



钲地半导体
Tudi Semiconductor

Product Specification

TUDI-LM2595

Power Converter 150-kHz 1-A Step-Down Voltage Regulator

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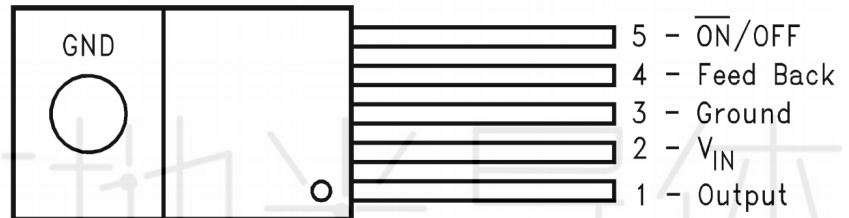
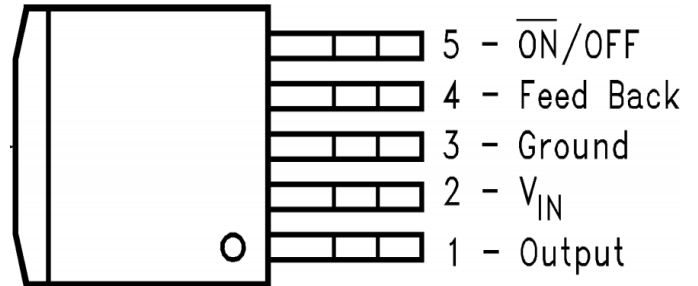
**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- Input voltage range 4.5V to 40V
- The regulated output has 3.3V, 5V, 12V and an adjustable output version, which ranges from 1.23V to 37V
- The duty cycle can be adjusted within the range of 0~100%
- Minimum saturated pressure drop 1.5V
- 150KHz fixed operating frequency
- 3A Fixed current output capability
- ON-OFF Delay Switch Function
- Built-in over-temperature and over-current protection
- Built-in frequency compensation
- High work efficiency, linear adjustment rate, and load adjustment rate



Description

The LM2595 series of regulators are monolithic integrated circuits that provide all the functions needed for a step-down (buck) switching regulator with the ability to drive loads of up to 1A with excellent line and load regulation. These devices offer fixed output voltages of 3.3V, 5V, 12V as well as an adjustable version.

These regulators require minimal external components, are easy to use, and include internal frequency compensation and a fixed frequency oscillator.

LM2595 series operates at a switching frequency of 150 kHz, thus allowing the use of smaller filter components than with lower frequency switching regulators. Standard 5-pin TO-220 package with several different lead bend options, as well as a pin TO-263 surface mount package. Typically, no heatsink is required for voltages less than 12V and for ambient temperatures below 50°C.

Applications

- LCD display, LCD TV
- Digital photo frame
- Set-top box
- modem
- Various telephone and network devices



Pin description

Pin number	Pin name	I/O	Functional description
1	OUTPUT	O	The output pin of a power transistor is a switching node that supplies power to the output load.
2	VIN	I	Power supply input pin.A DC power supply in the range of 4.5V~40V is required during operation.A large
3	GND	-/O	Ground pin.It should be placed on the output point ground path outside the Schottky diode
4	FEEDBACK	I/O	Voltage feedback pin.The voltage feedback terminal monitors and controls the output voltage through
5	ON_OFF	I	Enable the switch pin.The switch pin activates the chip by applying a voltage;a high voltage turns off the chip.It defaults to low when left floating.

Absolute Rating

Parameter	Symbol	Scope	Unit
Input power supply voltage	VIn	~40	V
Voltage feedback terminal voltage	VFB	-0.3~VIN	V
Switching terminal voltage	Von_OFF	-0.3~VIN	V
Power transistor output voltage	VoOUTPUT	-0.3~VIN	V
Power dissipation	PD	Internal restriction	m
Working temperature limit	Tj	-40~125	°C
Storage temperature	TsTG	-65~150	°C
Weld wire temperature,10S	TLEAD	245	°C
ESD capability (human discharge mode)	ESD	2000	V

