■ Features

- Output voltage: 3.3V, 5V, 12V, 15V and adjustable output versions
- Adjustable version output voltage range:1.23V to 30V±4% max over line and load conditions
- Guaranteed 3A output current
- Input voltage up to 36V
- Requires only 4 external components
- 52KHz fixed frequency internal oscillator
- TTL shutdown capability, low power standby mode
- High efficiency
- Thermal shutdown and current limit protection

■ Applications

- Simple High-efficiency step-down regulator
- Efficient pre-regulator for linear regulators
- Positive to negative converter(Buck-Boost)

■ General Description

The OCP2576 series of regulators are monolithic IC that provide all the active function for a step-down (buck) switching regulator, capable of driving 3A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3V, 5V, 12V, 15V and an adjustable output version.

Requiring a minimum number of external components, these regulators are simple to use and include internal frequency compensation and a fixed frequency oscillator.

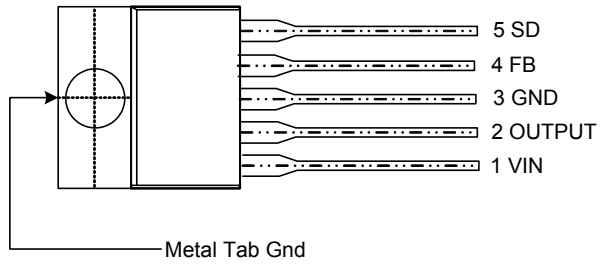
A standard series of inductors optimized for use with the OCP2576 are available from several different manufacturers. This feature greatly simplifiers the design of switch-mode power supplies.

Others features include a guaranteed ±4% tolerance on output within specified input voltages and output load conditions, and ±10% on the oscillator frequency. External shutdown in included, featuring 50μA (typical) standby current. The output switch includes cycle-by-cycle current limiting, as well as thermal shutdown for full protection under fault conditions.

■ Pin Configuration

(1) TO220-5L

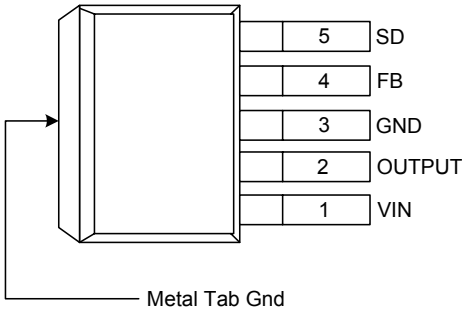
(Top View)



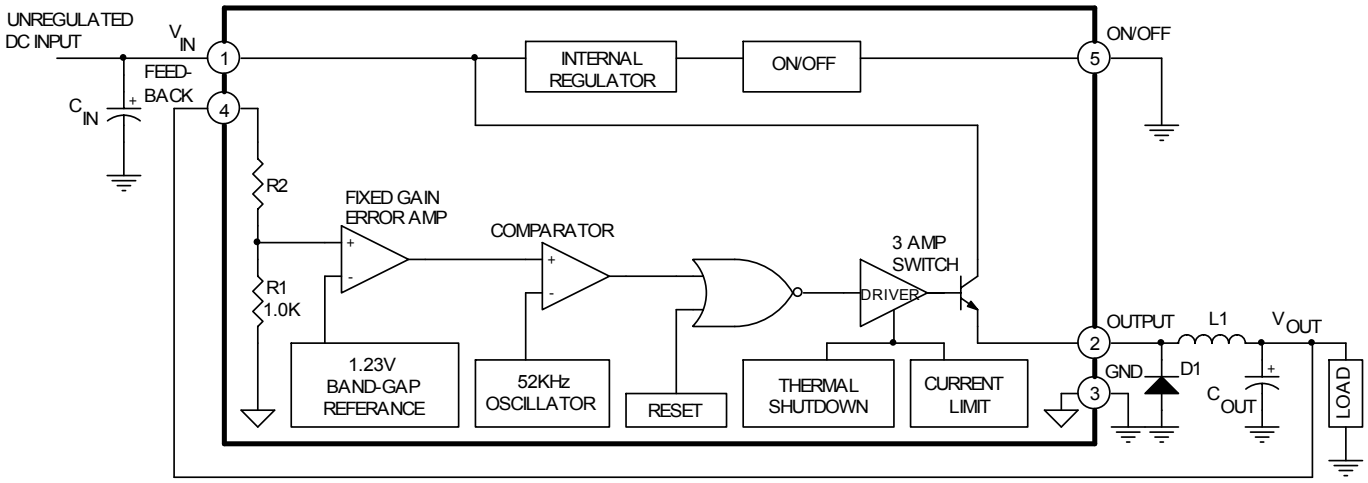
Symbol	Name	Descriptions
1	Vin	Operating Voltage Input
2	Output	Switching Output
3	Gnd	Ground
4	FB	Output Voltage Feedback Control
5	SD	ON/OFF Shutdown

