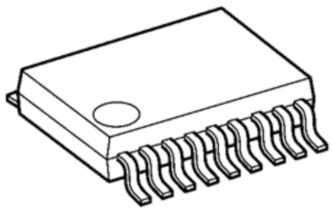
TOSHIBA BiCD Integrated Circuit Silicon Monolithic

TBD62183AFNG, TBD62183AFWG

8channel sink type DMOS transistor array

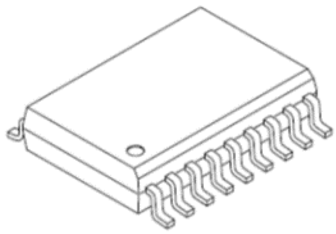
TBD62183A series are DMOS transistor array with 8 circuits. It has a clamp diode for switching inductive loads built-in in each output. Please be careful about thermal conditions during use.

TBD62183AFNG



SSOP18-P-225-0.65

TBD62183AFWG



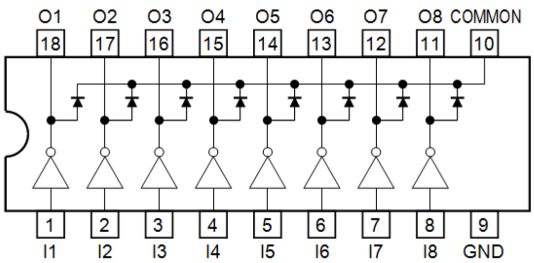
P-SOP18-0812-1.27-001

Weight
SSOP18-P-225-0.65 : 0.09 g (Typ.)
P-SOP18-0812-1.27-001 : 0.48 g (Typ.)

Features

- 8 circuits built-in
- High voltage : V_{OUT} = 50 V (MAX)
- High current : I_{OUT} = 50 mA/ch (MAX)
- Input voltage(output on) : 2.8 V (MIN)
- Input voltage(output off) : 0.6 V (MAX)
- Package : FNG type SSOP18-P-225-0.65
  FWG type P-SOP18-0812-1.27-001

Pin connection (top view)

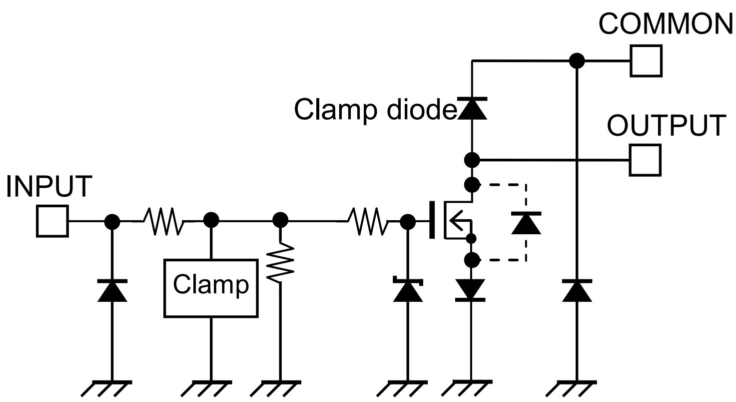


Pin connection may be simplified for explanatory purpose.

Pin explanations

Pin No.	Pin name	Function
1	I1	Input pin
2	I2	Input pin
3	I3	Input pin
4	I4	Input pin
5	I5	Input pin
6	I6	Input pin
7	I7	Input pin
8	I8	Input pin
9	GND	GND pin
10	COMMON	Common pin
11	O8	Output pin
12	O7	Output pin
13	O6	Output pin
14	O5	Output pin
15	O4	Output pin
16	O3	Output pin
17	O2	Output pin
18	O1	Output pin

Equivalent circuit



Equivalent circuit may be simplified for explanatory purpose.

Absolute Maximum Ratings (Ta = 25 °C)

Characteristics		Symbol	Rating	Unit
Output voltage		V_{OUT}	50	V
COMMON pin voltage		V_{COM}	−0.5 to 50	V
Output current		I_{OUT}	50	mA/ch
Input voltage		V_{IN}	−0.5 to 30	V
Clamp diode reverse voltage		V_R	50	V
Clamp diode forward current		I_F	50	mA
Power dissipation	FNG (Note1)	P_D	0.96	W
	FWG (Note2)		1.31	
Operating temperature		T_{opr}	−40 to 85	°C
Storage temperature		T_{stg}	−55 to 150	°C

Note1: On PCB (Size: 50 mm × 50 mm × 1.6 mm, Cu area: 40 %, single-side glass epoxy).
When Ta exceeds 25 °C, it is necessary to do the derating with 7.7 mW/°C.
Note2: On PCB (Size: 75 mm × 114 mm × 1.6 mm, Cu area: 20 %, single-side glass epoxy).
When Ta exceeds 25 °C, it is necessary to do the derating with 10.48 mW/°C.