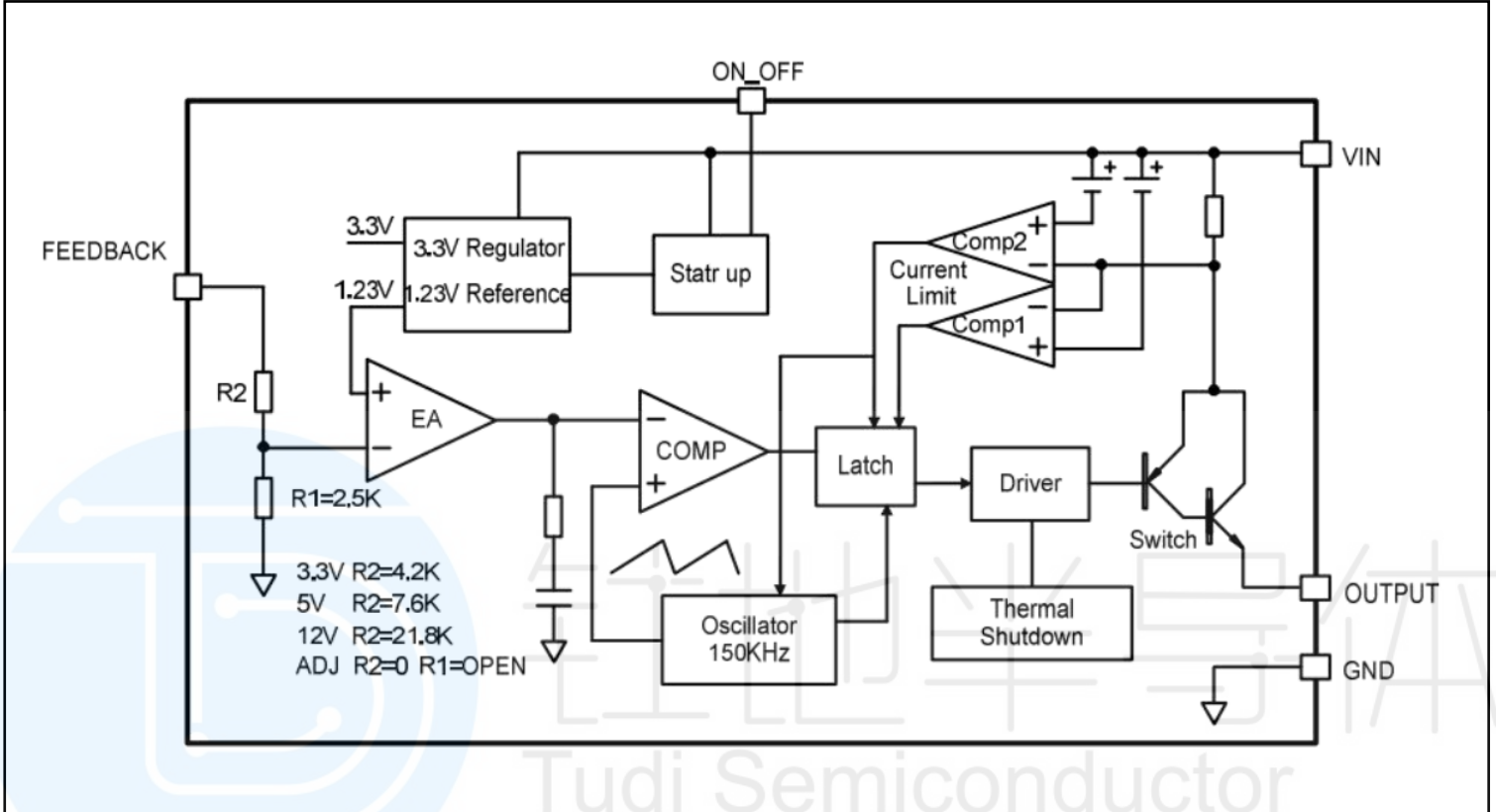
Note 1: If the value applied to the circuit is greater than the maximum limit of the parameter value in the table above, permanent damage may be caused to the chip. Continuous operation of the chip under the limit conditions in the table above for several cycles may affect the reliability of the chip

Recommended Working Conditions

Parameter	Symbol	Scope	Unit
Input voltage	VIN	5~40	V
Working temperature range	TJ	-40~+125	°C



Internal Flowchart



Thermal Performance Information

Symbol	Parameter	TO-220	TO-263	Unit
ReJA	Junction to ambient thermal resistance	32.4	42.6	°C/W
ReJC(top)	Thermal resistance of junction to shell (top)	41.2	43.3	°C/W
ReJB	Thermal resistance of circuit board	17.6	22.4	°C/W
ReJC(bot)	Thermal resistance of junction to shell(bottom)	0.4	0.4	°C/W
ψJT	Topology parameter	7.8	10.7	°C/W
ψJB	Characteristic parameter of circuit board	17	21.3	°C/W



Electrical characteristics

Specifications are for $T_J = 25^\circ\text{C}$ (unless otherwise noted).

