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
IVI system block diagram example

- Wi-Fi®/4G/GPS
  - modem
  - Ethernet Bridge
  - PHY/ Switch
  - Ethernet AVB
  - PHY/ Switch
  - PCI\textsuperscript{e} Bridge
  - HDMI®
  - HDMI® Interface
  - Bridge

- Application processor
  - HSIC
  - Interface
  - Bridge
  - HDMI®
  - PHY/ Switch
  - Interface
  - Bridge

- Wireless Communication
  - LDO
  - Camera
  - MIPI\textsuperscript{e} CSI-2\textsuperscript{SM}
  - Interface Bridge
  - Parallel
  - Serializer
  - MIPI\textsuperscript{e} CSI-2\textsuperscript{SM}
  - Deserializer
  - MIPI\textsuperscript{e} CSI-2\textsuperscript{SM}
  - Interface Bridge

- Video Input
  - LDO
  - Camera
  - HDMI®
  - Interface
  - Bridge

- Voice Input
  - MIC
  - Audio Codec
  - TVS
  - Reverse Battery Protection/ Load Switch

- Display/Audio Output
  - LVDS
  - Display
  - CAN
  - Line
  - FlexRay
  - Line

- USB Interface
  - USB Connector
  - USB Interface
  - Bus Switch
  - TVS

- Battery (12V)
  - DC-DC
  - LPF
  - Audio AMP
  - Speaker

- DSP/ Tuner
  - Audio AMP
  - Speaker

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Device selection points

- The adoption of Ethernet AVB is expanding to next-generation car networks.
- SoCs now used in smartphones and tablets are also being designed into automotive systems. These may require interface conversion of their peripheral devices.

Proposals from Toshiba

- **Long distance transmissions**
  Ethernet bridge IC
- **Absorb differences in interfaces**
  Automotive peripheral bridge IC
- **Realize low heat dissipation audio output**
  Audio power amplifier IC
- **Both device protection and signal quality is realized**
  TVS diode (for high-speed communication)

*Click on the numbers in the circuit diagram to jump to the detailed descriptions page*
Device selection points
- SoCs now used in smartphones and tablets are also being designed into automotive systems. These may require interface conversion of their peripheral devices.

Proposals from Toshiba
- **Absorb differences in interfaces**
  Automotive peripheral bridge IC
- **Both device protection and signal quality is realized**
  TVS diode (for high-speed communication)

* Click on the numbers in the circuit diagram to jump to the detailed descriptions page
IVI (information transmission department detail)

Wireless communications section

Device selection points
- The adoption of Ethernet AVB is expanding to next-generation car networks.
- Functions such as keyless entry is possible by means of linked communication ICs.

Proposals from Toshiba
- **Long distance transmissions**
  Ethernet bridge IC
- **It connects in the car the outside of a car.**
  Automotive communication IC

* Click on the numbers in the circuit diagram to jump to the detailed descriptions page

PCIe® and PCI Express® are registered trademarks of PCI-SIG.
Gate Driver

Device selection points
- The MOSFET must be selected according to the load.
- With the use of small packages, it is necessary to design heat dissipation in consideration of reliability.
- The dead time must be considered to prevent the occurrence of shoot through current.

Proposals from Toshiba
- **Low power consumption of the system is realized by low on-resistance**
  U-MOS series 40V N-ch power MOSFET

* Click on the numbers in the circuit diagram to jump to the detailed descriptions page.
SW for power supply ON/OFF control and reverse connection protection (1)

Power supply ON/OFF control and reverse connection protecting circuit
(P-ch method)

Device selection points
- It is necessary to select the product with the optimum current rating for each application.
- It is necessary to select a gate driver according to the performance of the switching device to be driven.
- It is necessary to select a small surface mount package suitable for miniaturization of the ECU.

