

0.8A, 40V Input, 600kHz Synchronous Buck Converter

Features

- High efficiency: up to 92%
- 600kHz operating frequency
- 0.8A output current
- No Schottky diodes required
- 5V~40V input voltage range
- The reference voltage is 0.8V
- Fast transient response
- Integrate internal compensation
- Stable and low ESR ceramic output capacitors
- Thermal shutdown and undervoltage protection
- Temperature range -40°C to +85°C
- SOT23-6 package

Description

The YTD2110GDT6 is a wide-input range, high-efficiency, synchronous step-down switching converter capable of delivering up to 0.8A of output current. Features a fixed 600kHz switching frequency, allowing the use of small external components such as ceramic capacitors for input and output, as well as inductors.

YTD2110GDT6 also uses a proprietary control scheme that switches the device to power-saving mode at light loads, making it suitable for applications where system efficiency is high. This makes it an ideal solution for

industrial applications such as smart meters and automotive applications. In automotive systems, their battery voltages typically range from 9V to 24V. The YTD2110GDT6 minimum input voltage can be as low as 5V and as high as 40V. Linear regulators cannot be used for high voltage and high current due to overheating. Instead, using a YTD2110GDT6 high-efficiency switching converter minimizes heat dissipation.

YTD2110GDT6 is available in a SOT23-6 package.

Application

- Automotive applications
- Smart meter
- Industrial applications

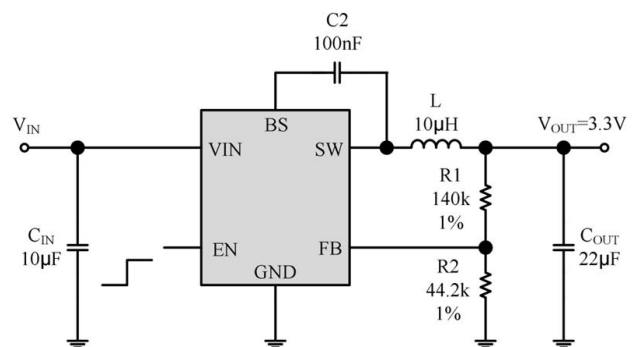


Fig. 1 Typical application circuit

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Package and Ordering Information

Part No.	Marking	Package	Operating Temperature	Packing Method
YTD2110GDT6	A06VDC	SOT23-6	-40°C to 85°C	Tape 3000 pcs/Reel

Marking Rule: V: Version, D: Year, C: Week

Pin Configuration

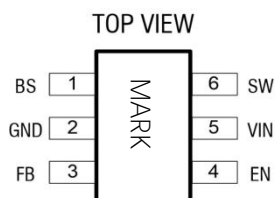


Fig. 2 Pin Configuration

Pin Definition

Pin No.	Name	Description
1	BS	External bootstrap capacitors (100nF)
2	GND	Ground
3	FB	Output Feedback Pin (Feedback Voltage 0.8V)
4	EN	Enable pin, activate the operation when the EN is greater than 1.5V, turn off the operation when it is less than 0.4V, and do not be the EN pin left floating
5	VIN	The input pin must be placed close to the input ceramic capacitor
6	SW	Switch node, connected to the inductor

