HT1086 Series
1.5A General Purpose LDO

Features

- Output voltage ranges: Fixed range of 1.8V, 2.5V, 2.85V, 3.3V, 5.0V or adjustable type.
- High accuracy: ±2%
- Low voltage drop: 1.3V (typ.), V_{OUT}=5.0V at 1.5A
- Guaranteed output current: 1.5A
- Low quiescent current: 8mA (typ.)
- Integrated current limit & thermal protection circuits
- SOT-223, TO-220, TO-252, TO-263 packages

Applications

- Active SCSI terminations
- Post regulator for switching power supplies
- Low voltage microcontrollers
- Motherboard clock supplies
- Battery chargers

General Description

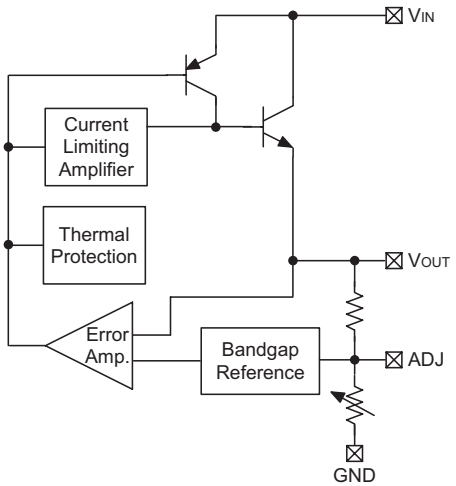
The HT1086 devices are a series of three-terminal high current low voltage regulators. They can deliver an output current of 1.5A and can accept input voltages up to 12V. The devices are available in both adjustable and fixed output voltage type with a range of 1.8V to 5V. Internal current limit and thermal protection circuits provide protection against overload conditions that could create excessive junction temperatures.

Selection Table

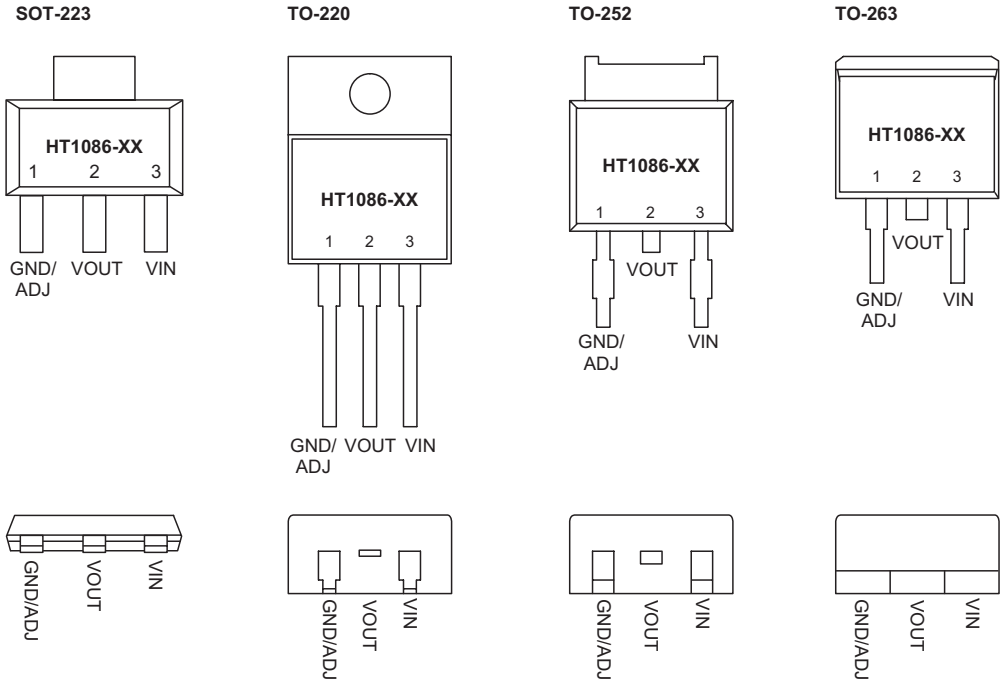
Part No.	Output Voltage	Package	Marking
HT1086-ADJ	Adjust	SOT-223 TO-220 TO-252 TO-263	HT1086-ADJ HT1086-18 HT1086-25 HT1086-28 HT1086-33 HT1086-50
HT1086-18	1.8V		
HT1086-25	2.5V		
HT1086-28	2.85V		
HT1086-33	3.3V		
HT1086-50	5.0V		