Proposals from Toshiba
- Low power consumption of the system is realized by low on-resistance
  U-MOS series -40V / -60V P-ch power MOSFET
- Various product lineups and small packages
  General-purpose small-signal MOSFET
  General-purpose small-signal bipolar transistor
  General-purpose small-signal bias resistor built-in transistor (BRT)
  One-gate logic (L-MOS)
- Both device protection and signal quality is realized
  TVS diode (for CAN communication)

* Click on the numbers in the circuit diagram to jump to the detailed descriptions page

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SW for power supply ON/OFF control and reverse connection protection (2)

Power supply ON/OFF control and reverse connection protecting circuit (N-ch method)

Device selection points
- It is necessary to select the product with the optimum current rating for each application.
- It is necessary to select a gate driver according to the performance of the switching device to be driven.
- It is necessary to select a small surface mount package suitable for miniaturization of the ECU.

Proposals from Toshiba
- Low power consumption of the system is realized by low on-resistance
  U-MOS series 40V N-ch power MOSFET
- Gate driver with protection diagnostic function
  Gate driver (for switch)
- Various product lineups and small packages
  General-purpose small-signal MOSFET
  General-purpose small-signal bipolar transistor
  General-purpose small-signal bias resistor built-in transistor (BRT)
  One-gate logic (L-MOS)
- Both device protection and signal quality is realized
  TVS diode (for CAN communication)

* Click on the numbers in the circuit diagram to jump to the detailed descriptions page
Recommended Devices
As described above, in the design of IVI, “Information sharing”, “Reduction of power consumption” and “Miniaturization” are important factors. Toshiba’s proposals are based on these three solution perspectives.
Device solutions to address customer needs

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ethernet bridge</td>
</tr>
<tr>
<td>2</td>
<td>Automotive peripheral bridge IC</td>
</tr>
<tr>
<td>3</td>
<td>Automotive radio communication IC</td>
</tr>
<tr>
<td>4</td>
<td>Audio power amplifier IC</td>
</tr>
<tr>
<td>5</td>
<td>U-MOS series 40V N-ch power MOSFET</td>
</tr>
<tr>
<td>6</td>
<td>U-MOS Series -40V / -60V P-ch power MOSFET</td>
</tr>
<tr>
<td>7</td>
<td>Gate driver (for switch)</td>
</tr>
<tr>
<td>8</td>
<td>General-purpose small-signal MOSFET</td>
</tr>
<tr>
<td>9</td>
<td>General-purpose small-signal bipolar transistor</td>
</tr>
<tr>
<td>10</td>
<td>Small-signal bias resistor built-in transistor (BRT)</td>
</tr>
<tr>
<td>11</td>
<td>One-gate logic (L-MOS)</td>
</tr>
<tr>
<td>12</td>
<td>TVS diode (for high-speed communication)</td>
</tr>
<tr>
<td>13</td>
<td>TVS diode (for CAN communication)</td>
</tr>
</tbody>
</table>

- **High-performance processing and high-quality transmission**
- **High efficiency - Low loss**
- **Small size package**
Easy connectivity to the next-generation car network

1. **Compliant with Ethernet AVB / TSN**
   Due to comply with IEEE 802.1Qav for the Ethernet AVB and with IEEE 802.1Qbv for the Ethernet TSN, ensuring a high-speed data transfer with high reliability, quality, and low transmission latency.

2. **Multiple interfaces**
   Equipped with PCIe®, HSIC, I2S/TDM (Time Division Multiplex) interface. Can be easily connected with modem SoCs and application processors.

3. **Automotive reliability**
   Compliant with automotive quality level AEC-Q100 Grade 3.