Internal Block Diagram

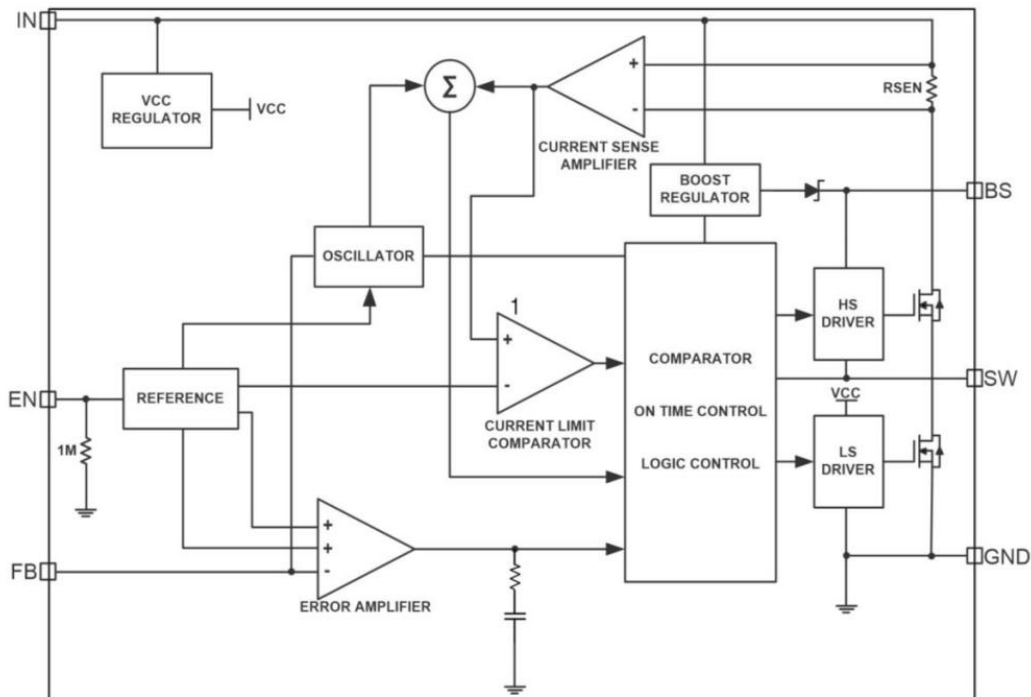


Fig. 3 Internal block diagram

Absolute Maximum Ratings^{Note1}

Parameters	Symbol	Range	Units
“VIN”, “EN” voltage range	V_{IN}, V_{EN}	-0.3 ~ 45	V
“SW” voltage range	V_{SW}	-0.3 ~ $V_{IN}+0.5$	V
“BS” voltage range	V_{BS}	$V_{SW}-0.3 \sim V_{SW}+0.5$	V
“FB” voltage range	V_{FB}	-0.3 ~ 6	V
Power Dissipation	P_D	0.6	W
ESD Human mode ^{Note2}	ESD_{hbm}	2000	V
Operating junction temperature range	T_j	-40 ~ 150	°C
Ambient temperature range	T_a	-40 ~ 85	°C
Welding temperature (< 20 s welding)	T_{lead}	260	°C
Junction to ambient thermal resistance	$R_{\theta JA}$	130	°C/W
Junction to Case thermal resistance	$R_{\theta JC}$	170	°C/W

Note1: Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device.

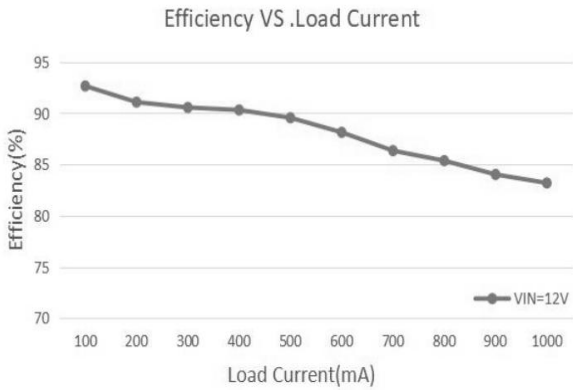
Note2: Electrical components and circuit boards will be aware of the situation in the discharge is not easy. Although this product has a special electrostatic protection circuit, but in the case of high-energy electrostatic discharge, the chip may have damage and loss of function or performance degradation. Therefore, users still need to take appropriate preventive measures ESD.

Electrical Characteristics^{Note3} ($V_{IN} = 12V$, $V_{OUT} = 3.3V$, Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$)

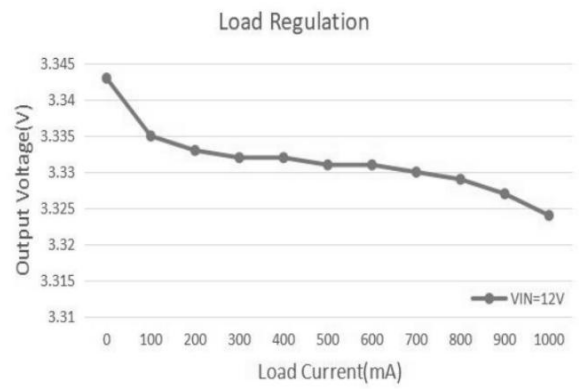
Parameters	Condition	Min	Typ	Max	Units
Input voltage range		5		40	V
Operating current	$V_{EN} = 2.0V$, $V_{FB} = 1.1V$		0.4	0.6	mA
	$T_J = -55^\circ\text{C} \sim 125^\circ\text{C}$			1	mA
Turn off current	$V_{EN} = 0$ or $EN = GND$		2	10	μA
	$T_J = -55^\circ\text{C} \sim 125^\circ\text{C}$			20	μA
Feedback voltage	$T_J = 25^\circ\text{C}$, $5V \leq V_{IN} \leq 40V$	0.784	0.800	0.816	V
High-side MOSFET R_{DS_ON}			400		m Ω
Low-side MOSFET R_{DS_ON}			250		m Ω
High-side MOSFET leakage current	$V_{EN} = 0V$, $V_{SW} = 0V$		0	10	μA
	$T_J = -55^\circ\text{C} \sim 125^\circ\text{C}$			60	μA
Maximum current of High-side MOSFET			2		A
Oscillation frequency			0.6		MHz
Maximum duty cycle			92		%
Minimum on-time			80		nS
Soft start time			1		mS
Thermal shutdown threshold			160		$^\circ\text{C}$

