1A Ultra Low Dropout Linear Regulator

FEATURES

- Guaranteed 1A Output Current.
- Low Ground Current
- Wide Operating Voltage Ranges: 2.3V to 5.5V.
- 0.5μA Quiescent Current in Shutdown.
- Fixed Output Voltage of 1.5V, 1.8V, 2.5V, 3.3V
- Fast Transient Response
- Current Limit and Thermal Limit
- Available in SOT-223, TO-220, TO-263 TO-263-5, TO-252 and TO-252-5 Packages

APPLICATIONS

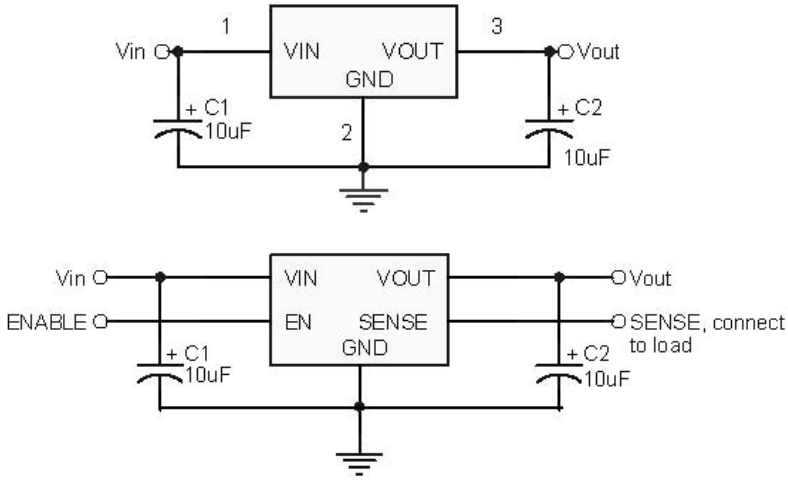
- Mother Board and Notebook
- Gigabit Ethernet Switch
- Microprocessor Power Systems
- Network Cards
- Peripheral Cards
- GTL, GTL+, BTL, and SSTL Bus Terminators
- DSPs Power Supplies
- Battery Powered Applications

DESCRIPTION

The AIC1187 is an ultra low dropout and high performance linear regulator with 1A output current capability. The output voltage is fixed 1.5V, 1.8V, 2.5V and 3.3V. Its low dropout voltage and fast transient response make it ideal for low voltage microprocessor applications.

In addition, the enable pin reduces power dissipation at shutdown mode. Current limit and thermal protection provide protection against any overload condition that would create excessive junction temperatures.

TYPICAL APPLICATION CIRCUIT



■ ORDERING INFORMATION

AIC1185-XXXXXX

- PACKING TYPE
  - TR: TAPE & REEL
  - TB: TUBE
- PACKAGING TYPE
  - Y: SOT-223
  - M: TO-263
  - E: TO-252
  - T: TO-220
  - M5: TO-263-5
  - E5: TO-252-5
- C: Commercial
  - P: Lead Free Commercial
  - G:Green Package
- OUTPUT VOLTAGE
  - 15: 1.5V
  - 18: 1.8V
  - 25: 2.5V
  - 33: 3.3V

Example: AIC1187-15CYTR

→ 1.5V version in SOT-223 Package & Taping & Reel Packing Type

AIC1187-15PYTR

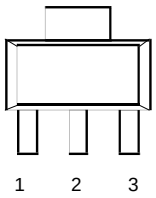
→ 1.5V Version, in SOT-223 Lead Free Package & Tape & Reel Packing Type

AIC1187-15GYTR

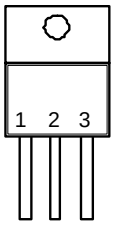
→ 1.5V Version, in SOT-223 Green Package & Tape & Reel Packing Type

PIN CONFIGURATION

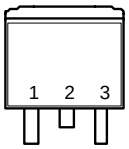
SOT-223
TOP VIEW
1: VIN
2: GND (TAB)
3: VOUT



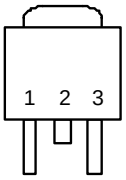
TO-220
FRONT VIEW
1: VIN
2: GND (TAB)
3: VOUT



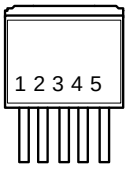
TO-263
TOP VIEW
1: VIN
2: GND (TAB)
3: VOUT



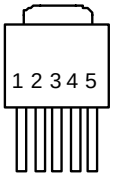
TO-252
TOP VIEW
1: VIN
2: GND (TAB)
3: VOUT