### Line up

<table>
<thead>
<tr>
<th>Model</th>
<th>TC9560BXBG</th>
<th>TC9562AXBG*</th>
<th>TC9562BXBG*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>P-LFBGA170 (0.65)</td>
<td>P-LFBGA120 (0.65)</td>
<td></td>
</tr>
<tr>
<td>Host I/F</td>
<td>HSIC</td>
<td>PCIe I/F [Gen2.0 (5 GT/s), Gen1.0 (2.5 GT/s), Endpoint, Single lane]</td>
<td></td>
</tr>
<tr>
<td>Automotive Ethernet</td>
<td>Ethernet AVB [IEEE802.1AS, IEEE802.1Qav]</td>
<td>Left + Ethernet TSN</td>
<td></td>
</tr>
<tr>
<td>I/F option</td>
<td>SGMII(except TC9562)/RGMII/RMII/MII</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: under development

**Return to Block Diagram TOP**
Supports high-speed data transfer between mobile SoC and peripheral devices.

To expand a wider parts selection

By converting the I/F of an SoC that supports only a mobile phone video standard interface, component options can be expanded.

1. Display interface
   - X standard
   - Y standard

   Host processor ➔ Interface Bridge ➔ Display

2. Camera interface bridge
   - X standard
   - Y standard

   Camera ➔ Interface Bridge ➔ Host processor

3. Less noise

Converting parallel bus line to serial improves noise immunity and suppresses the generation of own noise.

4. Reduced a wiring risk

Converting parallel bus line to serial reduces the number of wires on a board and the risk of a bridge/disconnection.

Line up

<table>
<thead>
<tr>
<th>Camera I/F Bridge</th>
<th>Display I/F Bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>TC9590</td>
</tr>
<tr>
<td>Package</td>
<td>VFBGA80</td>
</tr>
<tr>
<td>Input</td>
<td>HDMI™1.4a</td>
</tr>
<tr>
<td></td>
<td>(2) Parallel 24bit@154MHz</td>
</tr>
<tr>
<td>Output</td>
<td>MIPI® CSI-1STM 4 Lanes x 1ch</td>
</tr>
</tbody>
</table>

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Comfortable driving environment by means of enhanced data connectivity

1. RKE (Remote Keyless Entry)
It is the optimal as a receiver of a remote keyless entry system and a tire-pressure supervising system (TPMS). It can be used also for the bidirectional low rate data communications using a transmitting function.

2. ETC (Electronic Toll Collection System)
It corresponds to broad ETC standards, such as Japan and South Korea, and can use it not only for onboard equipment but for RSU.

<table>
<thead>
<tr>
<th>Line up</th>
<th>RKE (Remote Keyless Entry)</th>
<th>ETC (Electronic Toll Collection System)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>TC32306FTG</td>
<td>TC32163FG</td>
</tr>
<tr>
<td>Package</td>
<td>QFN36</td>
<td>LQFP48</td>
</tr>
<tr>
<td>RF frequency</td>
<td>315MHz ～ 915MHz</td>
<td>5.8 GHz band</td>
</tr>
<tr>
<td>IF frequency</td>
<td>230 kHz (wideband), 280 kHz (mid-band)</td>
<td>40 MHz (1st), 7.232 MHz (2nd)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>2.0 ～ 5.5 V</td>
<td>2.7 ～ 3.6 V</td>
</tr>
</tbody>
</table>

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Achieves audio output with low heat dissipation at a reasonable price

1. **Proprietary high efficiency amplifier (patent registered)**
   - Realizes efficiency equivalent to a class D digital amplifier with an output of 4W or less.
   - Power consumption inside the IC is about one-fifth of a standard class AB amplifier and about one-half of a conventional high efficiency linear KB class.

2. **Low BOM**
   - Without switching action like in a digital class D amplifier, the BOM cost can be reduced by half as there is no need for external LPF or components for EMI suppression.

3. **Continuous error detection (patent registered)**
   - Includes a proprietary speaker burnout prevention system that continuously checks for any abnormal DC offset regardless of signal presence and informs the microcomputer.