Note3: The max and minimum parameters specified are guaranteed by test, the typical value are guaranteed by design, characterization and statistical analysis.

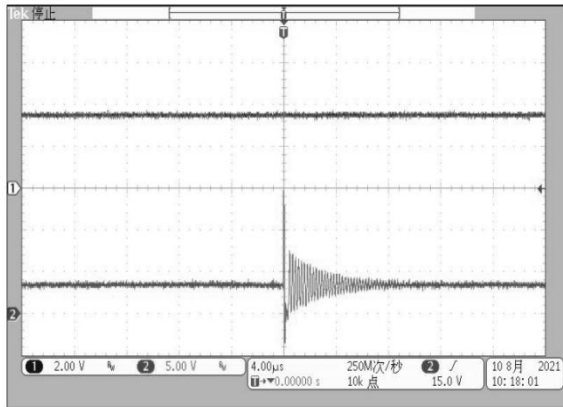
Typical Performance Characteristics



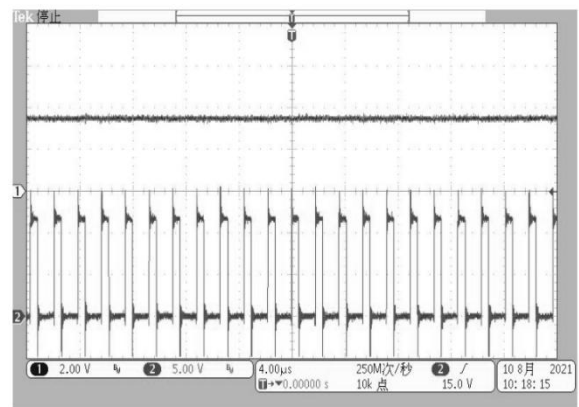
VIN:12V, OUT:3.3V



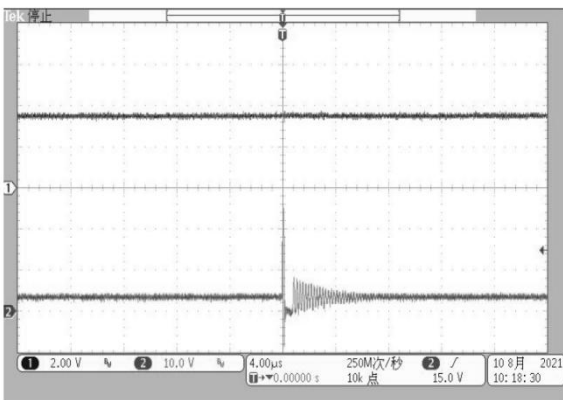
VIN:12V, OUT:3.3V



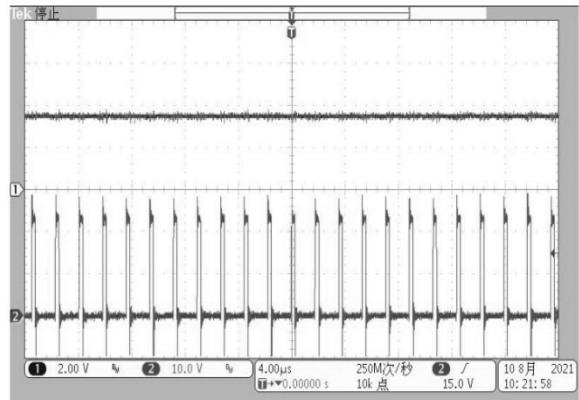
VIN:12V, OUT:3.3V/0A



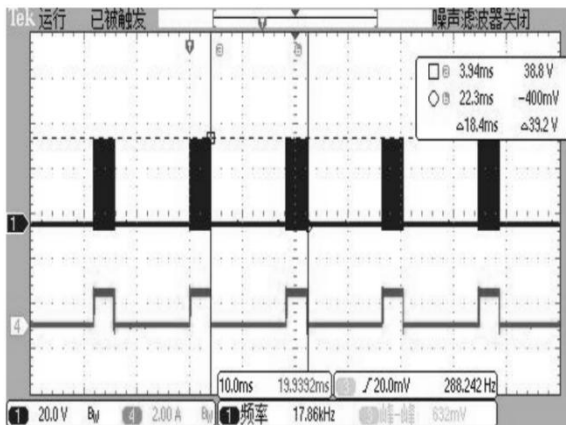
VIN:12V, OUT:3.3V/0.8A



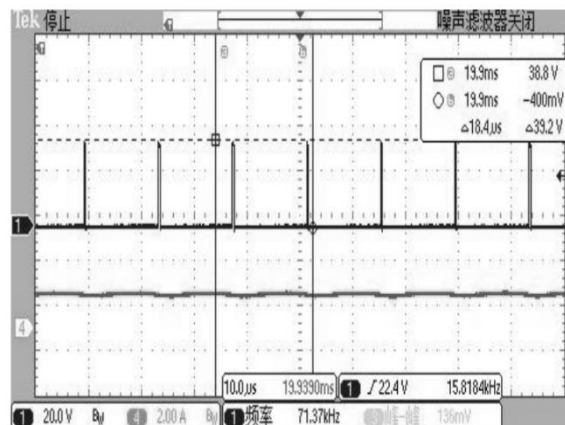
VIN:24V, OUT:3.3V/0A



VIN:24V, OUT:3.3V/0.8A



Short Circuit VIN:24V



Short Circuit VIN:24V

Application Suggestion

Set The Output Voltage

The external resistor voltage division is used to set the output voltage (see Section typical application on page 1). The calculation formula is as follows:

$$V_{OUT} = V_{FB} \times \left(1 + \frac{R1}{R2} \right)$$

PCB Routing Considerations

For YTD2110GDT6 to work optimally, the following LAYOUT rules need to be met:

