

Switching Voltage Regulators

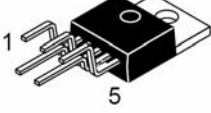
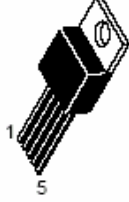
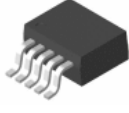
IL2596-xx

Features

- 3.3V, 5V, 12V, and adjustable output versions
- Adjustable version output voltage range, 1.2V to 37V
± 3% max over line and load conditions
- Guaranteed 3A output load current
- Input voltage range up to 40V
- Requires only 4 external components
- Excellent line and load regulation specifications
- 150kHz fixed frequency internal oscillator
- TTL shutdown capability
- Low power standby mode,
I_Q typically 100µA
- Thermal shutdown and current limit protection

Functions

- Simple high-efficiency step-down regulator
- On-card switching regulators
- Positive to negative converter

	TO-220-5L
	TO-220-5L
	TO-263-5L

ORDERING INFORMATION

IL2596Q	TO-220-5L
IL2596S	TO-220-5L
IL2596D2	TO-263-5L

T_A = -40° to 125° C for all packages

Description

The IL2596 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down switching regulator, capable of driving a 3A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3V, 15V, 12V and an adjustable output version.

Requiring a minimum number of external components, these regulators are simple to use.

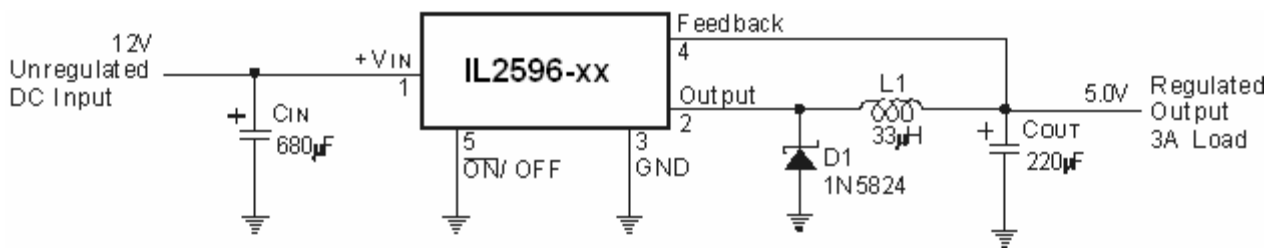
The IL2596 series operates at a switching frequency of 150kHz. Available in standard 5-lead TO-220 package.

Other features include a guaranteed ± 3% tolerance on output voltage under specified input voltage and output load conditions, and ± 15% on the oscillator frequency. External shutdown is included, featuring typically 100µA standby current. Self protection features include a two stage frequency reducing current limit for output switch and an over temperature shutdown for complete protection under fault conditions. The over temperature shutdown level is about 145°C with 5°C hysteresis.

Absolute Maximum Rating
($T_A = 25^\circ\text{C}$)

Characteristic	Symbol	Value	Unit
Maximum Input Supply Voltage	V_I	45	V
ON/OFF Pin Input Voltage	V_{IN}	$-0.3 \leq V \leq +25$	V
Feedback Pin Voltage		$-0.3 \leq V \leq +25$	V
Output Voltage to Ground	V_O	-1	V
Power Dissipation	P_D	Internally limited	W
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$
Operating Temperature Range	T_J	$40 \leq T_J \leq +125$	$^\circ\text{C}$
Operating Supply Voltage	V_{IN}	4.5 to 40	V

Typical Application (Fixed Output Voltage Versions)



Electrical Characteristics

Unless otherwise specified, $T_J = 25\text{ }^\circ\text{C}$ $V_{IN} = 12\text{V}$ for the 3.3V, 5V, and Adjustable version and $V_{IN} = 24\text{V}$ for the 12V version. $I_{LOAD} = 500\text{mA}$.