(2) TO263-5L

(Top View)



■ Block Diagram



3.3V: R2=1.7K 5V: R2=3.1K 12V: R2=8.4K
15V: R2=11.3K For Adjustable R2=0K；R1=open

■ Pin Functions

V_{IN}
This is the positive input supply for the IC switching regulator. A suitable input bypass capacitor must be present at this pin to minimize voltage transients and to supply the switching currents needed by the regulator.

Ground
Circuit ground.

Output
Internal switch, the voltage at this pin switches between ($V_{IN} - V_{SAT}$) and approximately – 0.5V.To minimize coupling to sensitive circuitry, the PC board copper area connected to this pin should be kept to a minimum.

Feedback
Senses the regulated output voltage to complete the feedback loop.

ON/OFF
Allows the switching regulator circuit to be shut down using logic level signals. Pulling this pin below a threshold voltage of approximately 1.5V turns the regulator on, and pulling this pin above 1.51V (up to a maximum of 25V) shuts the regulator down. If this shutdown feature is not needed, the ON/OFF pin can be wired to the ground pin or it can be left open, in either case the regulator will be in the ON condition.

■ Absolute Maximum Ratings (Note1)

Parameter		Rating	Unit
Maximum Supply Voltage		45	V
ON/OFF Pin Input Voltage		-0.3~+V_{IN}	V
Output Voltage to Ground Steady State		-1	V
Power Disipation		Internally limited	
Storage Temperature Range		-65~150	℃
ESD Susceptibility (Human Body Model)		2	KV
Conditions	Maximum Junction Temperature	150	℃
	Temperature Range	-40~125	℃
	Supply Voltage	4.5~40	V

■ Electrical Characteristics (All Output Voltaeg Versions)

Unless otherwise specified, V_{IN}=12V for the 3.3V, 5V, and adjustable version , V_{IN}=25V for the 12V version, and V_{IN}=30V for the 15V version, I_{LOAD}=0.5A

Symbol	Paramrter	Conditions	Min. (Note2)	Typ.	Max. (Note2)	Unit
I_b	Feedback bias current	V_{OUT}=5V (Adjustable version only)		50	100	nA
f_O	Oscillator frequency	(Note 11)	47	52	58	KHz
V_{SAT}	Saturation voltage	I_{OUT}=3A (Note 4)		1.5	2.0	V
DC	Max.Duty Cycle(ON)	(Note 5)	93	98		%
I_{CL}	Current limit	(Notes 4,11)	5.5	6.12	6.7	A
I_L	Output leakage current	Output=0V (Notes 6,7)			2.0	mA
		Output=-1V (Note 10)		7.5	3.0	mA
I_Q	Quiescent Current	(Note 6)		6	12	mA
I_{STBY}	Standby Quiesient Current	ON/OFF Pin=5V (OFF)		200	300	μA
V_{IL}	ON/OFF pin logic input level	VOUT=Nominal Output Voltage		1.36	1.43	V
V_{IH}		V_{OUT}=0V	1.38	1.50		
I_H	ON/OFF pin input current	ON/OFF Pin=5V (OFF)		12	30	μA
I_L		ON/OFF Pin=0V (ON)		0	10	
θ_{JA}	Thermal Resistence	T Pakage, Junction to Ambient (Note8)		65		℃/W
θ_{JA}		T Pakage, Junction to Ambient (Note9)		45		℃/W
θ_{JC}		T Pakage, Junction to Case		2		℃/W
θ_{JA}		K Pakage, Junction to Ambient (Note10)		50		℃/W

