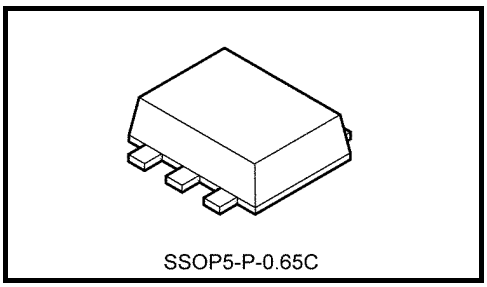
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TAH6N201U

2-Channel Non Up-convert Type Constant Current Driver IC

The TAH6N201U is non up-convert type constant current driver IC. This device can operate from 2.5V to 5.5V and set the driving current by only one external resistor. It is suitable to constant current driving circuits for the equipments using compact buttery.



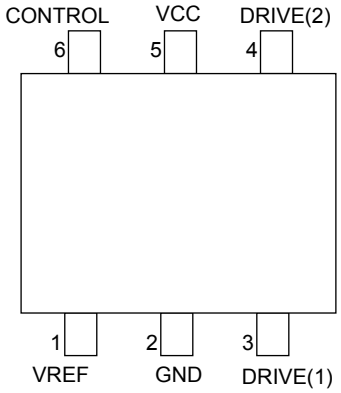
Weight: 0.007 g (typ.)

Features

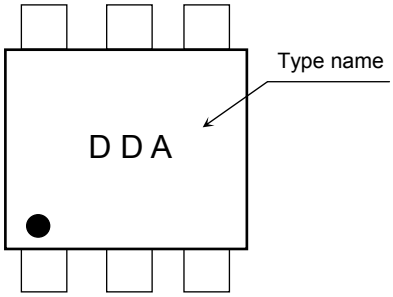
- Constant current driving not to be influenced by load driving voltage or supply voltage due to built-in reference voltage circuit. (Note 1)
- Built-in protection circuit
- Need only one external resistor for setting the driving current

Note 1: Higher power supply voltage than the total of load supply voltage and V_{DRIVE}(SAT).

Pin Assignment (top view)



Marking



Switch Condition

INPUT	OUTPUT	
CONTROL	DRIVE(1)	DRIVE(2)
L	OFF	
H	ON	

Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Power supply Voltage	V_{CC}	7	V
DC input voltage	V_{IN}	- 0.3 ~ V_{CC} + 0.3	V
Input diode current	I_{IK}	±25	mA
V_{REF} output current	I_{REF}	250	μA
Driving current (each output)	I_{DRIVE}	25	mA
Driving current (total of 2 output)	I_{DRIVE}	50	
Power dissipation	P_D	200 (Note 2)	mW
Operating temperature	T_{opr}	-40~85	°C
Storage temperature	T_{stg}	-55~150	°C

Note 2 : Mounted on a glass epoxy PCB sized 30 × 30 mm (Cu pad area size: 70 mm^2)

Recommended Operating Conditions (VCC = 2.5 ~5.5 V , Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.5~5.5 (Note 3)	V
Input voltage	V_{IN}	0 ~ V_{CC}	V

Note 3 : Higher power supply voltage than the total of load supply voltage and V_{DRIVE}(SAT).

Electrical Characteristics (T_a = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
CONTROL input voltage (Note 4)	ON	$V_{CT\ (ON)}$	—	2.0	—	—	V
	OFF	$V_{CT\ (OFF)}$	—	—	—	0.3	V
V_{REF} output voltage		V_{REF}	CONTROL = $V_{CT\ (ON)}$	1.07	1.17	1.27	V
Saturation voltage		V_{DRIVE}(SAT)	I_{DRIVE} = 20 mA (1-channel output each)	—	—	0.2	V
DRIVE current		| I_{DRIVE} |	V_{DRIVE} = 0.2V,I_{REF} = 0.2mA (Note 5) Including Δ I_{DRIVE}	18	20	22	mA
DRIVE current deference between each channel		Δ I_{DRIVE}	V_{DRIVE} = 0.2V, I_{REF} = 0.01 ~ 0.2mA (Note 5), I_{DRIVE} [Max] - I_{DRIVE} [Min] (Note 5)	0	—	5	%
OFF leakage current		I_{LEAK}	CONTROL = $V_{CT\ (OFF)}$	—	1	10	μA
Quiescent supply current		I_{CC}	CONTROL = $V_{CT\ (ON)}$, I_{DRIVE} = 20mA x 2-channel output	—	1	3	mA

Note 4: Not to use under the condition to open CONTROL terminal and supply under 0.3V absolutely to CONTROL terminal under no output condition.

Note 5: I_{REF} is current revel from V_{REF} terminal. 100 times current revel of I_{REF} is set as I_{DRIVE}.

(Example) I_{DRIVE}=20mA @ I_{REF}=0.2mA

Note 6 : Guarantee by design

Application Note (Example of 2-channel White LED Driving Circuit)

1. Description of basic operation

The reference voltage output from V_{REF} terminal, and the driving current is set by external resistor between V_{REF} terminal and GND. This device have built-in protection circuit for LED which reduce V_{REF} terminal voltage automatically when higher temperature condition.