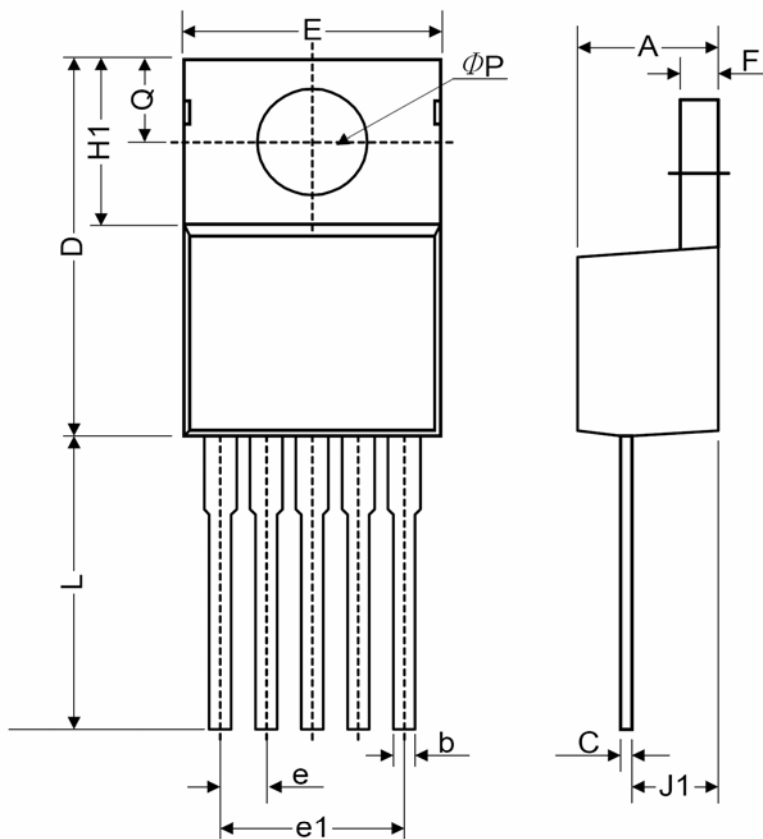
Characteristic	Symbol	Test Condition		Min	Typ	Max	Unit
Output Voltage	V_{OUT}	IL2596-3	$4.75\text{V} \leq V_{IN} \leq 40\text{V}$, $0.2\text{A} \leq I_{LOAD} \leq 3\text{A}$	3.20	3.3	3.40	V
		IL2596-5	$7\text{V} \leq V_{IN} \leq 40\text{V}$, $0.2\text{A} \leq I_{LOAD} \leq 3\text{A}$	4.85	5.0	5.15	
		IL2596-12	$15\text{V} \leq V_{IN} \leq 40\text{V}$, $0.2\text{A} \leq I_{LOAD} \leq 3\text{A}$	11.65	12.0	12.36	
Efficiency	η	IL2596-3	$I_{LOAD} = 3\text{A}$		73		%
		IL2596-5	$I_{LOAD} = 3\text{A}$		80		
		IL2596-12	$V_{IN} = 25\text{V}$, $I_{LOAD} = 3\text{A}$		90		
		IL2596-A	$V_{OUT} = 3\text{V}$, $I_{LOAD} = 3\text{A}$		73		%
Feedback Voltage	V_{FB}	IL2596-A	$4.5\text{V} \leq V_{IN} \leq 40\text{V}$, $0.2\text{A} \leq I_{LOAD} \leq 3\text{A}$ V_{OUT} programmed for 3V	1.210	1.230	1.250	V
Feedback Bias Current	I_D	IL2596-A; $V_{FB} = 1.3\text{V}$			15	50	nA
Oscillator Frequency	f_o			110	150	173	kHz
Saturation Voltage	V_{SAT}	$I_{OUT} = 3\text{A}$ (Note 1,2)			1.16	1.4	V
Max Duty Cycle (ON) Max Duty Cycle (OFF)	DC	(Note 2)			100		%
		(Note 3)			0		
Current Limit	I_{CL}	Peak Current (Note 1,2)		3.4	4.5	6.0	A
Output Leakage Current	I_L	Output = 0V (Note 1,3)				50	μA
		Output = -1V, $V_{IN} = 40\text{V}$			2	30	mA
Quiescent Current	I_Q	(Note 3)			5	10	mA
Standby Quiescent Current	I_{STBY}	ON/OFF pin = 5V (OFF), $V_{IN} = 40\text{V}$			100	200	μA
ON/OFF Pin Logic Input Threshold Voltage	V_{IH}	Low (Regulator ON)		2.0	1.3	0.6	V
	V_{IL}	High (Regulator OFF)					
ON/OFF Pin Input Current	I_H	$V_{LOGIC} = 2.5\text{V}$ (regulator OFF)			5	15	μA
	I_L	$V_{LOGIC} = 0.5\text{V}$ (regulator ON)			0.02	5	