■ Electrical Characteristics (Continued)

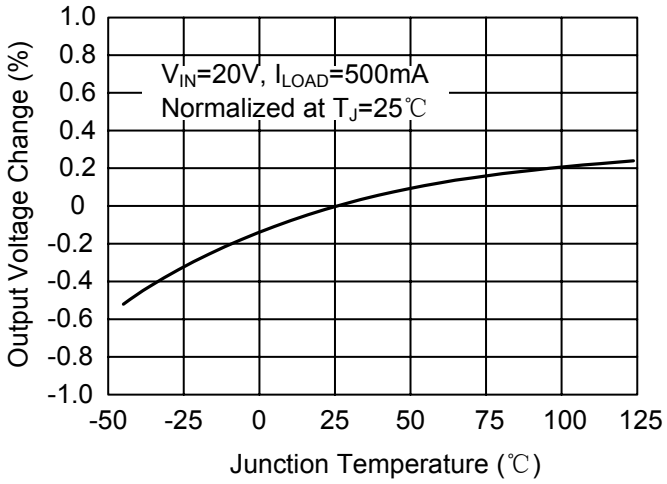
Specifications with standard type face are for T_J=25℃, System Parameters (Note 3)

	Symbol	Parameter	Conditions	Min. (Note 2)	Typ.	Max. (Note 2)	Unit
OCP2576-ADJ	V_{FB}	Feedback Voltage	8V≤V_{IN}≤36V 0.5A≤I_{LOAD}≤3A V_{OUT}=5V	1.193	1.230	1.267	V
	η	Efficiency	V_{IN} =12V, I_{LOAD} =3A ,V_{OUT}=5V		77		%
OCP2576-3.3V	V_{OUT}	Output voltage	6V≤V_{IN}≤36V 0.5A≤I_{LOAD}≤3A	3.168	3.3	3.432	V
	η	Efficiency	V_{IN} =12V, I_{LOAD} =3A		75		%
OCP2576-5V	V_{OUT}	Output voltage	8V≤V_{IN}≤36V 0.5A≤I_{LOAD}≤3A	4.800	5.0	5.20	V
	η	Efficiency	V_{IN} =12V, I_{LOAD} =3A		77		%
OCP2576-12V	V_{OUT}	Output voltage	15V≤V_{IN}≤36V 0.5A≤I_{LOAD}≤3A	11.520	12	12.480	V
	η	Efficiency	V_{IN} =15V, I_{LOAD} =3A		88		%
OCP2576-15V	V_{OUT}	Output voltage	18V≤V_{IN}≤36V 0.5A≤I_{LOAD}≤3A	14.400	15	15.600	V
	η	Efficiency	V_{IN} =18V, I_{LOAD} =3A		88		%