TO-263-5
TOP VIEW
1: VIN
2: EN
3. GND (TAB)
4. SENSE
5: VOUT



TO-252-5
TOP VIEW
1: VIN
2: EN
3. GND (TAB)
4. SENSE
5: VOUT



■ ABSOLUTE MAXIMUM RATINGS

Supply Voltage		5.5V
Storage Temperature Range		-65ºC~150ºC
Operating Temperature Range		-40ºC~85ºC
Junction Temperature		125ºC
Lead Temperature (Soldering, 10 sec)		260ºC
Thermal Resistance (Junction to Case)	SOT-220	3ºC /W
	SOT-223	15ºC /W
	TO-263, TO-263-5	6ºC /W
	TO-252, TO252-5	12.5ºC /W
Thermal Resistance Junction to Ambient	SOT-220	50ºC /W
(Assume no ambient airflow, no heat sink)	SOT-223	130ºC /W
	TO-263, TO-263-5	60ºC /W
	TO-252, TO-252-5	100ºC /W

Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

■ TEST CIRCUIT

Refer to “TYPICAL APPLICATION CIRCUIT”.

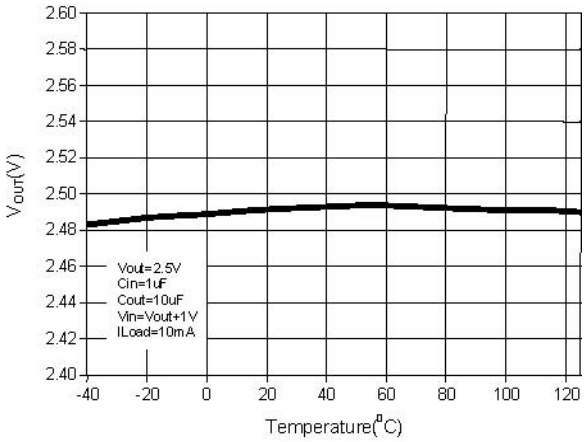
ELECTRICAL CHARACTERISTICS

(V_{IN} = V_O + 0.7V, I_{OUT} = 10mA, V_{EN} = V_{IN}, T_A=25°C, unless otherwise specified) (Note 1)

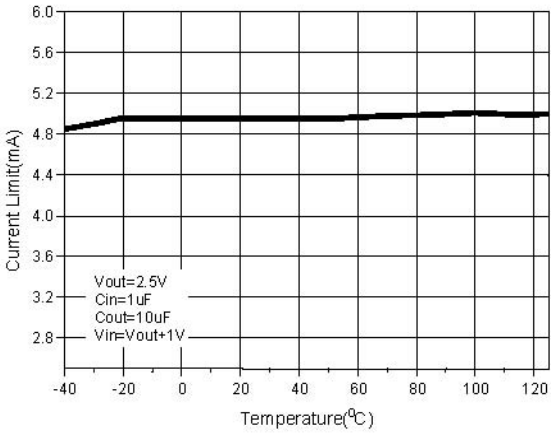
PARAMETER	TEST CONDITIONS		SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Voltage Range			V_{IN}	2.25		5.5	V
Output Voltage Tolerance				-1.5		+1.5	%
Line Regulation	V_{IN} = V_{OUT} + $V_{Drop(max)}$ to 5.5V		ΔV_{LIR}		0.3	1	%
Load Regulation	V_{IN} = V_{OUT} + 0.7		ΔV_{LOR}		30	60	mV
Dropout Voltage	I_{OUT}=1A	V_0≥1.8	V_{DROP}		550	700	mV
		V_0=1.5				750	
Quiescent Current			I_Q		1	2	mA
Shutdown Supply Current	V_{EN}=0V		I_{SD}		0.5	5	μA
Output Current Limit	V_{IN}=V_{OUT} + 0.7		I_{IL}	2	5		A
Shutdown Terminal Specifications							
EN Pin Shutdown Threshold	Output=H		V_{EN}	1.2			V
	Output=L					0.4	
EN Pin Current	V_{EN}= V_{IN}		I_{EN}		0.1		nA
FLG Pin Leakage Current					1		nA
FLG Pin Sink Current	V_{FLG}=0.5V			2			mA
Thermal Protection							
Thermal Shutdown Temperature	Guaranteed by design		T_{SD}		170		ºC
Thermal Shutdown Hysteresis	Guaranteed by design		T_{HYST}		10		ºC

Note 1: Specifications are production tested at T_A =25°C. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