Operating Ranges (Ta = −40 to 85 °C, unless otherwise noted)

Characteristics		Symbol	Condition		Min	Typ.	Max	Unit
Output voltage		V_{OUT}	—		—	—	50	V
COMMON pin voltage		V_{COM}	—		0	—	50	V
Output current	FNG(Note1)	I_{OUT}	1 circuits ON, Ta = 25°C		0	—	45	mA/ch
			t_{pw} = 25 ms 8 circuits ON Ta = 85°C T_j = 120°C	Duty = 50%	0	—	45	
				Duty = 100%	0	—	33	
	FWG(Note2)		1 circuits ON, Ta = 25°C		0	—	45	
			t_{pw} = 25 ms 8 circuits ON Ta = 85°C T_j = 120°C	Duty = 50%	0	—	45	
				Duty = 100%	0	—	38	
Input voltage (Output on)		$V_{IN (ON)}$	I_{OUT} = 45 mA, V_{OUT} = 2 V		2.8	—	25	V
Input voltage (Output off)		$V_{IN (OFF)}$	I_{OUT} = 100 μA or less, V_{OUT} = 2 V		0	—	0.6	V
Clamp diode forward current		I_F	—		—	—	45	mA

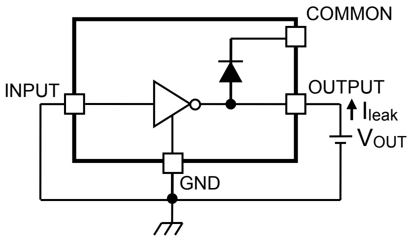
Note1: On PCB (Size: 50 mm × 50 mm × 1.6 mm, Cu area: 40%, single-side glass epoxy).
Note2: On PCB (Size: 75 mm × 114 mm × 1.6 mm, Cu area: 20%, single-side glass epoxy).

Electrical Characteristics (Ta = 25°C unless otherwise noted)

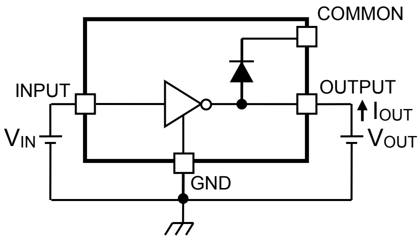
Characteristics	Symbol	Test Circuit	Condition	Min	Typ.	Max	Unit
Output leakage current	I_{leak}	1	V_{OUT} = 50 V, Ta = 85°C V_{IN} = 0 V	—	—	1.0	μA
Output voltage	V_{OUT}	2	I_{OUT} = 45 mA, V_{IN} =5.0 V	—	1.0	1.4	V
			I_{OUT} = 10 mA, V_{IN} =5.0 V	—	0.8	1.0	
Input current (Output on)	$I_{IN (ON)}$	3	V_{IN} = 3.0V	—	—	0.1	mA
Input current (Output off)	$I_{IN (OFF)}$	4	V_{IN} = 0 V, Ta = 85°C	—	—	1.0	μA
Input voltage (Output on)	$V_{IN (ON)}$	5	I_{OUT} = 45 mA, V_{OUT} = 2 V	—	—	2.8	V
Clamp diode reverse current	I_R	6	V_R = 50 V, Ta = 85°C	—	—	1.0	μA
Clamp diode forward voltage	V_F	7	I_F = 45 mA	—	—	1.5	V
Turn−on delay	t_{ON}	8	V_{OUT} = 50 V R_L = 1k Ω C_L = 15 pF	—	0.2	—	μs
Turn−off delay	t_{OFF}			—	0.4	—	