Note 1: No elements connected to output pin.

Note 2: Feedback pin removed from output and connected to 0V to force the output transistor switch ON.

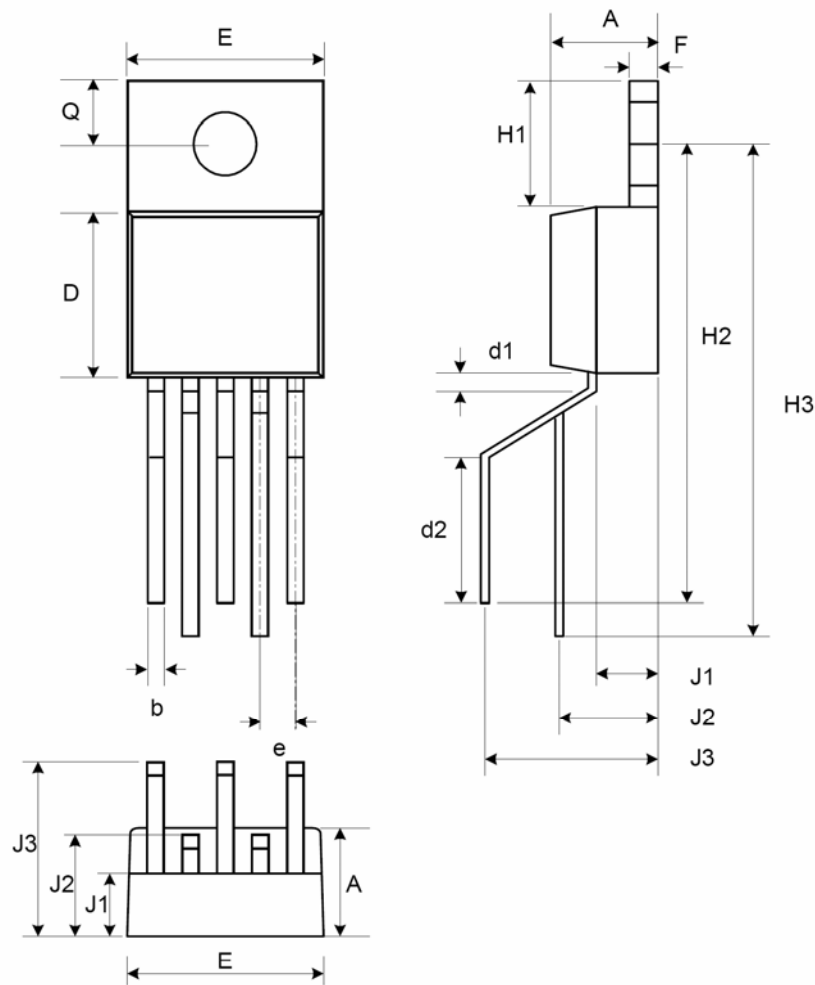
Note 3: Feedback pin removed from output and connected to 12V for the 3.3V, 5V, and the A version, and 15V for the 12V version. To force the output transistor switch OFF.