---

**Power consumption (for 0.8W x 4 channels)**

<table>
<thead>
<tr>
<th>Model</th>
<th>TCB701FNG</th>
<th>TCB702FNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>P-HSSOP36-1116-0.65-001 (36 pin)</td>
<td></td>
</tr>
<tr>
<td>Max. output power</td>
<td>49W×4ch (VCC=15.2V, RL=4Ω Max Power)</td>
<td>45W×4ch (VCC=15.2V, RL=4Ω Max Power)</td>
</tr>
<tr>
<td>Total harmonic distortion (THD)</td>
<td>0.01% (at POUT=4W)</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>6 ~ 18V</td>
<td></td>
</tr>
<tr>
<td>Output noise voltage</td>
<td>60μVrms (BW=DIN AUDIO)</td>
<td></td>
</tr>
</tbody>
</table>

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The advanced U-MOS IX-H processes enables low on-resistance and low noise, thereby reducing power consumption.

**1. Low loss (reduced chip resistance)**
Using low chip resistance technology to contribute to reduced power consumption systems.
Chip resistance of 61% reduction per unit area (compared to UMOSIV)

**2. Compact, low-loss package**
By adopting a Cu connector structure and a double-sided heat dissipation structure,
Development of low-loss, high-heat-dissipation packages

**3. Low noise (low EMI)**
Optimized chip process, reduce surge voltage and ringing time.

---

**Line up**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Drain current</th>
<th>On-resistance (Max) @VGS=10V</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>XPN3R804NC</td>
<td>40A</td>
<td>3.8mΩ</td>
<td>TSON Advance(WF)</td>
</tr>
<tr>
<td>TK1R4S04PB</td>
<td>120A</td>
<td>1.35mΩ</td>
<td>DPAK+</td>
</tr>
<tr>
<td>TPHR7904PB</td>
<td>150A</td>
<td>0.79mΩ</td>
<td>SOP Advance(WF)</td>
</tr>
<tr>
<td>TPWR7904PB</td>
<td>150A</td>
<td>0.79mΩ</td>
<td>DSOP Advance(WF)</td>
</tr>
<tr>
<td>TKR74F04PB</td>
<td>250A</td>
<td>0.74mΩ</td>
<td>TO-220SM(W)</td>
</tr>
<tr>
<td>TK1R5R04PB</td>
<td>160A</td>
<td>1.5mΩ</td>
<td>D2PAK+</td>
</tr>
</tbody>
</table>

---

- Package resistance reduction 64%, Compared to D2PAK
- TO-220SM(W) Cu connector design
- DSOP Advance(WF) double-sided cooling packages
- Decrease of thermal resistance 76% reduction @t=3s, mounted on board Compared to SOP-8

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Value provided

Low on-resistance contributes to reduced system power consumption.

1. **Low-loss (reduced chip resistance), logic-level response**

Using low chip resistance technology to contribute to reduced power consumption systems
Lineup of Logic-level-drive types

Low Loss: RonA Reduction Trend

Large current, small size, high heat dissipation package

- UMOS III
  - Ron-A = 0.3Ω
  - (10x13mm) ~200A
- DPAK+
  - Ron-A = 1.1Ω
  - (6.5x10mm) ~90A
- SOP Advance (WF)
  - Ron-A = 0.9Ω
  - (5x6mm) ~100A

2. **Small surface mount package developed**

Development of low-loss, high-heat-dissipation packages by adopting a Cu connector structure
Ensuring mountability by using the Wettable Flank (WF) structure

**Line up**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Drain-source Voltage</th>
<th>Drain current</th>
<th>On-resistance (Max) @VGS=10V</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>TJ90S04M3L</td>
<td>-40V</td>
<td>-90A</td>
<td>4.3mΩ</td>
<td>DPAK+</td>
</tr>
<tr>
<td>TJ60S06M3L</td>
<td>-60V</td>
<td>-60A</td>
<td>11.2mΩ</td>
<td></td>
</tr>
<tr>
<td>XPH3R114MC</td>
<td>-40V</td>
<td>-100A</td>
<td>3.1mΩ</td>
<td>SOP Advance(WF)</td>
</tr>
<tr>
<td>TJ200F04M3L</td>
<td>-40V</td>
<td>-200A</td>
<td>1.8mΩ</td>
<td>TO-220SM(W)</td>
</tr>
<tr>
<td>TJ150F06M3L</td>
<td>-60V</td>
<td>-150A</td>
<td>5.6mΩ</td>
<td></td>
</tr>
</tbody>
</table>

◆Return to Block Diagram TOP
A charge pump for the FET gate drive is built-in, allowing for easy semiconductor relay configuration.