Note: For lead free devices, a "#" mark is suffixed at the end of the date code.

Block Diagram



Pin Assignment



Absolute Maximum Ratings*

Input Supply Voltage .....V_{SS}–0.3V to V_{SS}+13V

Storage Temperature .....–50°C to 125°C

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

"*" Absolute maximum ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. The guaranteed specifications apply only for the test conditions listed.

Recommended Operating Conditions

Input Supply Voltage .....V_{SS}–0.3V to V_{SS}+12V

Ambient Temperature .....–40°C to 85°C

Thermal Information

Symbol	Parameter	Package	Max.	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient)	SOT-223	134	°C/W
		TO-220	50	°C/W
		TO-252	80	°C/W
		TO-263	60	°C/W
P_D	Power Dissipation	SOT-223	0.75	W
		TO-220	2	W
		TO-252	1.27	W
		TO-263	1.67	W

Note: P_D is measured at Ta= 25°C

Electrical Characteristics

T_J=25°C, V_{IN}=V_{OUT}+1.5V, I_O=10mA, unless otherwise specified (see note 1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{REF}	Reference Voltage	2.75V ≤ V_{IN} ≤ 12V	1.225	1.25	1.275	V
V_{OUT}	Output Voltage	HT1086-18	1.764	1.800	1.836	V
		HT1086-25	2.45	2.50	2.55	V
		HT1086-28	2.793	2.850	2.907	V
		HT1086-33	3.234	3.300	3.366	V
		HT1086-50	4.90	5.00	5.10	V
ΔV_{LOAD}	Load Regulation (see note 2)	10mA ≤ I_{OUT} ≤ 1.5A	1	—	30	mV
ΔV_{LINE}	Line Regulation	2.75 ≤ V_{IN} ≤ 12V	—	0.015	0.15	%/V
V_{DIF}	Dropout Voltage (see note 3)	ΔV_{OUT}=2%, I_{OUT}=1.5A	—	1.3	1.5	V
I_{LIMIT}	Current Limit (see note 4)	ΔV_{OUT}=10%	1.5	2.3	—	A
I_{ADJ}	Adjust Pin Current (Variable Version)	2.75 ≤ V_{IN} ≤ 12V	—	55	120	μA
I_{SS}	Quiescent Current (Fixed Version)	2.75 ≤ V_{IN} ≤ 12V	—	8	13	mA
RR	Ripple Rejection	120Hz input ripple C_{OUT}=22μF	—	60	—	dB
	Temperature Coefficient	–40°C<Ta<85°C	—	±0.4	—	mV/°C

Note: 1. Specifications are production tested at room temperature, Ta. Specifications within the –40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

2. Load regulation is measured at a constant junction temperature, using pulse testing with a low ON time and is guaranteed up to the maximum power dissipation. Power dissipation is determined by the input/output differential voltage and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} – Ta) / \theta_{JA}$.

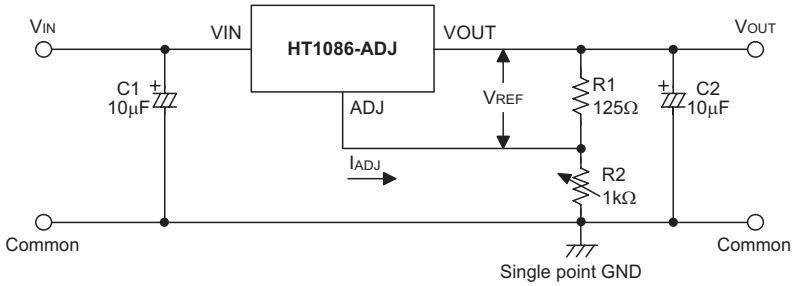
3. Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+1.5V with a fixed load.

