TOSHIBA CDMOS Integrated Circuit Silicon Monolithic

TC62D749CFG/CFNAG

16-Output Constant Current LED Driver (Output switching high-speed version)

Features

- Power supply voltages : V_{DD} = 3.3 V and 5.0 V
- 16-output built-in
- Output current setting range : I_{OUT} = 1.5~90 mA
- Current accuracy (@ R_{EXT} = 1.2 kΩ, V_{OUT} = 1.0 V, V_{DD} = 3.3 V, 5.0 V)
  : S rank ; Between outputs ± 1.5 % (max)
  : S rank ; Between devices: ± 1.5 % (max)
  : N rank ; Between outputs ± 2.5 % (max)
  : N rank ; Between devices: ± 2.5 % (max)
- Output voltage : V_{OUT} = 17 V (max)
- High-speed output switching : t_{WOE} = 25 ns (min), t_{or} = 10 ns (typ.), t_{of} = 10 ns (typ.)
  There is TC62D748 as an output switching standard-speed version of this product.
- Input signal voltage level : 3.3 V and 5.0 V CMOS interfaces
  (Schmitt trigger input)
- Serial data transfer rate : 25 MHz (max) @cascade connection
- Operation temperature range : T_{opr} = –40~85 °C
- Power-on-reset function built-in : When the power supply is turned on, internal data is reset.
- Package : CFG type SSOP24-P-300-1.00B
  : CFNAG type SSOP24-P-150-0.64

Absolute Maximum Ratings (T_a = 25 °C)

Characteristics	Symbol	Rating *Note1	Unit
Power supply voltage	V_{DD}	–0.3~6.0	V
Output current	I_{OUT}	95	mA
Logic input voltage	V_{IN}	–0.3~V_{DD} + 0.3 *Note2	V
Output voltage	V_{OUT}	–0.3~17	V
Operating temperature	T_{opr}	–40~85	°C
Storage temperature	T_{stg}	–55~150	°C
Thermal resistance	Rth(j-a)	94 (CFG) *Note3, 80.07(CFNAG)	°C/W
Power dissipation	P_D *Note4	1.32 (CFG) *Note3, 1.56(CFNAG)	W

*Note1 : Voltage is ground referenced.
*Note2 : Do not exceed 6.0V.
*Note3 : PCB condition 76.2 x 114.3 x 1.6 mm, Cu 30% (SEMI conforming)
*Note4 : The power dissipation decreases the reciprocal of the saturated thermal resistance (1/ Rth(j-a)) for each degree (1°C) that the ambient temperature is exceeded (Ta = 25°C).

Operating Condition (Unless otherwise specified, V_{DD} = 3.0~5.5 V T_a = –40~85 °C)

Characteristics	Symbol	Test Conditions	Min	Typ.	Max	Unit
Power supply voltage	V_{DD}	—	3.0	—	5.5	V
High level logic input voltage	V_{IH}	SIN,SCK, $\overline{SLAT}$, $\overline{OE}$	0.7 × V_{DD}	—	V_{DD}	V
Low level logic input voltage	V_{IL}	SIN,SCK, $\overline{SLAT}$, $\overline{OE}$	GND	—	0.3 × V_{DD}	V
Serial data transfer frequency	f_{SCK}	—	—	—	25	MHz

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Electrical Characteristics (Unless otherwise specified, V_{DD} = 3.3 V or 5.0 V, T_a = 25 °C)

Characteristics		Symbol	Test Conditions	Min	Typ.	Max	Unit
Constant current error (Ch to Ch)	(S rank)	$\Delta I_{OUT(Ch)}$	V_{OUT} = 1.0 V, R_{EXT} = 1.2 kΩ, 1 output on	—	±1.0	±1.5	%
	(N rank)			—	±1.0	±2.5	
Constant current error (IC to IC)	(S rank)	$\Delta I_{OUT(IC)}$	V_{OUT} = 1.0 V, R_{EXT} = 1.2 kΩ, 1 output on	—	±1.0	±1.5	%
	(N rank)			—	±1.0	±2.5	
Output rise time		t_{or}	10~90 % of voltage waveform	—	10	20	ns
Output fall time		t_{of}	90~10 % of voltage waveform	—	10	20	ns
Enable pulse width		t_{wOE}	$\overline{OE}$ = "H" or "L"	25	—	—	ns