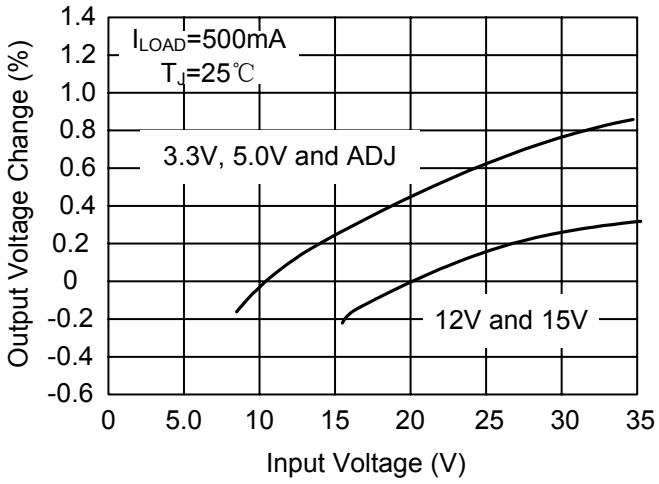
Note 1: Absolute Maximum Ratings indicates limits beyound which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not guaranteed. For guarabted spcifications and the best conditions, see the Electrical Characteristics.
Note 2: All limits guaranteed at room temperature (standard type face) and at temperature extremes (bold type face). All room temperature limits at 100% production tested. All limits at temperature extremes are guaeanteed via correlating using standard Statistical Quality Control (SQC) methods.
Note 3: External components such as the catch diode, inductor, input and output capacitors, and voltage programing resistors can affect switching regulator system performance.
Note 4: Output pin sourcing current. No diode, inductor or capacitor connected to output pin.
Note 5: Feedback pin removed from output and connected to 0 V.
Note 6: Feedback pin removed from output and connected to +12V for the 3.3V, 5V, and the ADJ. version, and +25V for the 12V and 15V version, to force the output transistir switch OFF.
Note 7: V_{IN}=36V.
Note 8: Junction to ambient theraml resistance (no external heat sink) for the 5 lead TO220 package mounted verticallly, with 1/2 inch leads in a socket, or on a PC board with minimum cooper area.
Note 9: Junction to ambient thermal resistance (no extermal heat sink) for the 5 lead TO200 pckage mounted vertically, with 1/4 inch leads soldered to a PC board contaning approximately 4 square inches of copper area surrounding the leads.
Note 10: If the TO263-5L package is used, the thermal resistance can be reduced by increasing the PC board copper area hermally to the package. Using 0.5 square inches of copper area θ_{JA}=50℃/W, with 1 square inch of copper area, θ_{JA}=37℃/W, and with 1.6 or more square inches of cooper area θ_{JA}=32℃/W.
Note 11: The oscillator frequency reduces to approximately 11KHz in the event of an output short or an overload which causes the regulated output voltage to drop approximately 40% from the nominal output voltage. The self-protection feature lowers the average power dissipation of the minimum duty cycle from 5% to approximately 2%.