4. Current limit is measured by pulsing for a short time.

Application Circuits

Basic Circuits

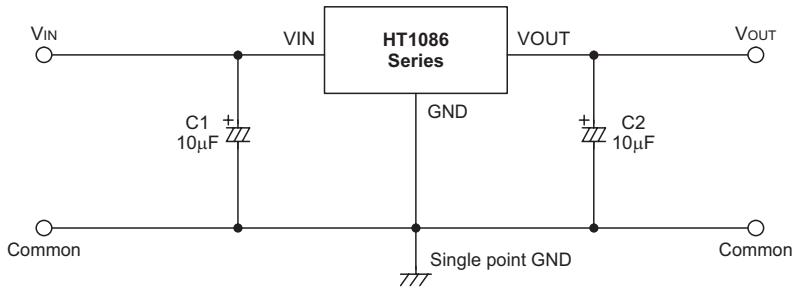
- Variable voltage type



$$V_{OUT} = V_{REF} \left(1 + \frac{R2}{R1} \right) + I_{ADJ} R2$$

Note: C1 is required if the needed if the device is located far from filter capacitors, the recommended value is 10μF.
C2 is required for stability, the recommended value is 10μF.
R1 is required for regulation, the recommended value is 125Ω.

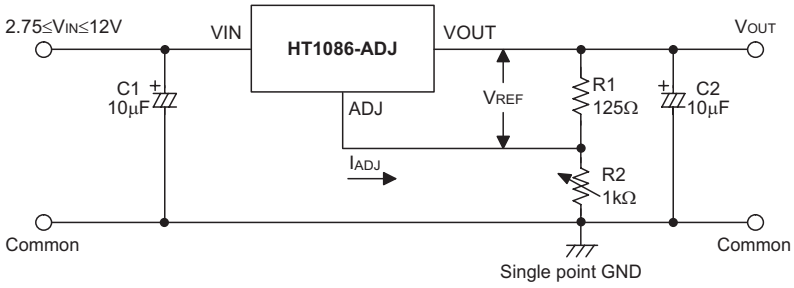
- Fixed voltage type



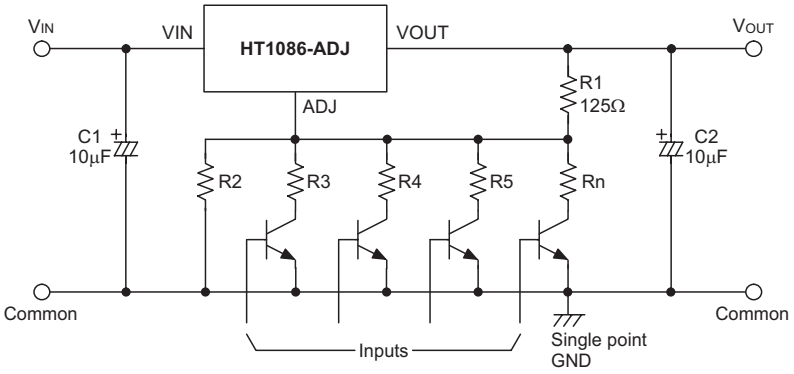
Note: C1 is required if the needed if the device is located far from filter capacitors, the recommended value is 10μF.
C2 is required for stability, the recommended value is 10μF.

