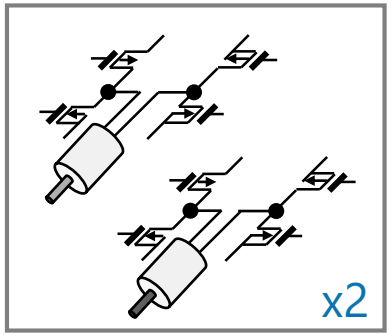
3 selectable H bridge combination according to motor type and required current as follows: 1) 2 steppers drive 2) 4 brushed drive 3) large current 2 brushed drive

■3 drive mode

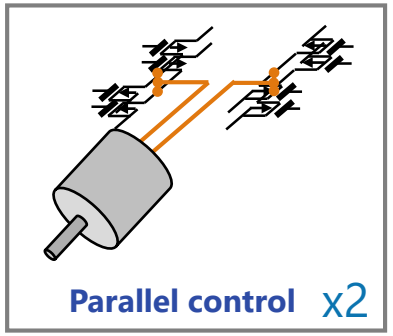
1) 2 steppers



2)4 brushed



3) Large current 2 brushed



Line up

Part number	TC78S121FNG / FTG, TC78S122FNG / FTG
Package	HTSSOP48 / QFN48
Package size [mm]	12.5 x 8.1 x 1.2
Maximun ratings	40 V / 2.0 A
Low on resistor output (sum of 2 Tr)	0.6 Ω
Features	- Over limit current detection, over heat detection and power on reset - 2 line up supports clock input for stepping motor control and phase input - Single power supply without 5 V input

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Dual H-bridge driver IC

TC78H653FTG

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

Value provided

Selectable drive mode of 2ch DC brushed motor or 1ch stepping motor

1 Small package

The QFN16 package contributes to reduce foot print areas.

2 Protection and abnormality detection

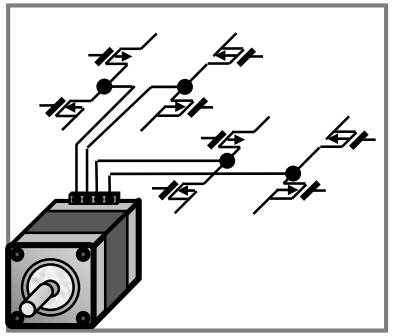
Thorough current preventing function and various abnormality detection such as over current detection, over heat detection and low voltage detection contribute safety motor control.

3 2 drive mode

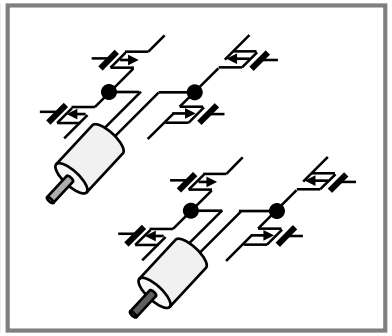
3 selectable H bridge combination according to motor type and required current as follows: 1) 2 steppers drive 2) 4 brushed drive 3) large current 2 brushed drive

■2 drive mode

1) 1 stepper



2) 2 brushed



Line up

Part number	TC78H653FTG
Package	QFN16
Package size [mm]	3.0 x 3.0 x 0.9
Maximum ratings	8 V / 4.0 A
Low on register output (Total Tr)	0.22 Ω
Features	• Thorough current preventing function • Over current detection, over heat detection and low voltage detection

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8 Electronic Fuse eFuse IC

TCKE8 series

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

Value provided

eFuse IC (electronic fuses) can protect circuits from abnormal conditions such as overcurrent and overvoltage repeatedly.

1 Repeated use

When excessive current flows through the eFuse IC , the internal detection circuit operates and turns off the internal MOS. It is not destroyed by a single overcurrent and can be used repeatedly.

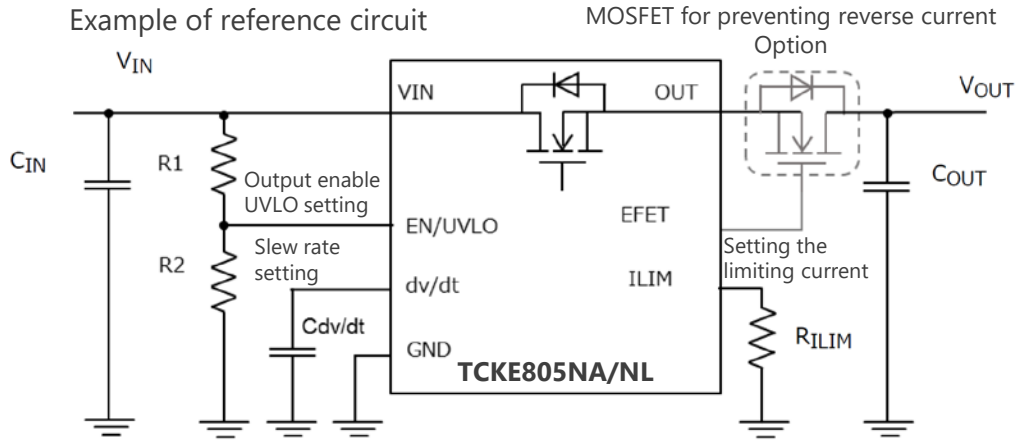
2 High-speed short-circuit protection

The cut-off time at the time of output short-circuit is 150ns (Typ.), and the output current is cut-off at high speed at the time of short-circuit detection.

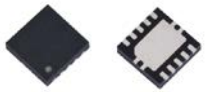
3 Rich protection functions

In addition to short-circuit protection, the circuit is protected by overcurrent clamp (OCC), overvoltage clamp (OVC), Thermal shut down (TSD), inrush current suppression, Reverse current protection (optional), and other. functions

Example of reference circuit



Line up

Part number	TCKE800NA/NL*	TCKE805NA/NL	TCKE812NA/NL*
Package	WSON10B 3.0x3.0x0.7mm 		
V_{IN} [V]	4.4 to 18		
R_{ON} (Typ.) [mΩ]	28		
Return function	NA: Automatic return, NL: Latch type (external signal control)		
V_{OVC} (Typ.) [V]	-	6.04	15.0

* Under development

◆Return to Block Diagram TOP

If you are interested in these products and have questions or comments about any of them, please do not hesitate to contact us below:

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