Parameter	Model	Symbol	Test condition	Least value	Representative value	Crest value	Unit
Output voltage regulation value	LM2595-3.3	VoUT	VIN=4.75V ~ 40V ILoad=0.2A ~ 3A	3.168	3.3	3.432	V
Productiveness		n	VIN=12V,VoUT=5V ILoad=3A		73		%
Output voltage regulation value	LM2595-5.0	VOUT	VIN=7V ~ 40V ILoad=0.2A ~ 3A	4.8	5	5.2	V
Productiveness		n	VIN=12V,VoUT=5V ILoad=3A		80		%
Output voltage regulation value	LM2595-12	VoUT	VIN=15V ~ 40V ILoad=0.2A ~ 3A	11.52	12	12.48	V
Productiveness		n	VIN=25V,VouT=5V ILoad=3A		90		%
voltage regulator	LM2595-ADJ	VoUT	VIN=4.5V ~ 40V ILoad=0.2A ~ 3A	1.193	1.23	1.267	V
Productiveness		n	VIN=12V,VouT=3V ILoad=3A		73		%

Functional Description

LM2595 is a drop-out regulated DC power converter, whose main function is to convert high voltage DC voltage with large noise and ripple into low voltage DC regulated output with small ripple and noise. LM2595 has four different versions, which are divided into different output voltage values, namely 3.3V, 5V, 12V and adjustable output voltage version. The chip provides over temperature protection function, current limiting protection function and so on.

All Electrical DC Parameters

3.3V, 5V, and ADJ versions ($V_{IN} = 12\text{V}$); 12V version ($V_{IN} = 24\text{V}$). $GND = 0$, with a $220\ \mu\text{F}/50\text{V}$ capacitor connected in parallel between V_{IN} and GND . $I_{OUT} = 500\text{mA}$, $T_a = 25$. Unless otherwise specified.



Parameter	Symbol	Test condition	Least value	Representative value	Crest value	Unit
Input operating voltage	VIn		4.5		40	V
Standby current	ISTBY	Von_OFF=5V		80	200	uA
Static operating current	Io	Von_oFF=0V, VFB=VIn		2	10	mA
Service frequency	Fosc		127	150	173	kHz
Limiting current	IL	VFB=0	3.6	4.8	6.9	A
Switching pin threshold voltage	VoN_OFF	Control gate Low(Control Open)		1.4 0.8		V
Switching pin leakage	IH	VoN_OFF=2.5V(OFF)		5	30	μA
	IL	VoN_OFF=0.5V(ON)		0.2	10	μA
Saturation voltage	VcE	VFB=0V LouT=3A		1.3	1.5	V
Maximum duty cycle	DMAX	CFB=0V		100		%
Thermal resistance coefficient (no heat sink TO220,TO 263 package)	RJA			50		°CW

LM2595 series voltage regulator design program (adjustable output)

Output voltage(V)	Through-hole output electrolysis			Surface mount output capacitor		
	Panasonic HFQ Series(uf/V)	NichiconPL series(uf/V)	Feedforward capacitor	AVX TPS series (uf/V)	Sprague 595D series(uf/V)	Feedforward capacitor
2	820/35	820/35	33nf	330/6.3	470/4	33nf
4	560/35	470/35	10nf	330/6.3	390/6.3	10nf
6	470/25	470/35	3.3nf	220/10	330/10	3.3nf
9	330/25	330/25	1.5nf	100/16	180/16	1.5nf
12	330/25	330/25	1nf	100/16	180/16	1nf
15	220/25	220/35	680pf	68/20	120/20	680pf
24	220/35	150/35	560pf	33/25	33/25	220pf
28	100/50	100/50	390pf	10-35	15/50	220pf



LM2595 series voltage regulator design program (fixed output)

Condition			Inductor(L1)	Output capacitor(COUT)			
				Through-hole electrolysis		Surface mounted tantalum	
Output voltage (V)	Load current (A)	Maximum input voltage (V)	Inductance (uh)	PanasonicHFQ series(uf/V)	NichiconPL series(uf/V)	AVX TPS series(uf/V)	Sprague 595D series(uf/V)
3.3	3	5	22	470/25	560/16	330/6.3	390/6.3
		7	22	560/35	560/35	330/6.3	390/6.3
		10	22	680/35	680/35	330/6.3	390/6.3
		40	33	560/35	470/35	330/6.3	390/6.3
	2	6	22	470/25	470/35	330/6.3	390/6.3
		10	33	330/35	330/35	330/6.3	390/6.3
		40	47	330/35	270/50	220/10	330/10
5	3		22	470/25	560/16	220/10	330/10
		10	22	560/25	560/25	220/10	330/10
		15	33	330/35	330/35	220/10	330/10
		40	47	330/35	270/35	220/10	330/10
	2	9	22	470/25	560/16	220/10	330/10
		20	68	180/35	180/35	100/10	270/10
		40	68	180/35	180/35	100/10	270/10
12	3	15	22	470/25	470/25	100/16	180/16
		18	33	330/25	330/25	100/16	180/16
		30	68	180/25	180/25	100/16	120/20
		40	68	180/35	180/25	100/16	120/20
	2	15	33	330/25	330/25	100/16	180/16
		20	68	180/25	180/25	100/16	120/20
		40	150	82/25	82/25	68/20	68/25