Typical Application Circuits

- 1.25~10.5V regulator

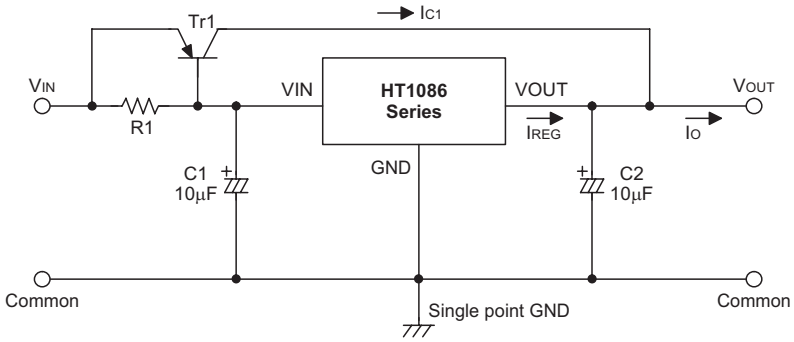


- Digitally selected outputs



Note: R2 can set the maximum voltage.

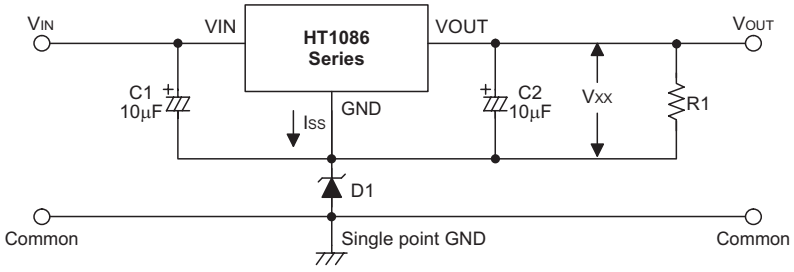
- High output current positive voltage regulator