■ Typical Performance Characteristics

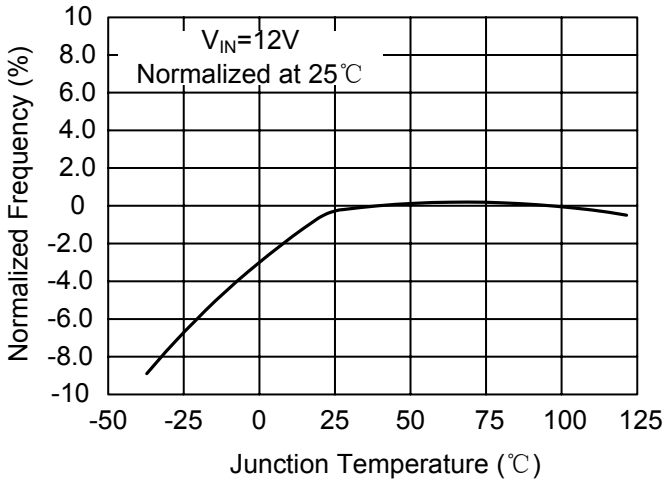
Normalized Output Voltage



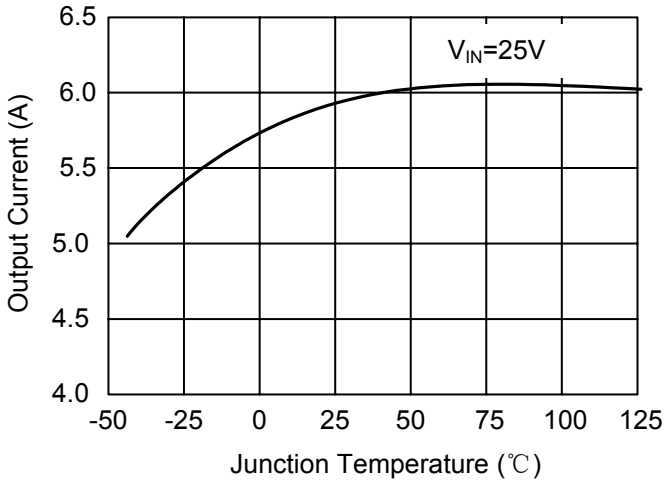
Line Regulation



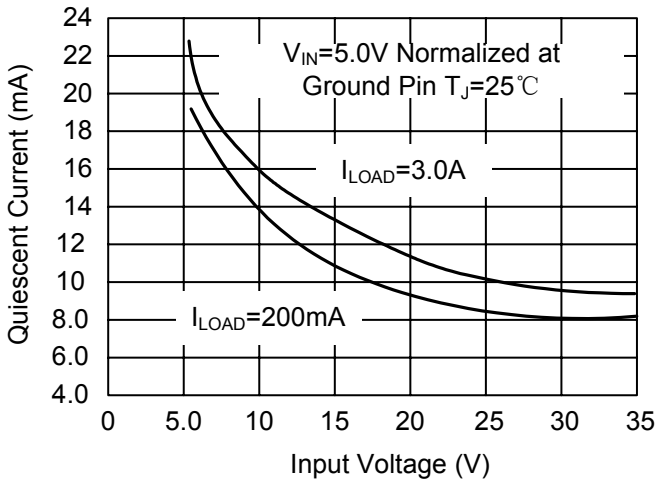
Oscillator Frequency



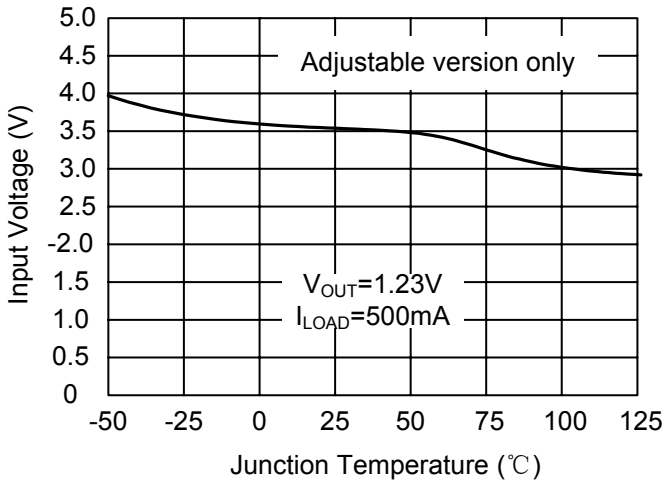
Current Limit



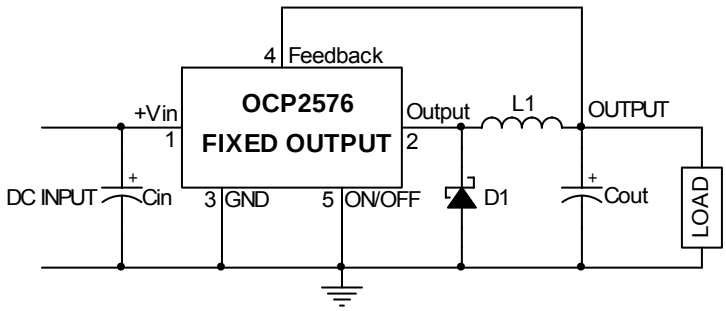
Quiescent Current



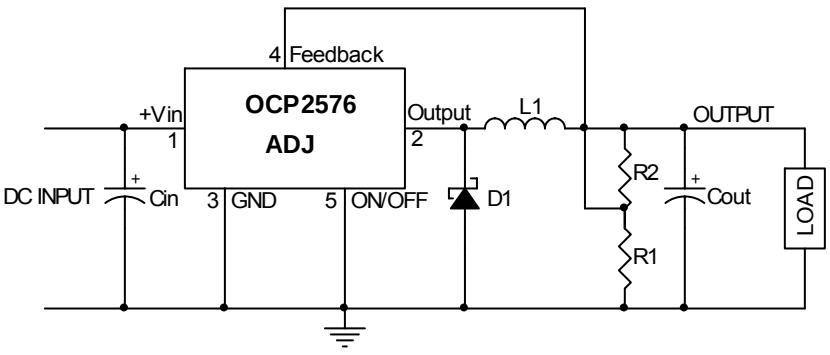
Minimum Operating Voltaeg