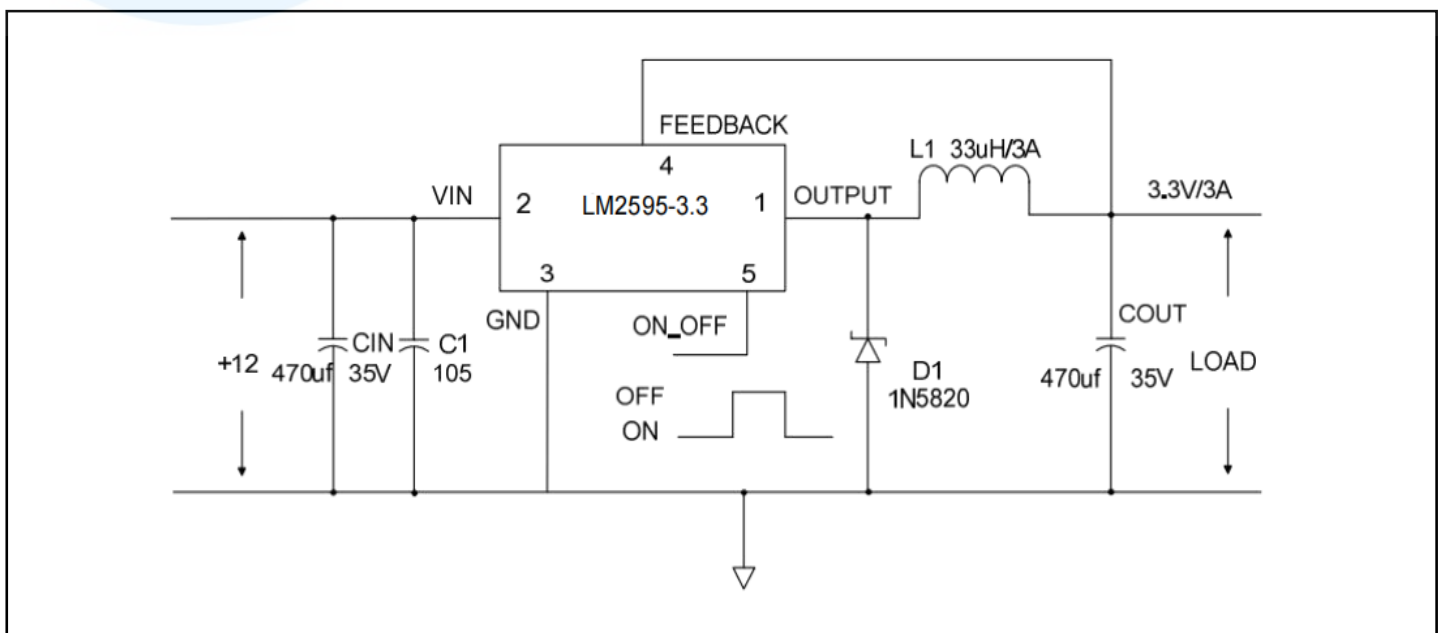


Schottky Diode Selection Table

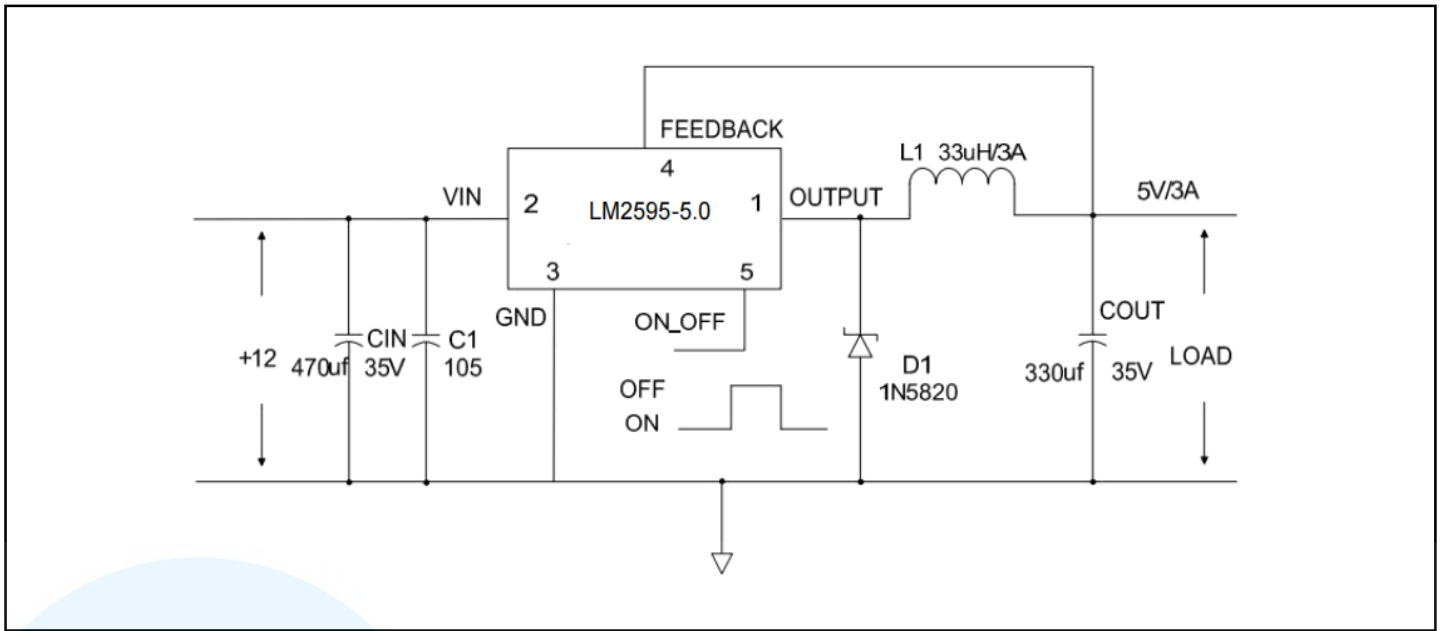
Before one	Surface mounting	Through-hole mounting	VR(same as the maximum input voltage of the system)				
			20V	30V	40V	50V	60V
1A		√	1N5817	1N5818	1N5819		
3A		√	1N5820	1N5821	1N5822		
		√	MBR320	MBR330	MBR340	MBR350	MBR360
	√		SK32	SK33	SK34	SK35	SK36
	√			30WQ03	30WQ04	30WQ05	
			√		31DQ03	31DQ04	31DQ05
			√	SR302	SR303	SR304	SR305
5A		√	1N5823	1N5824	1N5825		
		√	SR502	SR503	SR504	SR505	SR506
		√	SB520	SB530	SB540	SB550	SB560
	√			50WQ03	50WQ04	50WQ05	

Note:The application should ensure that the OUT pin negative voltage is higher than the turn-on voltage of the chip's internal parasitic diode to avoid the output pin negative voltage opening the internal parasitic diode, which would increase the power consumption of the internal pre-drive module. Therefore, it is recommended to use the Schottky diode in the table, which is a type of diode with a voltage of <0.5V.