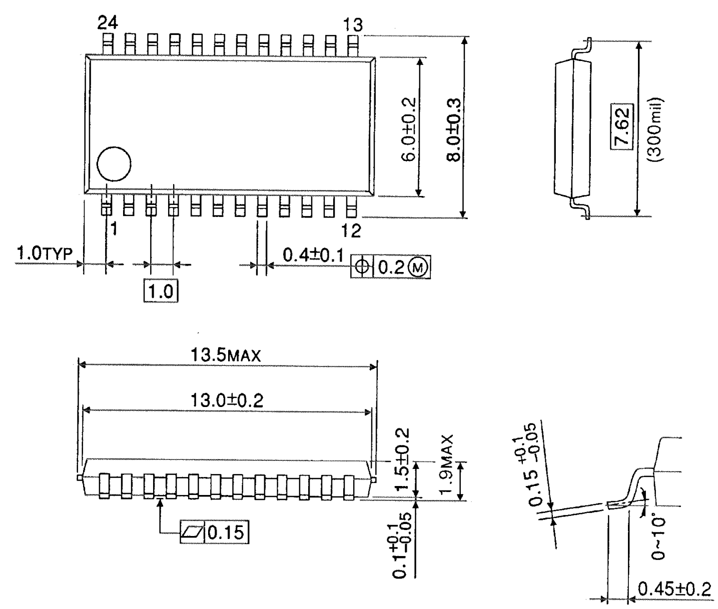
Pin Assignment

Pin No.	Name
1	GND
2	SIN
3	SCK
4	$\overline{SLAT}$
5	$\overline{OUT0}$
6	$\overline{OUT1}$
7	$\overline{OUT2}$
8	$\overline{OUT3}$
9	$\overline{OUT4}$
10	$\overline{OUT5}$
11	$\overline{OUT6}$
12	$\overline{OUT7}$
13	$\overline{OUT8}$
14	$\overline{OUT9}$
15	$\overline{OUT10}$
16	$\overline{OUT11}$
17	$\overline{OUT12}$
18	$\overline{OUT13}$
19	$\overline{OUT14}$
20	$\overline{OUT15}$
21	$\overline{OE}$
22	SOUT
23	REXT
24	VDD

Package

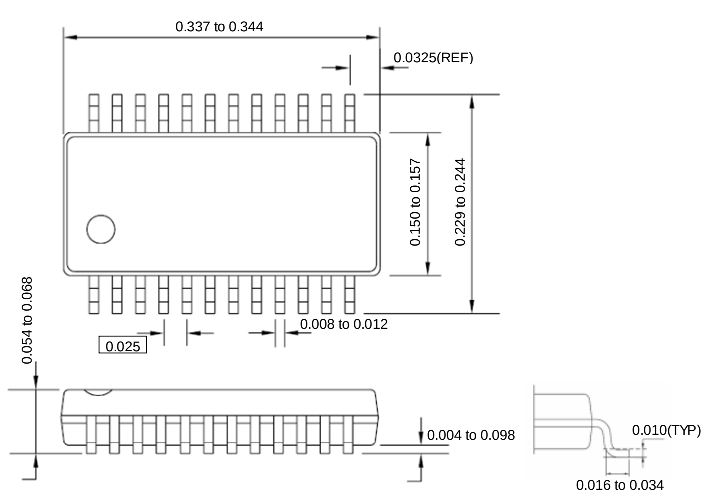
TC62D749CFG : SSOP24-P-300-1.00B
Weight: 0.29 g (typ.)

Unit : mm



TC62D749CFNAG : SSOP24-P-150-0.64
Weight: 0.14 g (typ.)