1. **Built-in charge pump**
   - No external add-ons required for driving the N-channel on the high side, making it easy to configure a semiconductor relay.

2. **Logic level drive**
   - Direct control is possible from microcomputer and CMOS logic.

3. **Small package**
   - The small surface mount PS8 contributes to the miniaturization of equipment.

### Semiconductor relay (switch) application

### Power supply reverse connection protection FET control

### Line up

<table>
<thead>
<tr>
<th>Part number</th>
<th>TPD7104AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>High-side gate driver</td>
</tr>
<tr>
<td>Number of output</td>
<td>1 output</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Operating power supply voltage range: 5 to 18 V</td>
</tr>
<tr>
<td>• Built-in charge pump</td>
</tr>
<tr>
<td>• Built-in power supply reverse connection protection function</td>
</tr>
</tbody>
</table>

(Supported for power supply reverse connection protection FET applications)
Choose from a wide array of small packages which contribute to the miniaturization and reduction of power consumption of equipment.

1. **Small package**
   - Starting with the SOT-723 (VESM 1.2mm² package), a lineup of various small packages is available, contributing to space savings during mounting.

2. **Low voltage drive**
   - The gate-source voltage can be driven at a low voltage of 1.2 V(SSM3J66MFV).

3. **AEC-Q101 qualified**
   - AEC-Q101 qualified and can be used for a wide range of automotive applications.
General-purpose small-signal bipolar transistor
2SC2712 / 2SA1162 / 2SC4116 / 2SA1586 and others

Extensive product lineup to meet all your needs.

1 Extensive lineup of packages
Various package lineups, such as 1in1, 2in1 are provided and suitable product for circuit board design can be selected.

2 Various product lineup
Various product lineups, such as general-purpose, low-noise, low V_{CE(sat)} and high-current types, are provided. Products can be selected depending on the application.

3 AEC-Q101 qualified
AEC-Q101 qualified and can be used for a wide range of automotive applications.
Small-signal bias resistor built-in transistor (BRT)
RN1114 / RN2114 / RN1414 / RN2414 series

Extensive product lineup to meet all your needs.

1 Built-in bias resistor type (BRT)
The BRT reduces the number of parts contributing to miniaturization and shorter production times.

2 Extensive lineup of package and pin assignment
Various package lineups, such as 1in1, 2in1 are provided and suitable product for circuit board design can be selected.

3 AEC-Q101 qualified
AEC-Q101 qualified and can be used for a wide range of automotive applications.

Line up

<table>
<thead>
<tr>
<th>Part number</th>
<th>NPN (BRT)</th>
<th>PNP (BRT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSM (SOT-416)</td>
<td>RN1114</td>
<td>RN2114</td>
</tr>
<tr>
<td>S-Mini (SOT-346)</td>
<td>RN1414</td>
<td>RN2414</td>
</tr>
<tr>
<td>V_{CEO} (Max) [V]</td>
<td>50</td>
<td>-50</td>
</tr>
<tr>
<td>I_c [mA]</td>
<td>100</td>
<td>-100</td>
</tr>
</tbody>
</table>

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One-gate logic (L-MOS)
TC7SH / TC7WH / TC7SZ / TC7WZ series

Extensive product lineup to meet all your needs.

1 Small package
A standard multi gate CMOS is separated into individual or dual gates and embedded in a small package. This can be suited for simpler designs and contributes to miniaturization.

2 Extensive lineup
The VHS/SHS series, which is widely used in Automotive, offers a wide range of functions, including a total of 230 products.