Test circuit

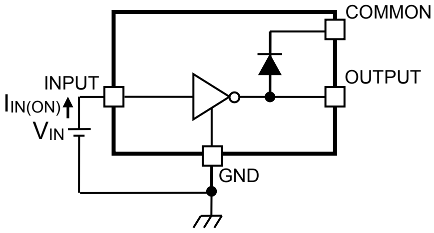
1. I_{leak}



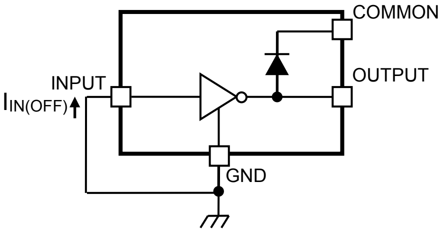
2. V_{OUT}



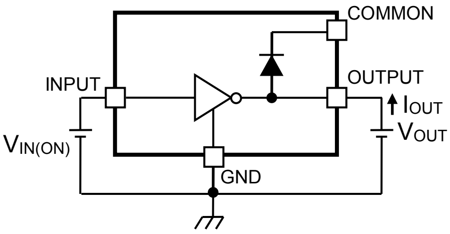
3. $I_{IN\ (ON)}$



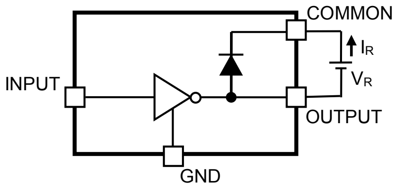
4. $I_{IN\ (OFF)}$



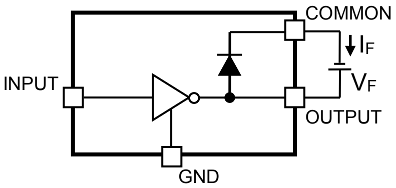
5. $V_{IN\ (ON)}$



6. I_R

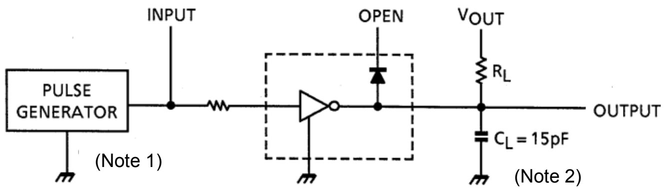


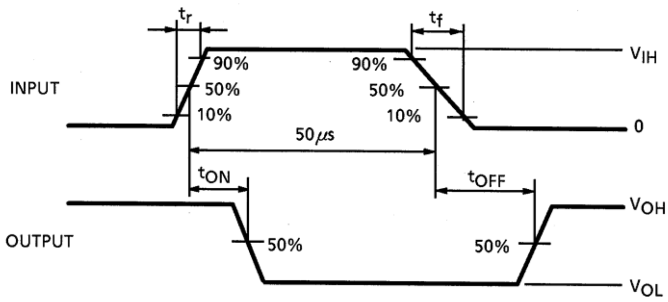
7. V_F



Test circuit may be simplified for explanatory purpose.

8. t_{ON}, t_{OFF}





Note 1: Pulse width 50 μs, Duty cycle 10%

Output impedance 50 Ω, $t_r \le 5$ ns, $t_f \le 10$ ns, $V_{IH} = 5.0$ V

Note 2: Includes the probe and the test board capacitance.

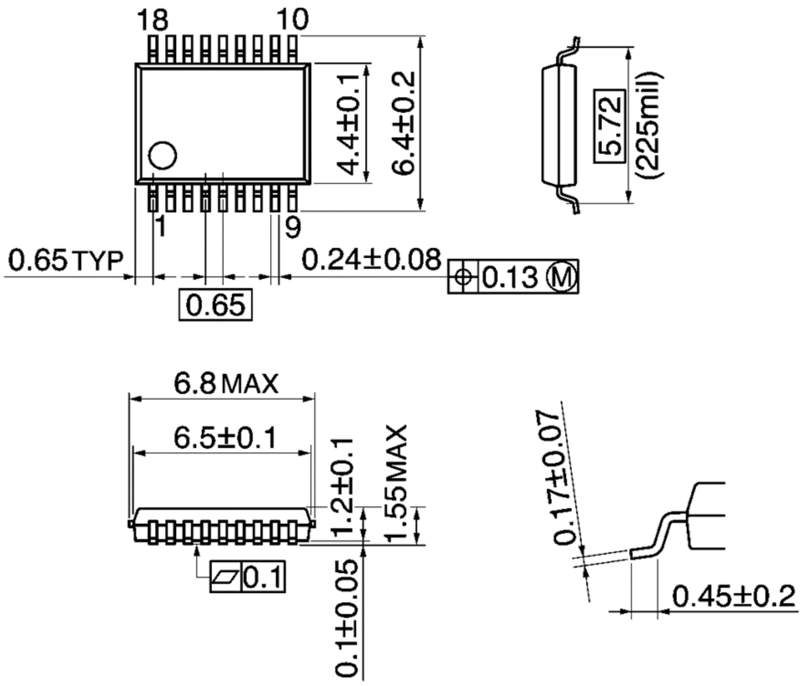
Test circuit and timing chart may be simplified for explanatory purpose.