Unit : Inch



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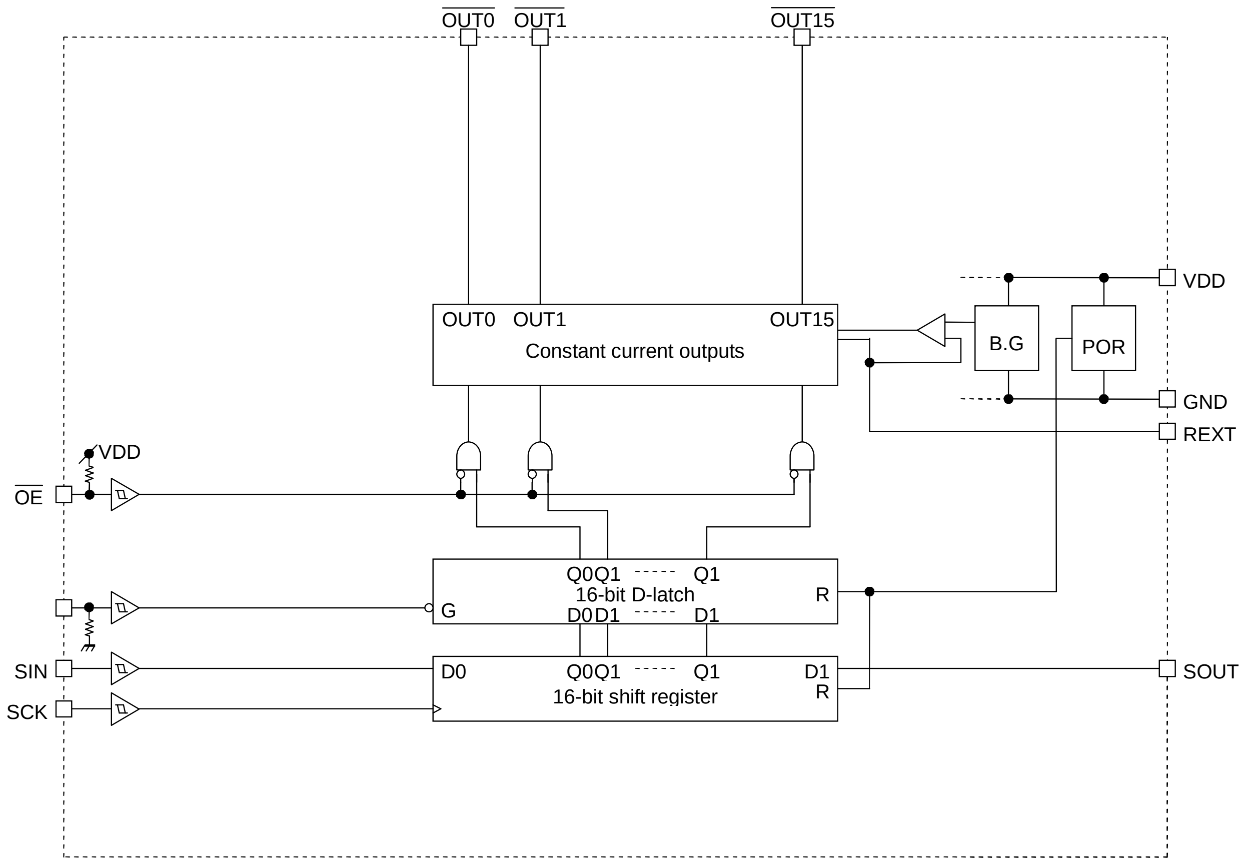
Block Diagram



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Notes on Contents

1. Block Diagrams

Some of the functional blocks, circuits, or constants in the block diagram may be omitted or simplified for explanatory purposes.

2. Equivalent Circuits

The equivalent circuit diagrams may be simplified or some parts of them may be omitted for explanatory purposes.

4. Application Circuits

The application circuits shown in this document are provided for reference purposes only. Thorough evaluation is required, especially at the mass production design stage.

Toshiba does not grant any license to any industrial property rights by providing these examples of application circuits.

5. Test Circuits

Components in the test circuits are used only to obtain and confirm the device characteristics. These components and circuits are not guaranteed to prevent malfunction or failure from occurring in the application equipment.

IC Usage Considerations

Notes on handling of ICs

[1] The absolute maximum ratings of a semiconductor device are a set of ratings that must not be exceeded, even for a moment. Do not exceed any of these ratings.
Exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.