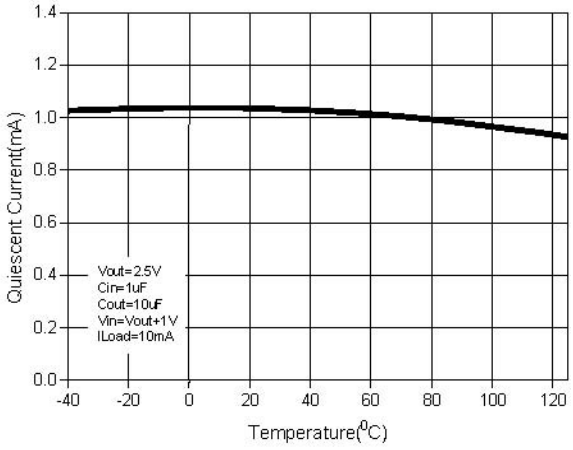
■ TYPICAL PERFORMANCE CHARACTERISTICS



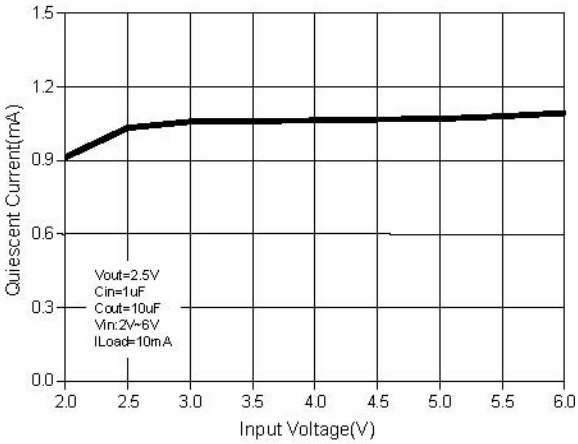
Output Voltage vs. Temperature



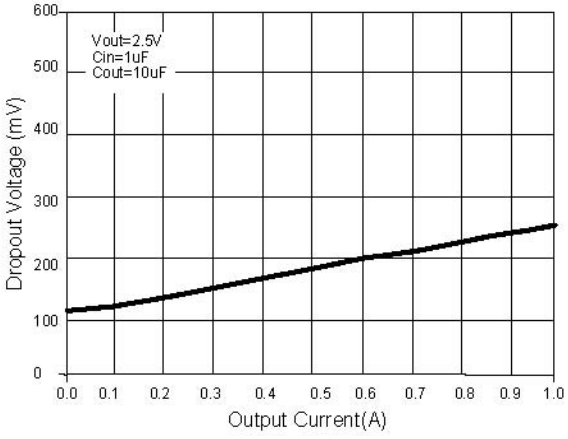
Current Limit vs. Temperature



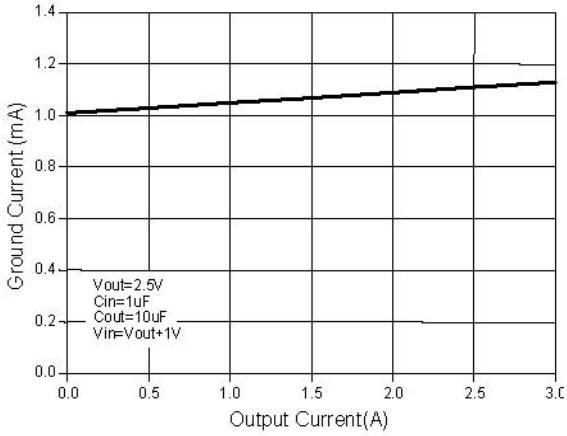
Quiescent Current vs. Temperature



Quiescent Current vs. Input Voltage

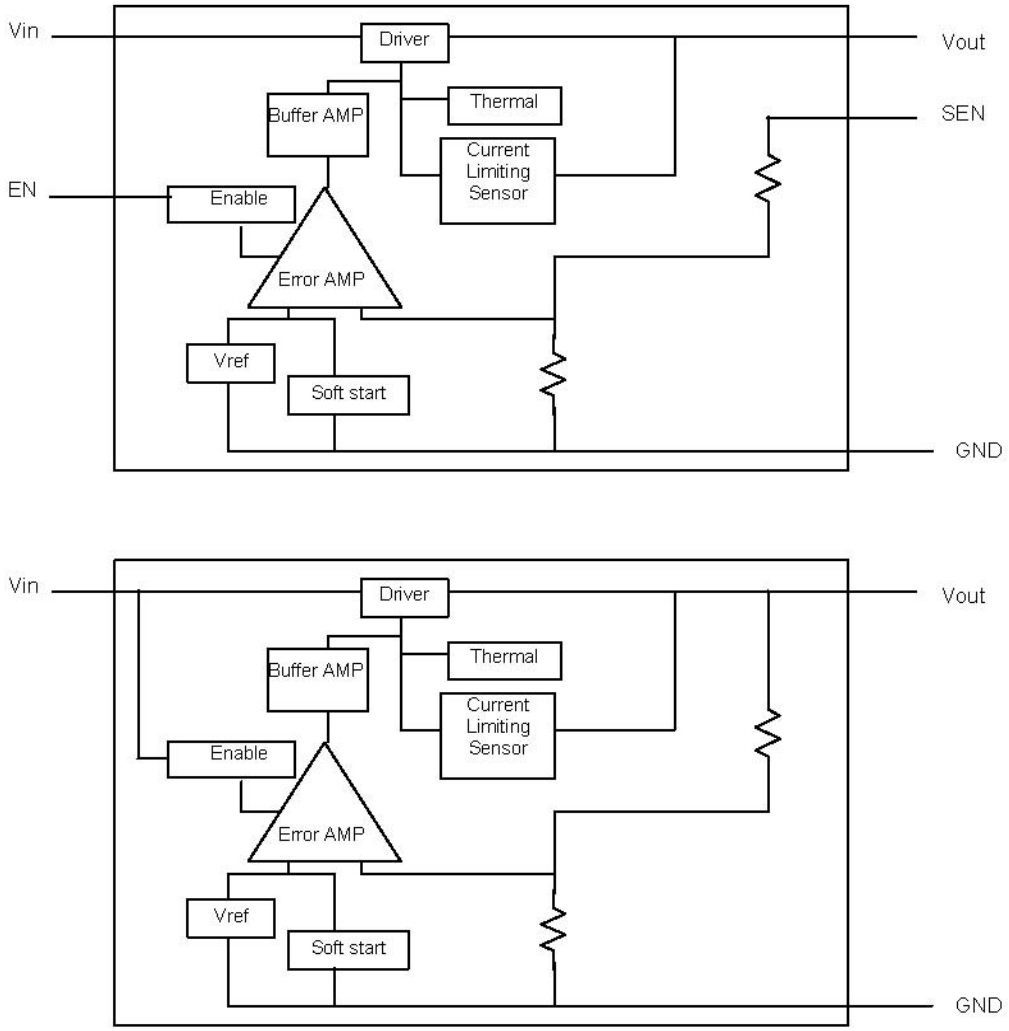


Dropout Voltage vs. I_{OUT} Current



Ground Current vs. I_{OUT} Current

BLOCK DIAGRAM