- ★ The input and output capacitors must be ground close to the IC's GND pin to reduce the current loop area.
- ★ Large AC currents flow through the VIN, SW, and VOUT traces, so make sure these traces are short and wide.
- ★ The copper skin at the SW foot is controlled in a relatively small area to prevent EMI because of the alternating voltage.
- ★ The FB pin is a high impedance node, and the FB trace should be short enough to avoid output voltage fluctuations caused by pickup noise, placing the feedback resistor as close to the IC as possible, while the GND of R2 should be placed as close to the GND pin of the IC as possible, and the routing from V_{OUT} to R1 should be far away from the inductor and switching nodes.

Negative Pressure Output Application

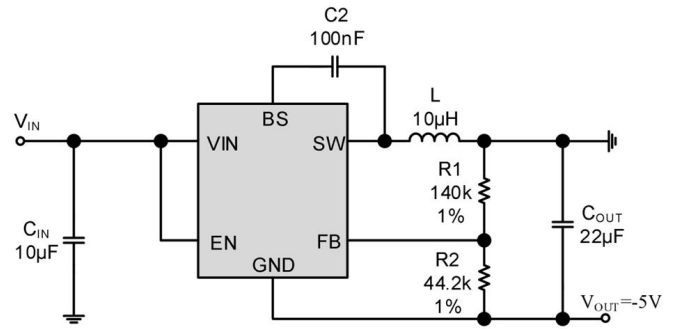


Fig. 5 -5V Output Application Circuit (VIN≤35V)

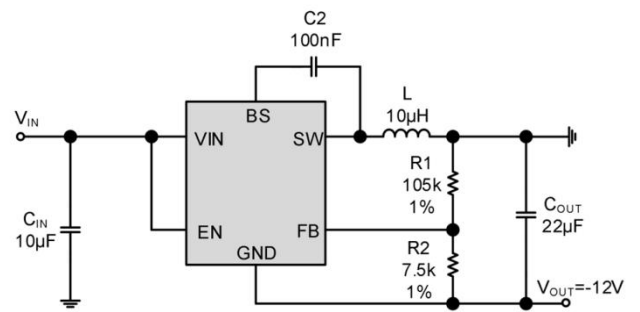


Fig. 6 -12V Output Application Circuit (VIN≤28V)