■ Typical Application Circuits



Fixed Output Voltage Versions



Adjustable Output Voltage Versions

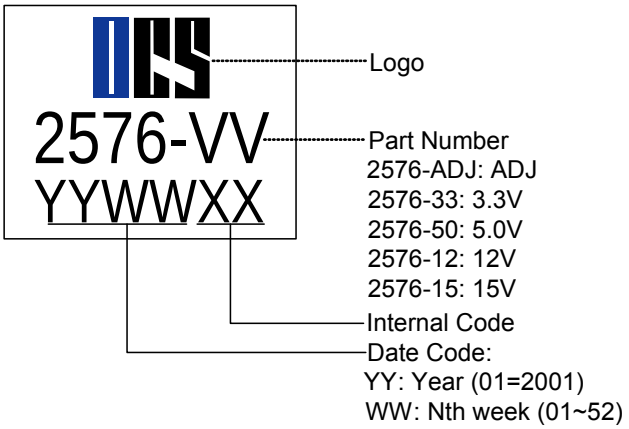
■ Ordering Information

OCP2576XXXX

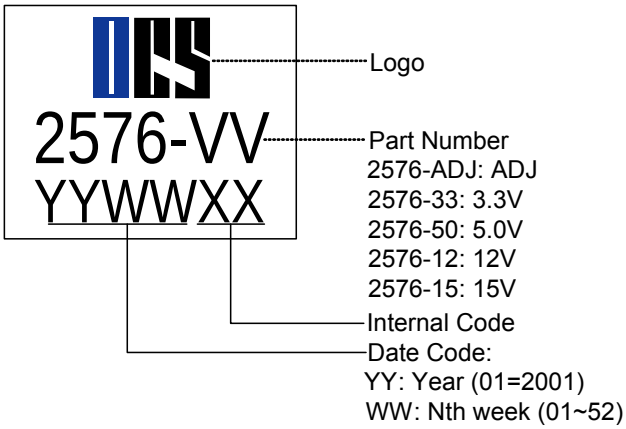
Package:	Output Voltage:	Packing:	Temperature Grade:
T: TO220-5L	Blank: ADJ	Blank: Tube or Bluk	E: -40~125℃
K: TO263-5L	33: 3.3V	A: Tape & Reel	
	50: 5.0V		
	12: 12V		
	15: 15V		