PIN DESCRIPTION

VOUT PIN - Output voltage.
GND PIN - Power GND.
SEN PIN - Remote sense.
VIN PIN - Power Input.
EN PIN - Enable Input.

APPLICATION INFORMATION

Input/Output Capacitors

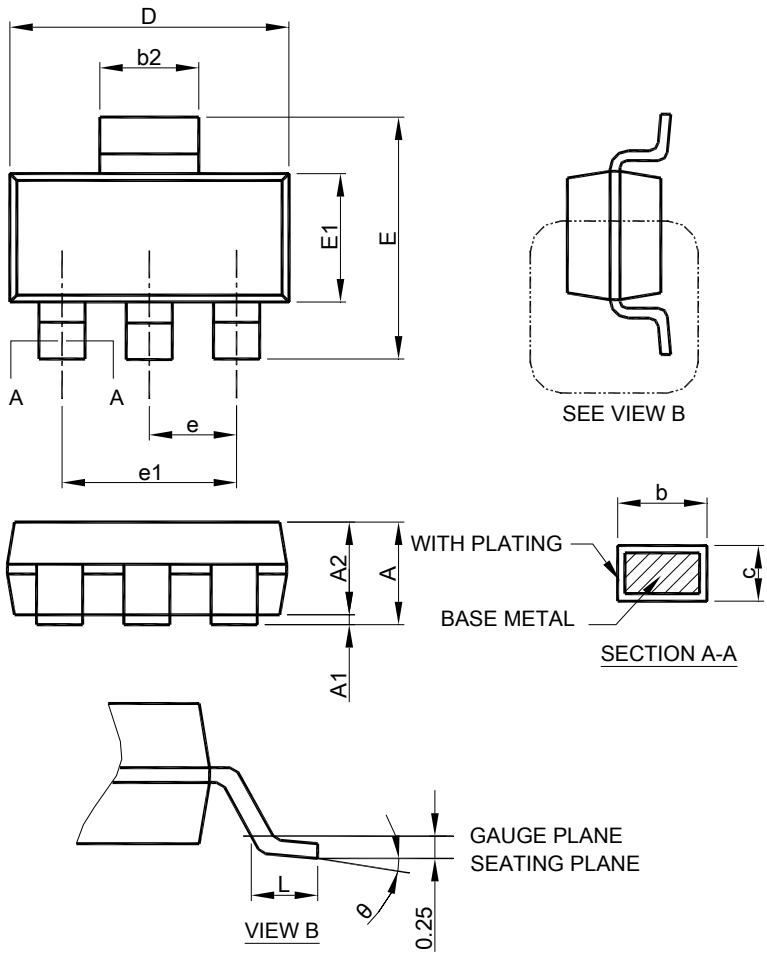
Linear regulators require input and output capacitors to maintain stability. A 4.7μF or 10μF electrolytic or tantalum capacitor is recommended for output. The output capacitor should be selected within the Equivalent Series Resistance (ESR).