Precautions for Using

This IC does not include built-in protection circuits for excess current or overvoltage.
If this IC is subjected to excess current or overvoltage, it may be destroyed.
Hence, the utmost care must be taken when systems which incorporate this IC are designed.
Utmost care is necessary in the design of the output line, COMMON and GND line since IC may be destroyed due to short−circuit between outputs, air contamination fault, or fault by improper grounding.

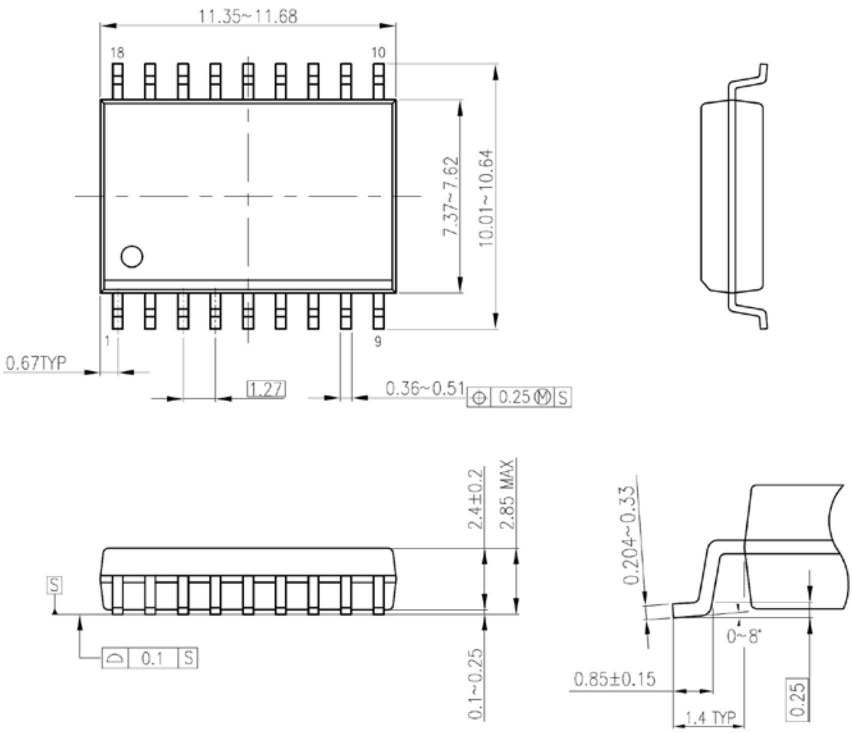
Package Dimensions

SSOP18-P-225-0.65 Unit: mm



Weight: 0.09 g (Typ.)

P-SOP18-0812-1.27-001 Unit: mm



Weight: 0.48 g (Typ.)

Notes on Contents

1. **Pin connection**
   Pin connection may be simplified for explanatory purpose.
2. **Equivalent Circuits**
   Equivalent circuit may be simplified for explanatory purpose.
3. **Test circuit**
   Test circuit may be simplified for explanatory purpose.
4. **Timing chart**
   Timing charts may be simplified for explanatory purposes.

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 device breakdown, damage or deterioration, and may result in injury by explosion or combustion.

(2) 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 device breakdown, damage or deterioration, and may result in injury by explosion or combustion. In addition, do not use any device inserted in the wrong orientation or incorrectly to which current is applied even just once.

(3) Use an appropriate power supply fuse to ensure that a large current does not continuously flow in the case of overcurrent 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 to smoke or ignition. To minimize the effects of the flow of a large current in the case of breakdown, appropriate settings, such as fuse capacity, fusing time and insertion circuit location, are required.

(4) 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.

(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 from 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 may cause smoke or ignition. (The overcurrent may 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.

Points to remember on handling of ICs

Heat Radiation Design

When using an IC with large current flow such as power amp, regulator or driver, design the device so that heat is appropriately radiated, in order not to exceed the specified junction temperature (T_j) at any time or under any 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, when designing the device, take into consideration the effect of IC heat radiation with peripheral components.

Back-EMF

When a motor rotates in the reverse direction, stops or slows abruptly, current flows back to the motor's power supply owing 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 the absolute maximum ratings. To avoid this problem, take the effect of back-EMF into consideration in system design.

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