3 AEC-Q100 qualified
AEC-Q100 qualified and can be used for a wide range of automotive applications.

Line up

<table>
<thead>
<tr>
<th>Package</th>
<th>VHS series</th>
<th>SHS series</th>
</tr>
</thead>
<tbody>
<tr>
<td>USV (SOT-353)</td>
<td>TC7SH series</td>
<td>TC7SZ series</td>
</tr>
<tr>
<td>US8 (SOT-765)</td>
<td>TC7WH Series</td>
<td>TC7WZ series</td>
</tr>
<tr>
<td>$V_{CC}$ [V]</td>
<td>2.0 ~ 5.5</td>
<td>1.65/1.8 ~ 5.5</td>
</tr>
<tr>
<td>$I_o$[mA]</td>
<td>8</td>
<td>24</td>
</tr>
</tbody>
</table>

* Compliant products with AEC-Q100’s reliability test only

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TVS diode (for high-speed communication)
DF2S5M4FS / DF2S6M4FS

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

1. Improve ESD absorbability
Our proprietary snapback technology (4-Gen. EAP Process) improves ESD absorption compared to conventional products. (50% reduction in $R_{\text{DYN}}$)

2. Ensuring High Signal integrity
Supports high-speed communications of Gbps orders such as Ethernet and LVDS. Lowered capacitance ensures higher signal integrity.

3. High ESD immunity
Compliant products with ISO10605 Standard > ±30 kV IEC61000-4-2 Standard > ±20 kV(L4)

Surge absorption performance
LVDS(@4.8 Gbps) DF2S6M4FS Eye pattern

Line up

<table>
<thead>
<tr>
<th>Part number</th>
<th>DF2S5M4FS</th>
<th>DF2S6M4FS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>SOD-923</td>
<td></td>
</tr>
<tr>
<td>$V_{\text{ESD}}$ [kV] @ISO10605</td>
<td>±30</td>
<td>±30</td>
</tr>
<tr>
<td>$V_{\text{BVM}}$ (Max) [V]</td>
<td>3.6</td>
<td>5.5</td>
</tr>
<tr>
<td>$C_{\text{T}}$ (Typ./Max.) [pF]</td>
<td>0.45/0.55</td>
<td></td>
</tr>
<tr>
<td>$R_{\text{DYN}}$ (Typ) [Ω]</td>
<td>0.35</td>
<td></td>
</tr>
</tbody>
</table>

(TJ) Jitter(µs)

Eye-Height

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

High-performance processing
High-quality transmission
High efficiency
Low loss
Small size package

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Return to Block Diagram TOP
TVS diode (for CAN communication)
DF3D18FU / DF3D29FU / DF3D36FU

Value provided

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

1 Improve ESD absorbability
Improved absorption of ESD through our proprietary Zener process. (Both low operating resistance $R_{\text{DYN}}$ and low capacitance $C_t$)

2 Ensuring high signal integrity
Supports in-vehicle LAN communication such as CAN, CAN-FD, FlexRay. Lower capacitance ensures higher signal integrity.

3 High ESD immunity
Compliant products with ISO10605 Standard > ±20 kV
IEC61000-4-2 Standard > ±20 kV (L4)

Line up

<table>
<thead>
<tr>
<th>Part number</th>
<th>DF3D18FU</th>
<th>DF3D29FU</th>
<th>DF3D36FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>USM (SOT-323)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{\text{ESD}}$ [kV] @ISO10605</td>
<td>±30</td>
<td>±30</td>
<td>±20</td>
</tr>
<tr>
<td>$V_{\text{RMIN}}$ (Max) [V]</td>
<td>12</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>$C_t$ (Typ./Max) [pF]</td>
<td>9 / 10</td>
<td>6.5 / 8</td>
<td>1.5</td>
</tr>
<tr>
<td>$R_{\text{DYN}}$ (Typ.) [Ω]</td>
<td>0.8</td>
<td>1.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*(NOTE): This product is an ESD protection diode and cannot be used for purposes other than ESD protection (including but not limited to constant voltage diode applications).

*1: TOSHIBA Electronic Device & Storage Corporation
*2: Measurements of the commercial product

*Return to Block Diagram TOP
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