Sense

Load is not usually close to regulator in actual application. The distance between these two devices results in decay of the load. A SENSE pin of the regulator connects to the load and traces the load voltage. AIC1187 will adjust the output voltage of the regulator to maintain the load at expected voltage.

PHYSICAL DIMENSIONS

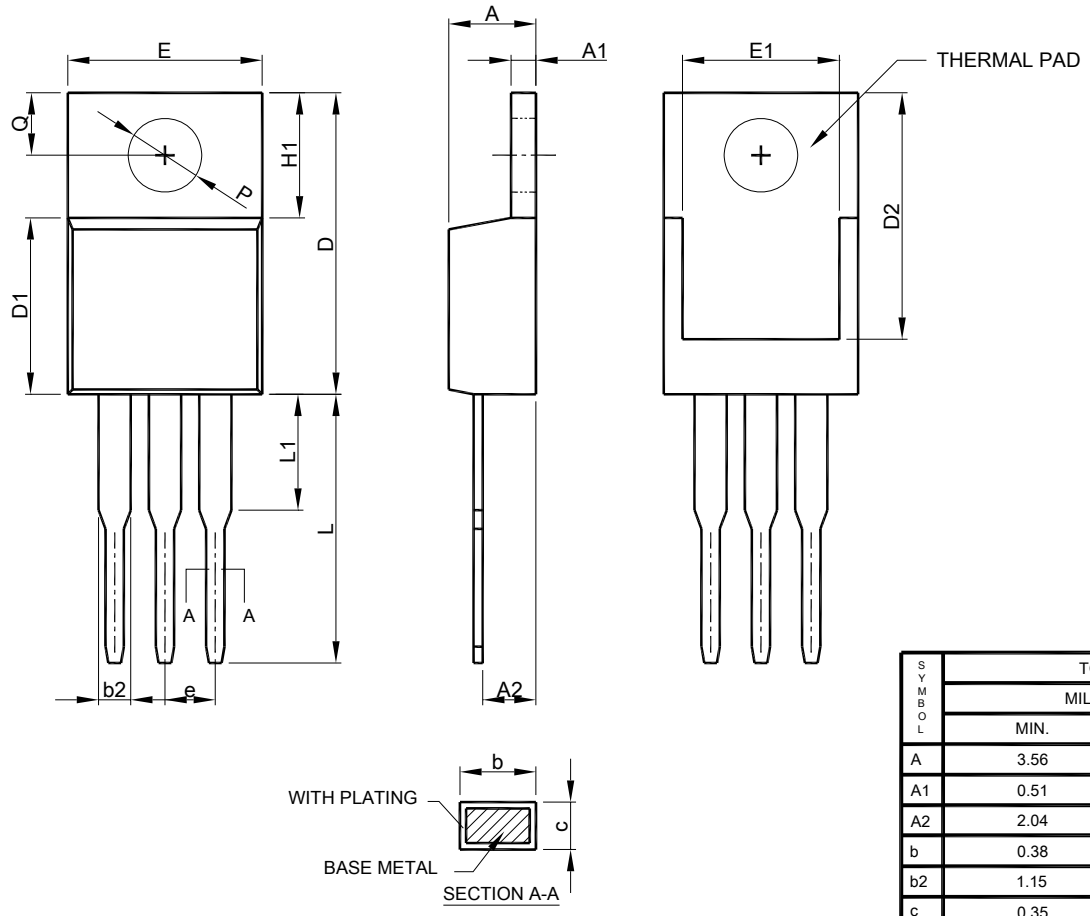
- **SOT-223**



SYMBOL	SOT-223	
	MILLIMETERS	
	MIN.	MAX.
A		1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.66	0.84
b2	2.90	3.10
c	0.23	0.33
D	6.30	6.70
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	
θ	0°	8°

Note: 1. Refer to JEDEC TO-261AA.
2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
3. Dimension "E1" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