TO-220-5L



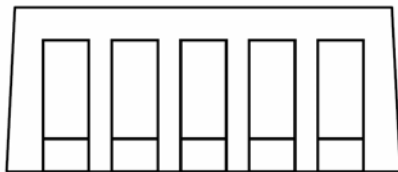
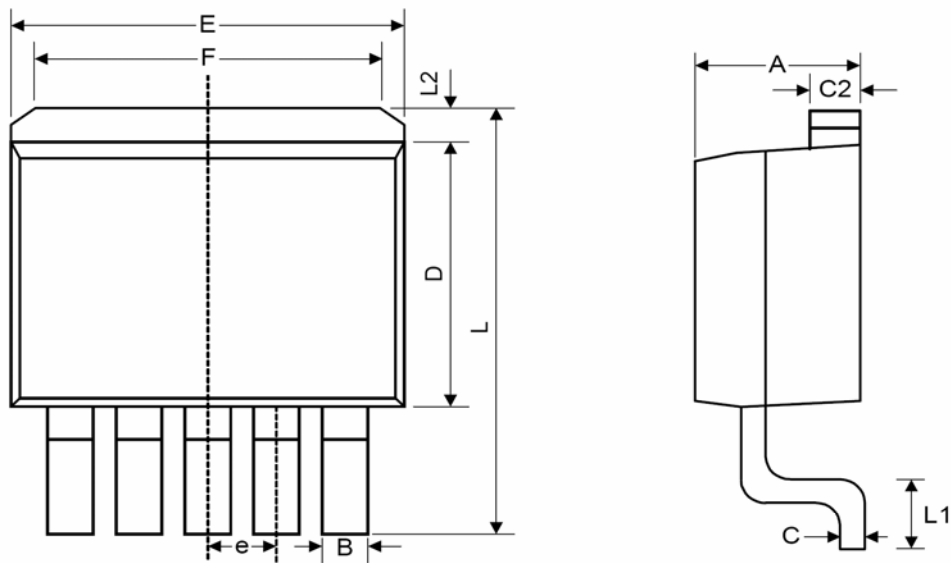
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.07	4.45	4.82	0.160	0.175	0.190
b	0.76	0.89	1.02	0.030	0.035	0.040
C	0.36	0.50	0.64	0.014	0.020	0.025
D	14.22	14.86	15.50	0.560	0.585	0.610
E	9.78	10.16	10.54	0.385	0.400	0.415
e	1.57	1.71	1.85	0.062	0.067	0.073
e1	6.68	6.81	6.93	0.263	0.268	0.273
F	1.14	1.27	1.40	0.045	0.050	0.055
H1	5.46	6.16	6.86	0.215	0.243	0.270
J1	2.29	2.74	3.18	0.090	0.108	0.125
L	13.21	13.97	14.73	0.520	0.550	0.580
ϕp	3.68	3.81	3.94	0.145	0.150	0.155
Q	2.54	2.73	2.92	0.100	0.107	0.115

TO-220-5L (Bent Staggered)



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.4	4.6	4.7	0.175	0.180	0.185
b	0.7	0.8	0.9	0.027	0.032	0.037
D	8.4	8.7	8.9	0.330	0.340	0.350
d1	1.0			0.039		
d2	6.3			0.248		
E	9.91	10.16	10.41	0.390	0.400	0.410
e	1.6	1.7	1.8	0.062	0.067	0.072
F	1.2	1.25	1.3	0.048	0.050	0.052
H1	6.4			0.250		
H2	20.8	21.6	22.4	0.820	0.850	0.880
H3	23.9	24.7	25.5	0.942	0.972	1.002
J1	2.7			0.105		
J2	3.7	4.5	5.3	0.147	0.177	0.207
J3	8.4			0.331		
Q	2.5	2.8	3.0	0.100	0.110	0.120

TO-263-5L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.07	4.46	4.85	0.160	0.176	0.191
B	0.66	0.84	1.02	0.026	0.033	0.040
C	0.36	0.50	0.64	0.014	0.020	0.025
C2	1.14	1.27	1.40	0.045	0.050	0.055
D	8.65	9.15	9.65	0.341	0.360	0.380
E	9.78	10.16	10.54	0.385	0.400	0.415
e	1.57	1.71	1.85	0.062	0.068	0.073
F	6.60	6.86	7.11	0.260	0.270	0.280
L	14.61	15.24	15.88	0.575	0.600	0.625
L1	2.29	2.54	2.79	0.090	0.100	0.110
L2	-	-	2.92	-	-	0.115