[2] Use an appropriate power supply fuse to ensure that a large current does not continuously flow in case of over current and/or IC failure. The IC will fully break down when used under conditions that exceed its absolute maximum ratings, when the wiring is routed improperly or when an abnormal pulse noise occurs from the wiring or load, causing a large current to continuously flow and the breakdown can lead smoke or ignition. To minimize the effects of the flow of a large current in case of breakdown, appropriate settings, such as fuse capacity, fusing time and insertion circuit location, are required.

[3] If your design includes an inductive load such as a motor coil, incorporate a protection circuit into the design to prevent device malfunction or breakdown caused by the current resulting from the inrush current at power ON or the negative current resulting from the back electromotive force at power OFF. IC breakdown may cause injury, smoke or ignition.
Use a stable power supply with ICs with built-in protection functions. If the power supply is unstable, the protection function may not operate, causing IC breakdown. IC breakdown may cause injury, smoke or ignition.

[4] Do not insert devices in the wrong orientation or incorrectly.
Make sure that the positive and negative terminals of power supplies are connected properly.
Otherwise, the current or power consumption may exceed the absolute maximum rating, and exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.
In addition, do not use any device that is applied the current with inserting in the wrong orientation or incorrectly even just one time.

[5] Carefully select external components (such as inputs and negative feedback capacitors) and load components (such as speakers), for example, power amp and regulator.
If there is a large amount of leakage current such as input or negative feedback condenser, the IC output DC voltage will increase. If this output voltage is connected to a speaker with low input withstand voltage, overcurrent or IC failure can cause smoke or ignition. (The over current can cause smoke or ignition from the IC itself.) In particular, please pay attention when using a Bridge Tied Load (BTL) connection type IC that inputs output DC voltage to a speaker directly.

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Points to remember on handling of ICs

(1) Heat Radiation Design

In using an IC with large current flow such as power amp, regulator or driver, please design the device so that heat is appropriately radiated, not to exceed the specified junction temperature (T_J) at any time and condition. These ICs generate heat even during normal use. An inadequate IC heat radiation design can lead to decrease in IC life, deterioration of IC characteristics or IC breakdown. In addition, please design the device taking into considerate the effect of IC heat radiation with peripheral components.

(2) Back-EMF

When a motor rotates in the reverse direction, stops or slows down abruptly, a current flow back to the motor's power supply due to the effect of back-EMF. If the current sink capability of the power supply is small, the device's motor power supply and output pins might be exposed to conditions beyond maximum ratings. To avoid this problem, take the effect of back-EMF into consideration in system design.

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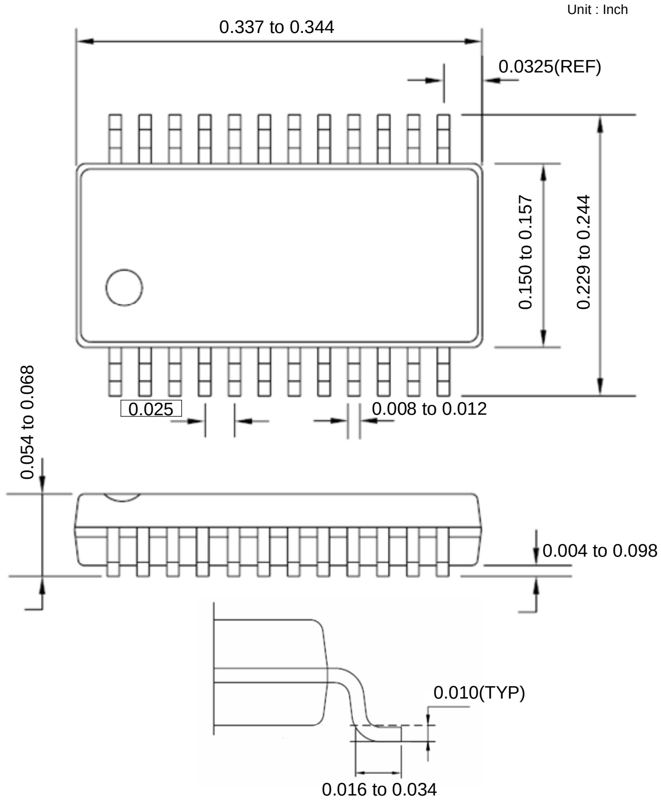
SSOP24-P-150-0.64



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