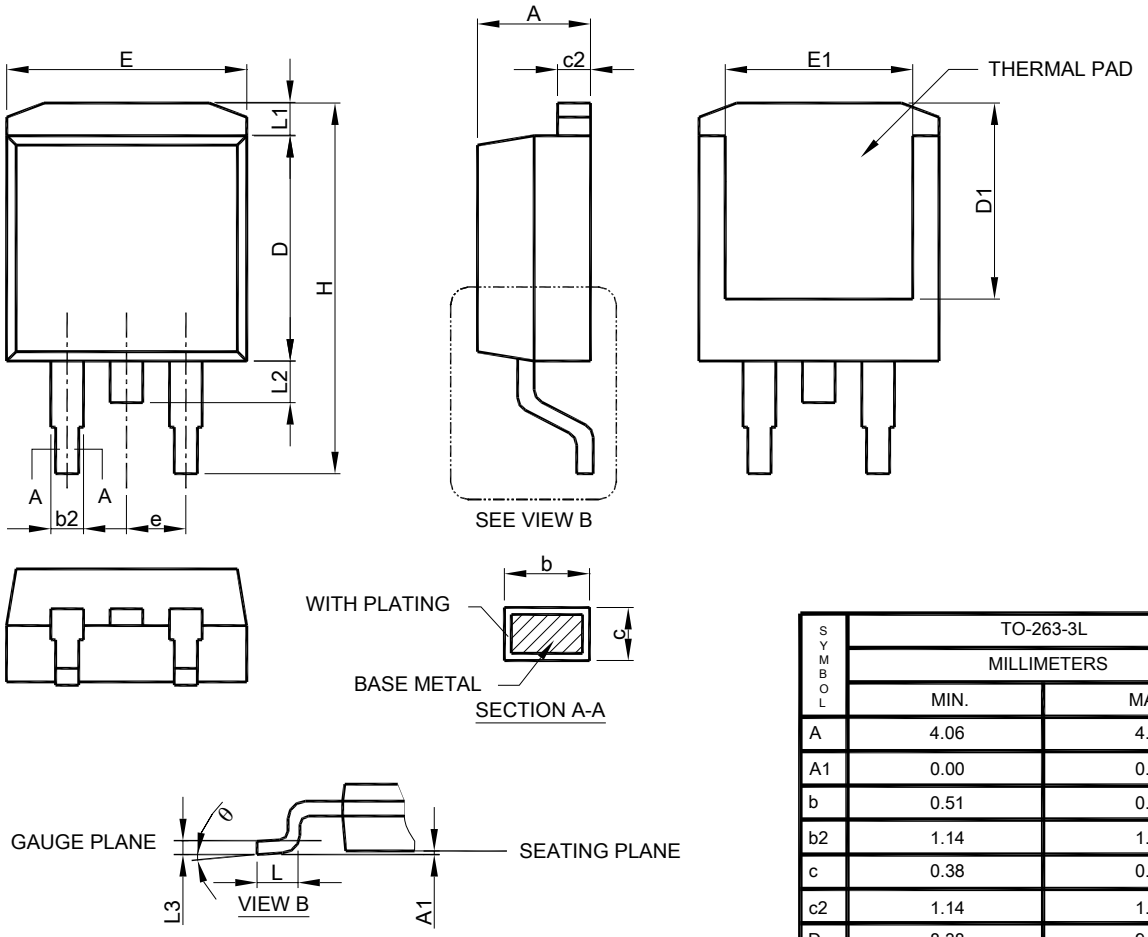
- **TO-220**



SYMBOL	TO-220	
	MILLIMETERS	
	MIN.	MAX.
A	3.56	4.82
A1	0.51	1.39
A2	2.04	2.92
b	0.38	1.01
b2	1.15	1.77
c	0.35	0.61
D	14.23	16.51
D1	8.38	9.02
D2	11.75	12.88
E	9.66	10.66
E1	6.86	8.90
e	2.54 BSC	
H1	5.85	6.85
L	12.70	14.73
L1	--	6.35
P	3.54	4.08
Q	2.54	3.42

Note: 1. Refer to JEDEC TO-220AB.
2. Dimension "E" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
3. Dimension "D1" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