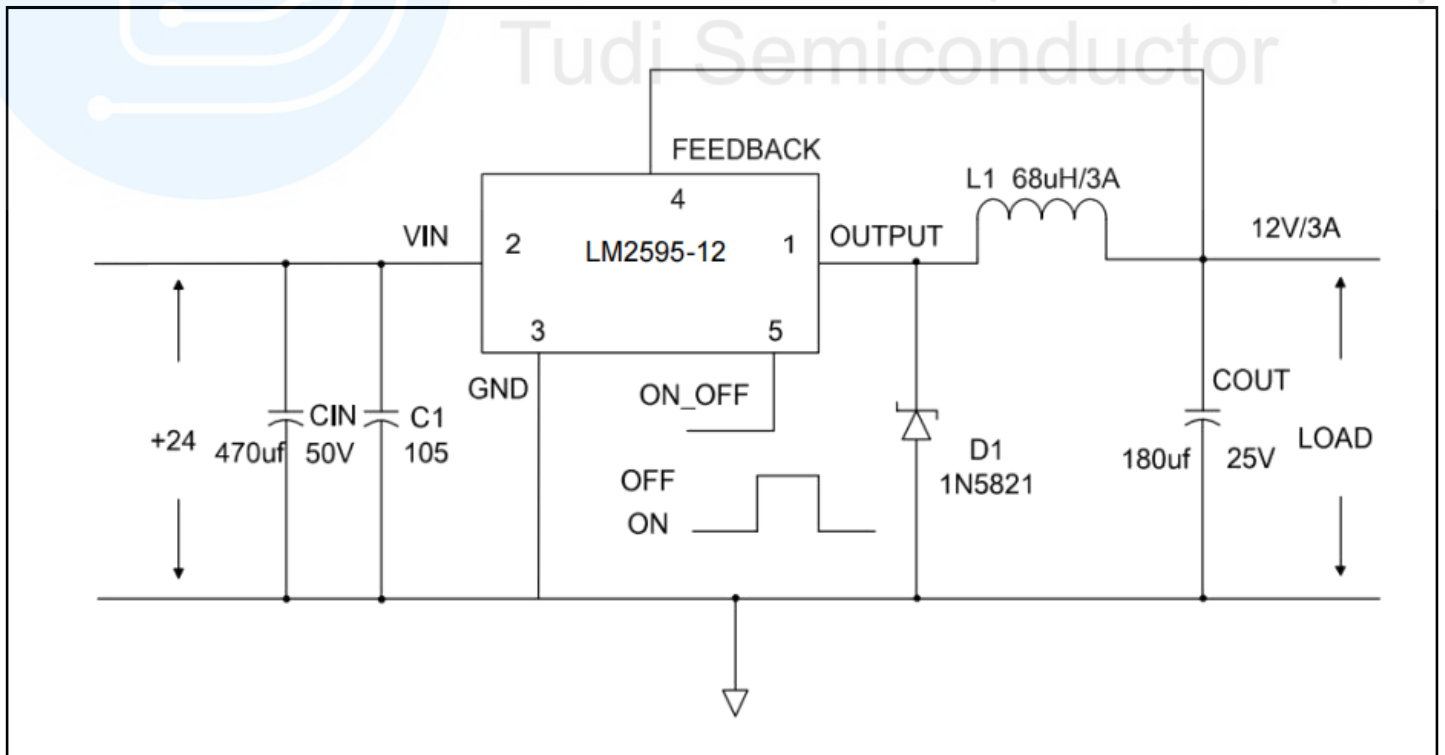
Applicative Circuit Diagram



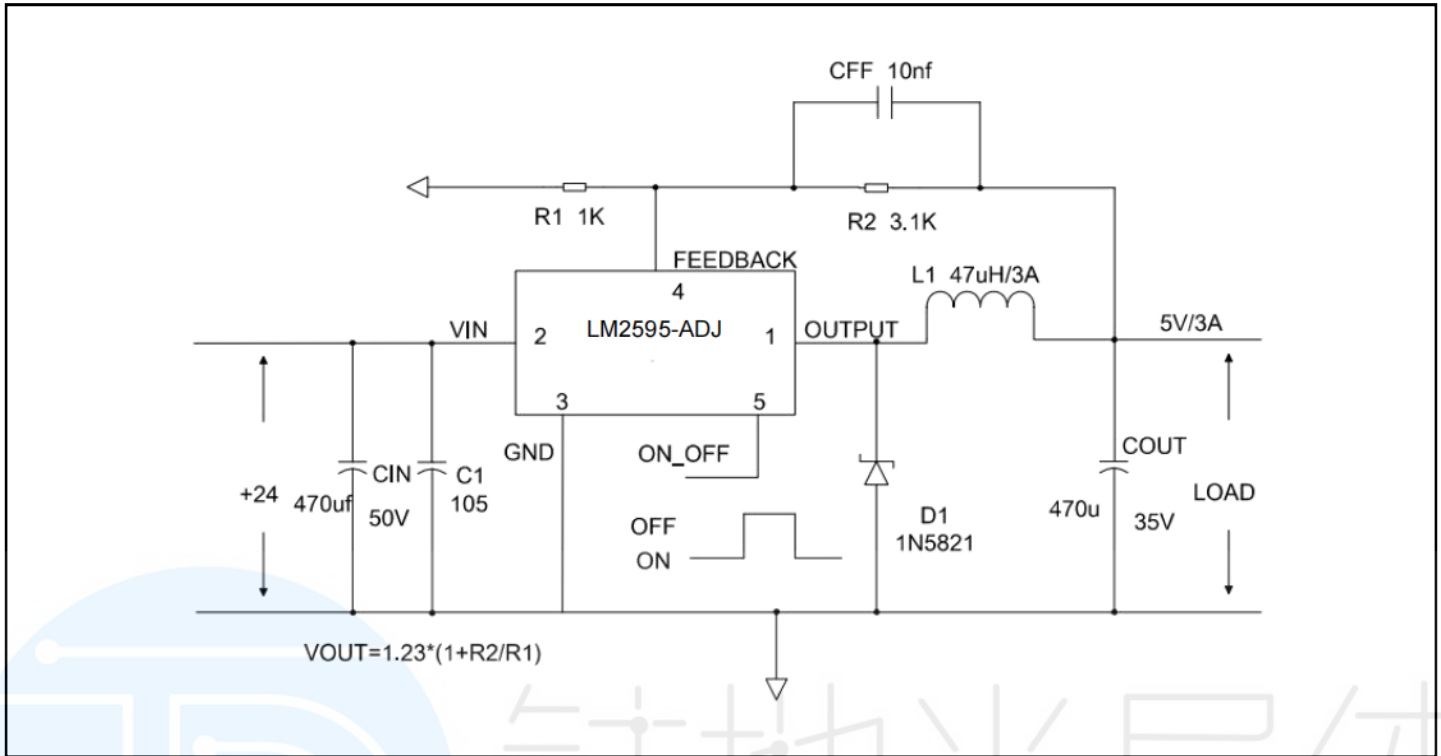
3.3V output voltage regulation version



5.0V output voltage regulation version



12V output voltage regulation version



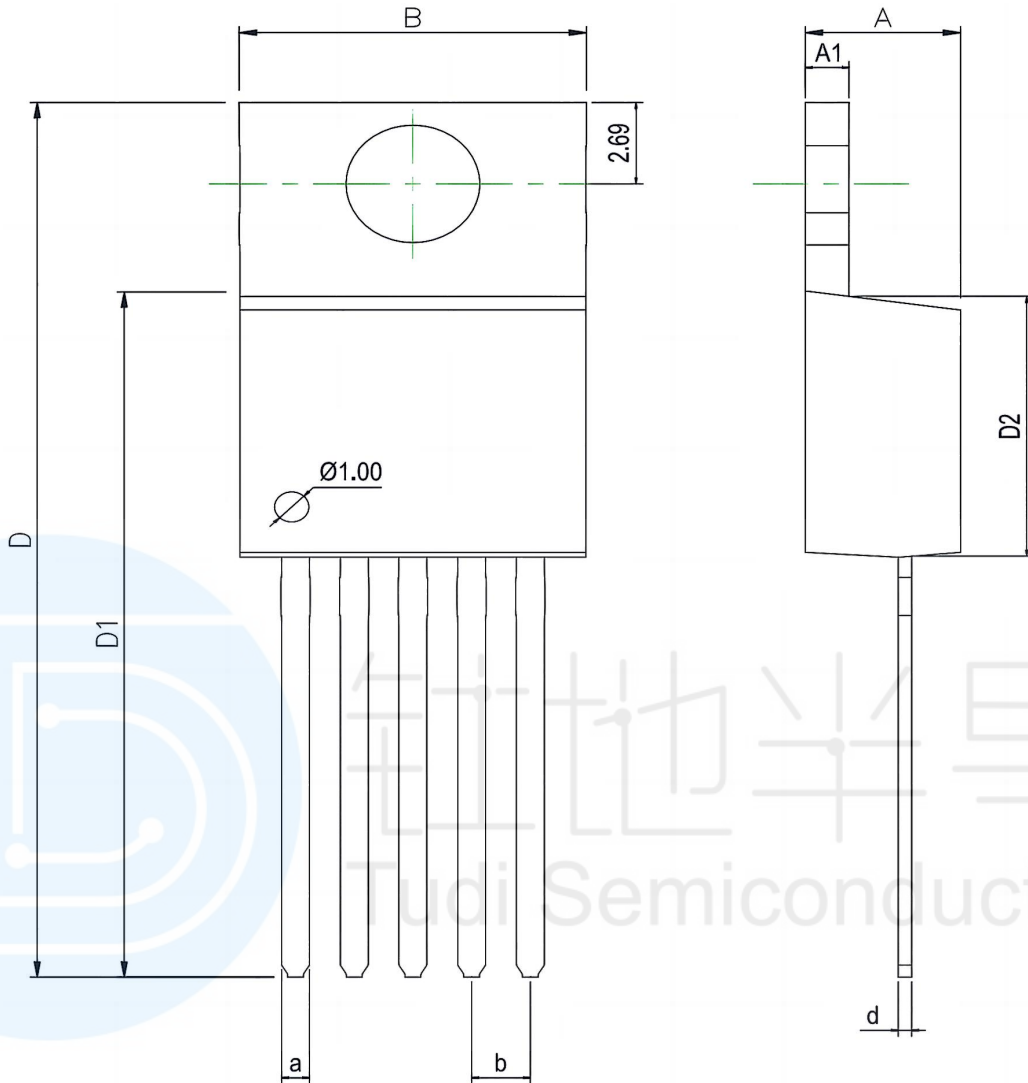
Export adjustable version

Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
LM2595SX-3.3/NOPB-TUDI	TO263-5	Tape,Reel,500	LM2595S-3.3	-40°C to 125°C
LM2595T-3.3-TUDI	TO220-5	Tube,50,A box of 2000	LM2595T-3.3	
LM2595SX-5.0/NOPB-TUDI	TO263-5	Tape,Reel,500	LM2595S-5.0	
LM2595T-5.0-TUDI	TO220-5	Tube,50,A box of 2000	LM2595T-5.0	
LM2595SX-12/NOPB-TUDI	TO263-5	Tape,Reel,500	LM2595S-12	
LM2595T-12-TUDI	TO220-5	Tube,50,A box of 2000	LM2595T-12	
LM2595SX-ADJ/NOPB-TUDI	TO263-5	Tape,Reel,500	LM2595S-ADJ	
LM2595T-ADJ-TUDI	TO220-5	Tube,50,A box of 2000	LM2595T-ADJ	