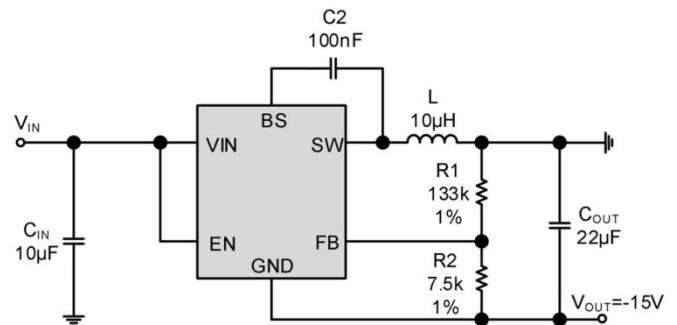


Fig. 7 -15V Output Application Circuit (VIN≤25V)

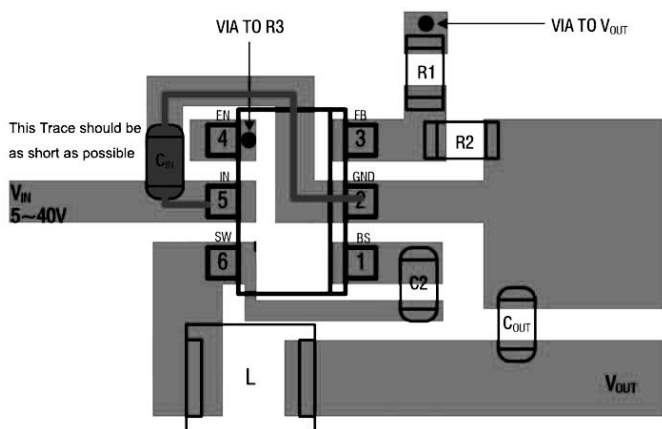
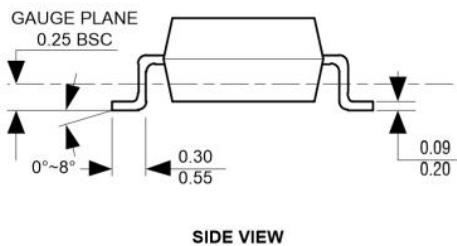
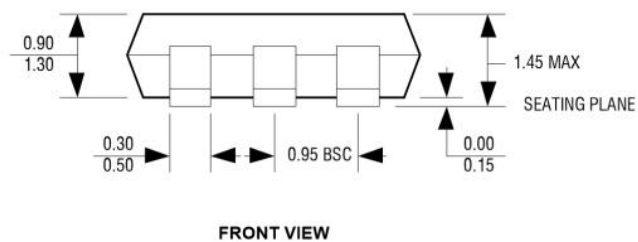
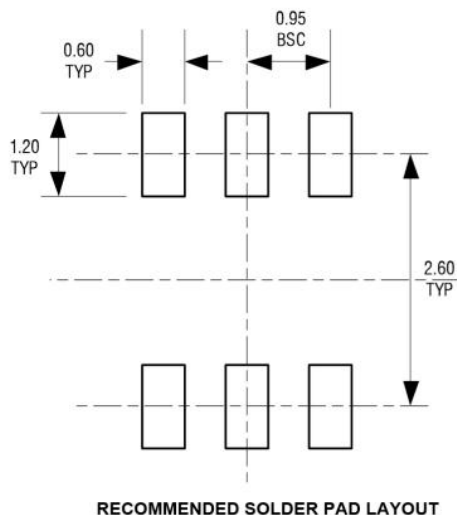
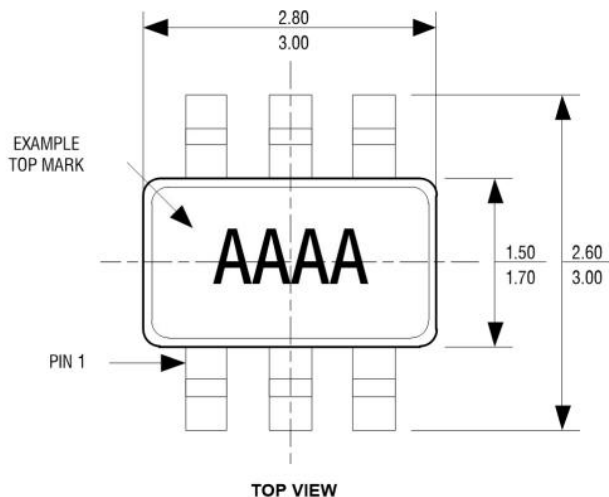


Fig. 4 LAYOUT Recommendation

Package

SOT23-6



Version History

Version	Date	Description
A0	Jul. 2024	Draft
A1	May. 2025	Released