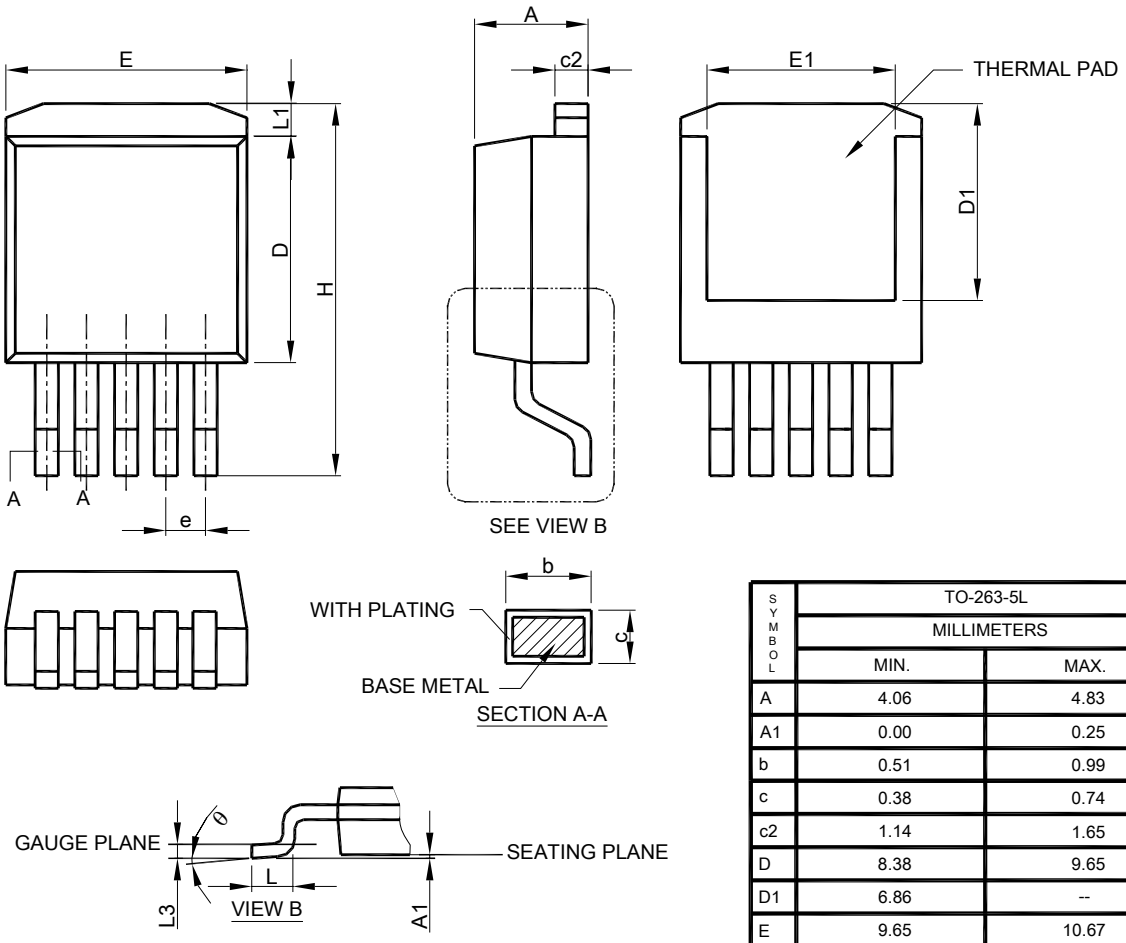
- **TO-263**



SYMBOL	TO-263-3L	
	MILLIMETERS	
	MIN.	MAX.
A	4.06	4.83
A1	0.00	0.25
b	0.51	0.99
b2	1.14	1.78
c	0.38	0.74
c2	1.14	1.65
D	8.38	9.65
D1	6.86	--
E	9.65	10.67
E1	6.23	--
e	2.54 BSC	
H	14.61	15.88
L	1.78	2.79
L1	--	1.68
L2	--	1.78
L3	0.25 BSC	
q	0°	8°

Note: 1. Refer to JEDEC TO-263AB.
2. Dimension "E" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
3. Dimension "D" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