Package TO220-5

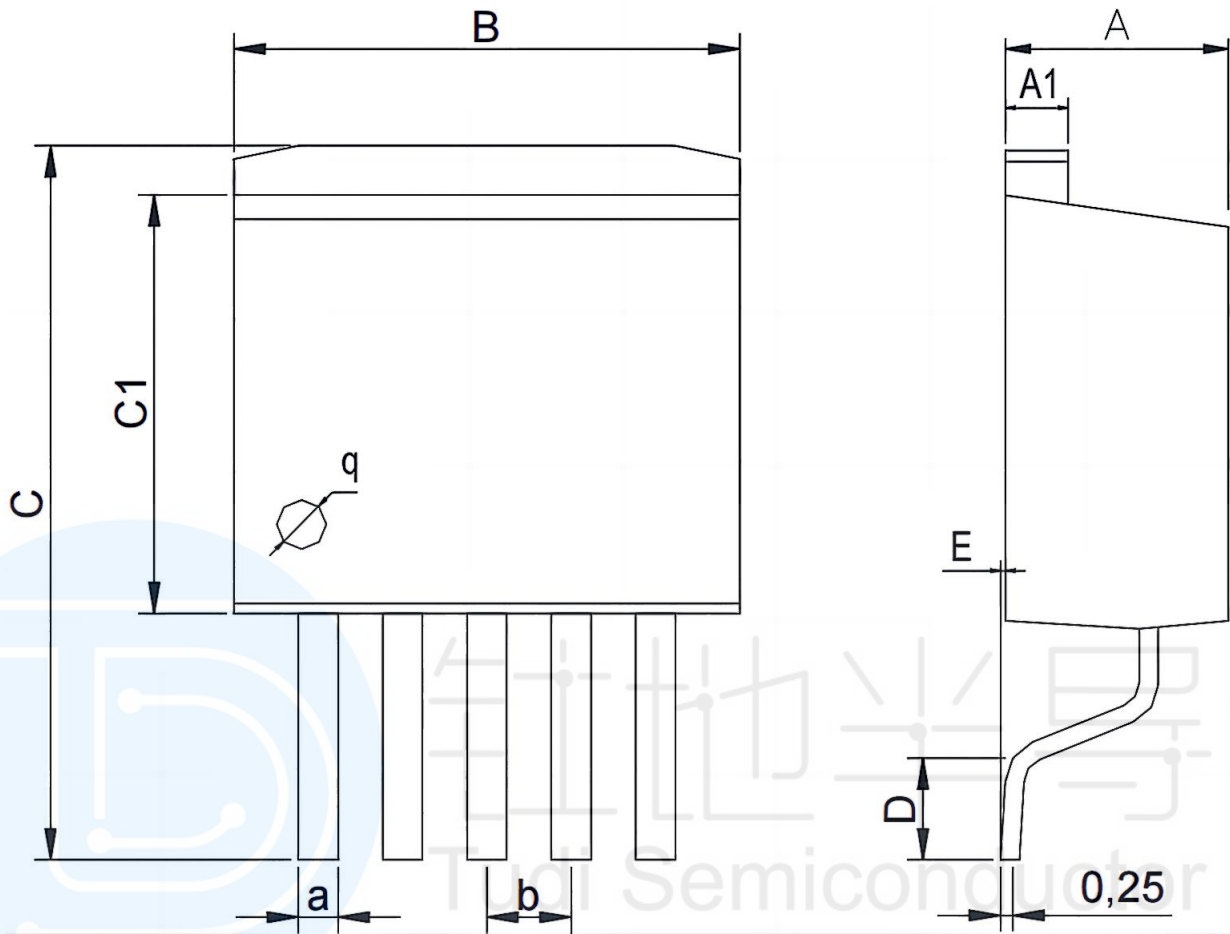


Dimensions In Millimeters(TO-220-5)

Symbol:	A	A1	B	D	D1	D2	a	d	b
Min:	4.52	1.25	10	28.2	22.4	8.69	0.71	0.33	1.70BSC
Max:	4.62	1.29	10.3	28.9	22.6	8.79	0.97	0.42	



Package TO263-5



Dimensions In Millimeters(TO-263-5)

Symbol:	A	A1	B	C	C1	D	E	a	b
Min:	4.45	1.22	10	13.7	8.40	1.90	0	0.71	1.70BSC
Max:	4.62	1.32	10.4	14.6	8.90	2.10	0.20	0.97	



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