■ Marking Information

1) TO220-5L

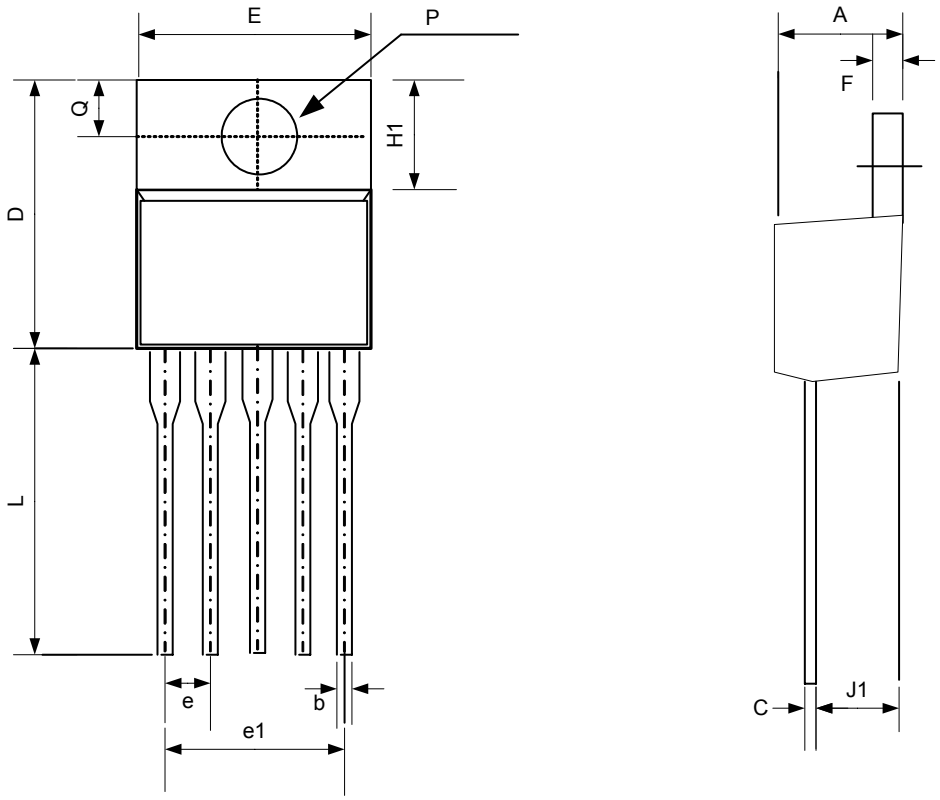


2) TO263-5L



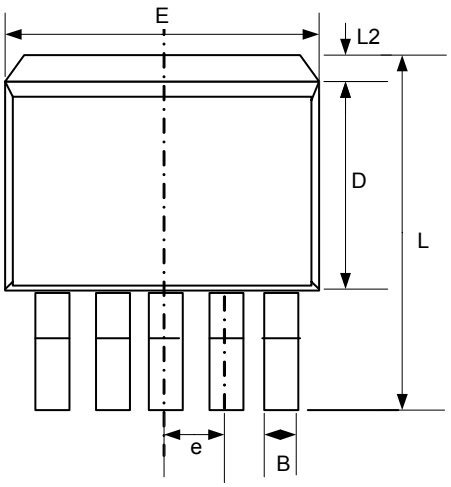
■ Package Information

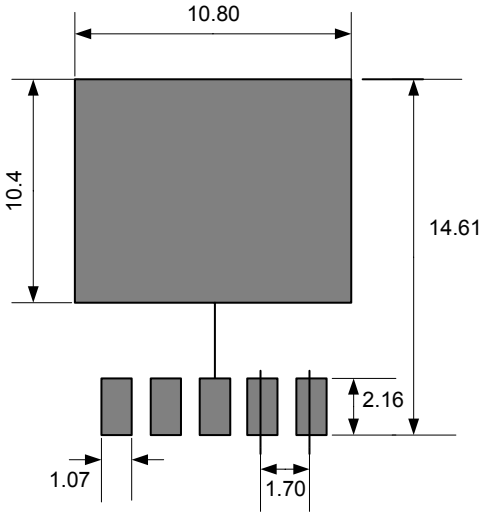
1) TO220-5L



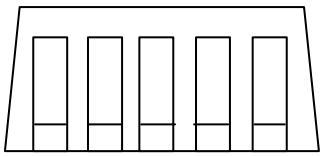
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.07	4.45	4.82	0.160	0.175	0.190
b	0.76	0.89	1.02	0.030	0.035	0.040
C	0.36	0.50	0.64	0.014	0.020	0.025
D	14.22	14.86	15.50	0.560	0.585	0.610
E	9.78	10.16	10.54	0.385	0.400	0.415
e	1.57	1.71	1.85	0.062	0.067	0.073
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
P	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

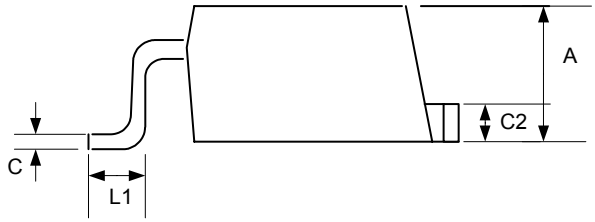
2) TO263-5L





Land Pattern Recommendation (Unit: mm)





Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.45	4.46	4.65	0.175	0.176	0.183
B	0.71	0.84	0.97	0.028	0.033	0.038
C	0.38	0.50	0.76	0.015	0.020	0.030
C2	1.22	1.27	1.32	0.048	0.050	0.052
D	8.38	9.15	9.65	0.330	0.360	0.380
E	9.91	10.16	10.41	0.390	0.400	0.410
e	1.45	1.71	1.96	0.057	0.068	0.077
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