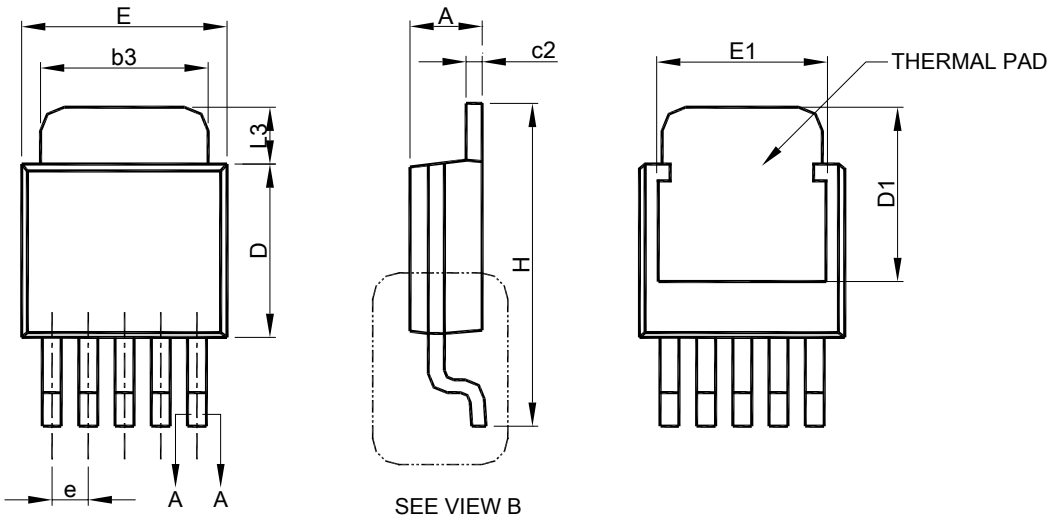
- **TO-263-5**

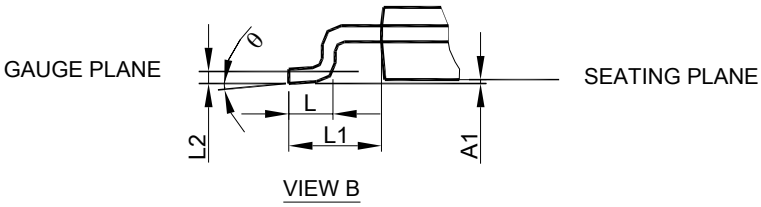


SYMBOL	TO-263-5L	
	MILLIMETERS	
	MIN.	MAX.
A	4.06	4.83
A1	0.00	0.25
b	0.51	0.99
c	0.38	0.74
c2	1.14	1.65
D	8.38	9.65
D1	6.86	--
E	9.65	10.67
E1	6.23	--
e	1.70 BSC	
H	14.61	15.88
L	1.78	2.79
L1	--	1.68
L3	0.25 BSC	
q	0°	8°

Note: 1. Refer to JEDEC TO-263BA.
2. Dimension "E" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
3. Dimension "D" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

- **TO-252-5**

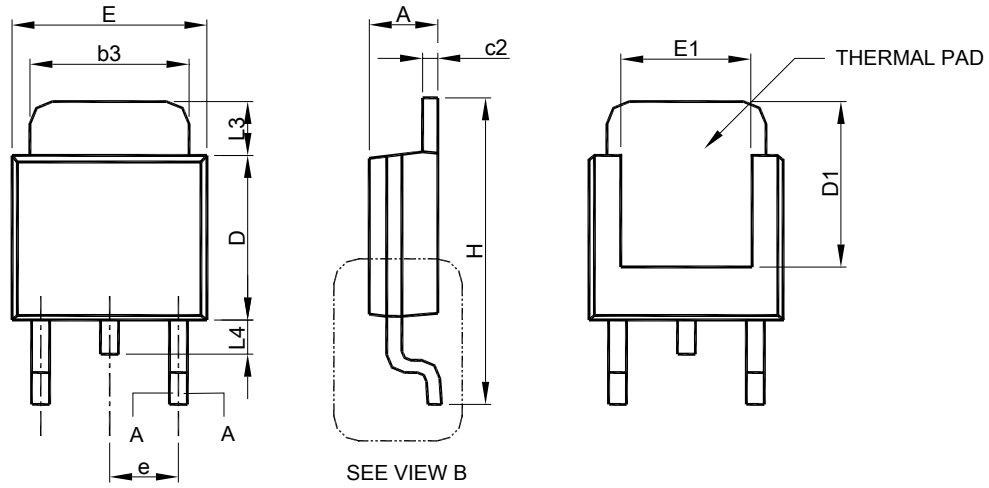


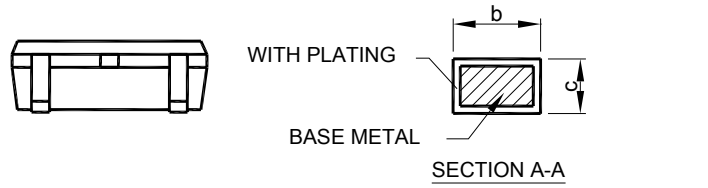


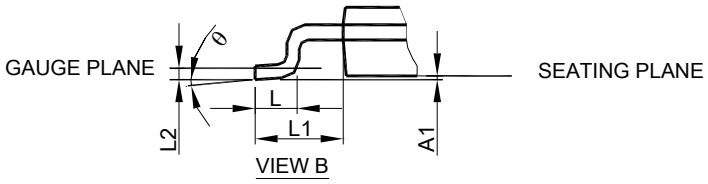
SYMBOL	TO-252-5L	
	MILLIMETERS	
	MIN.	MAX.
A	2.19	2.38
A1	0.00	0.13
b	0.51	0.71
b3	4.32	5.46
c	0.46	0.61
c2	0.46	0.89
D	5.33	6.22
D1	4.90	6.00
E	6.35	6.73
E1	4.32	5.33
e	1.27 BSC	
H	9.40	10.41
L	1.40	1.78
L1	2.67 REF	
L2	0.51 BSC	
L3	0.89	2.03
q	0°	8°

Note: 1. Refer to JEDEC TO-252AD and AB.
2. Dimension "E" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
3. Dimension "D" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

- **TO-252**







SYMBOL	TO-252-3L	
	MILLIMETERS	
	MIN.	MAX.
A	2.19	2.38
A1	0.00	0.13
b	0.64	0.89
b3	4.95	5.46
c	0.46	0.61
c2	0.46	0.89
D	5.33	6.22
D1	4.60	6.00
E	6.35	6.73
E1	3.90	5.46
e	2.28 BSC	
H	9.40	10.41
L	1.40	1.78
L1	2.67 REF	
L2	0.51 BSC	
L3	0.89	2.03
L4	--	1.02
θ	0°	8°

Note: 1. Refer to JEDEC TO-252AA and AB.
2. Dimension "E" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
3. Dimension "D" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.