2. External resistor setting

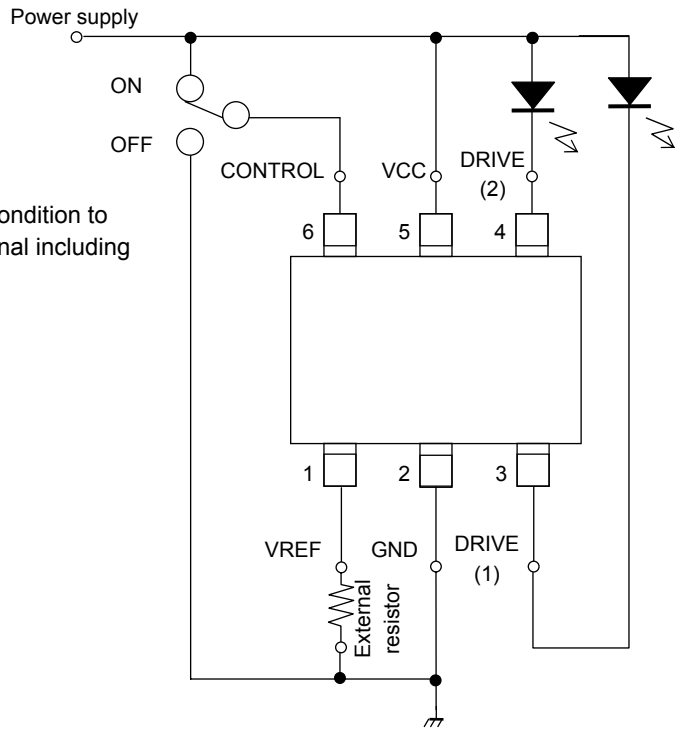
DRIVE terminal output I_{DRIVE} current which is 100 times of I_{REF} current from V_{REF} terminal. When setting external resistor, please chose the resistance value with enough margin to achieve required current level, after check each item of electrical characteristics.

External resistor = V_{REF} / (DRIVE current / 100)

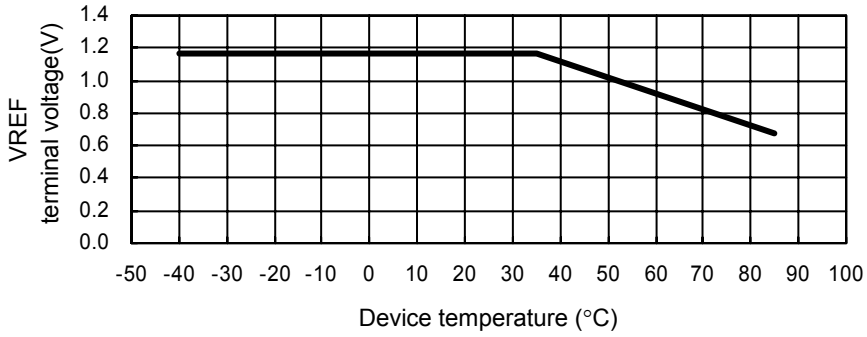
DRIVE current = I_{REF} x 100 times

3. Example of Application Circuit

Not to use under the condition to open CONTROL terminal including open drain condition.



VREF derating curve (Reference)



4. Calculation example

For example if 15mA(min) driving current for each channel required.

Firstly, please refer to the minimum value of V_{REF} output voltage mentioned on datasheet.

V_{REF} output voltage (minimum) : 1.07V

The resistance of external resistor gives

1.07 V / (15 mA / 100) = 7.13kΩ

As the accuracy of resistance for resistors is approximately 5% in general, resistance is calculated considering 5% margin as follows:

7.13 kΩ / 105% = 6.79 kΩ

This resistance value is possible to drive at 15mA considering accuracy of resistors.

In addition, it is necessary to confirm the maximum DRIVE current when using calculated value of resistor, due to confirmation of safety operation. The maximum DRIVE current gives from maximum V_{REF} output voltage and minimum resistance of external resistor as follows:

Minimum resistance = 6.79 kΩ x 95% = 6.45 kΩ
DRIVE current (max) = (1.27 V / 6.45 kΩ) x 100 = 19.7mA

Since the calculation result has become less than maximum ratings, it turns out that there is no problem iin use with this resistance. The design which took external factors, such as variation in resistance, ambient temperature, and product temperature, into condition besides product variation is required.

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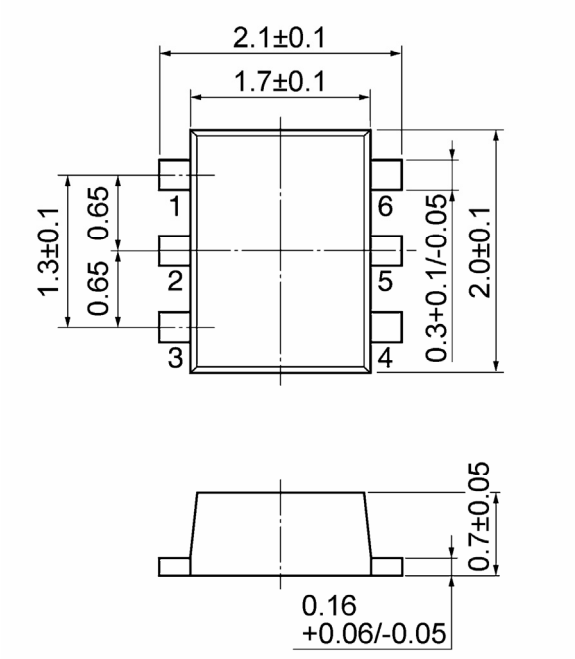
When use this device, please care ambient condition, precision of peripheral parts and safety margin.

Package Dimension



Weight:0.007g(typ)

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