$$R_1 = \frac{V_{BE1}}{I_{REG} - \frac{I_{C1}}{(1+\beta)}},$$

$$I_O = I_{C1} + I_{REG}$$

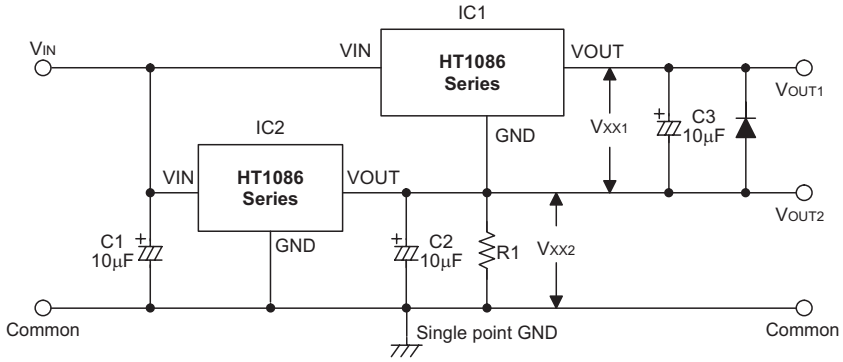
- Increased Output voltage Circuit



$$V_{OUT} = V_{XX} + V_{D1}$$

$$R_1 = \frac{V_{XX}}{I_{SS}}$$

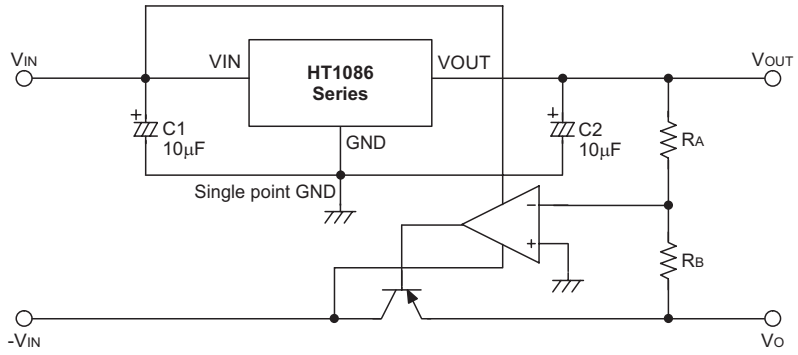
- Dual Supply Circuit



$$V_{OUT1} = V_{XX2} + V_{XX1}$$

$$V_{OUT2} = V_{XX2}$$

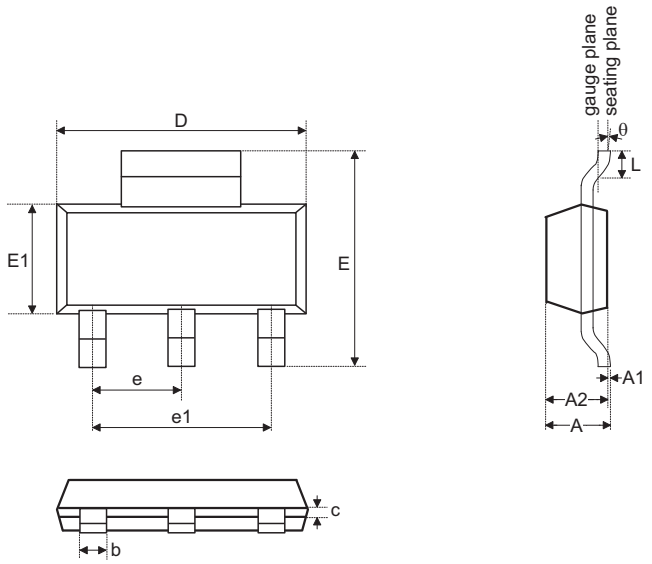
- Tracking Voltage Regulator



$$-V_O = V_{OUT} \times \frac{R_B}{R_A}$$

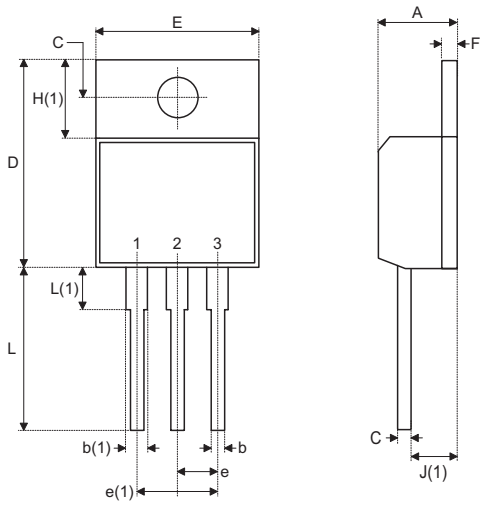
Package Information

3-pin SOT-223 Outline Dimensions



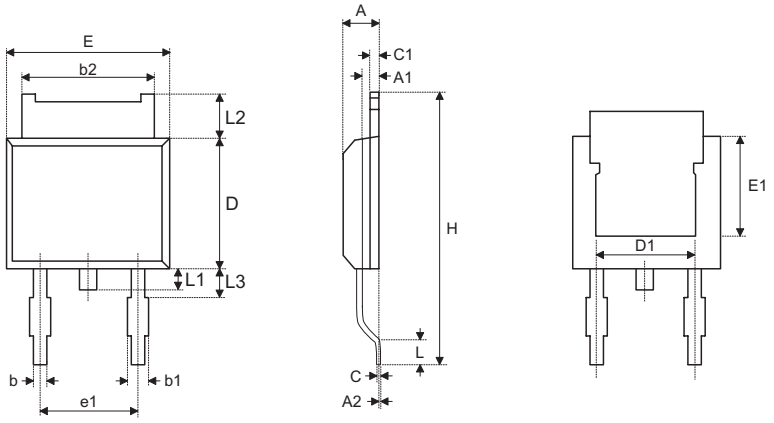
Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	—	—	1.8
A1	0.02	—	0.1
A2	1.5	—	1.7
b	0.66	—	0.84
C	0.23	—	0.35
D	6.3	—	6.7
E	6.7	—	7.3
E1	3.3	—	3.7
e	—	2.3	—
e1	—	4.6	—
L	0.75	—	—
θ	0°	—	10°

3-pin TO-220 Outline Dimensions



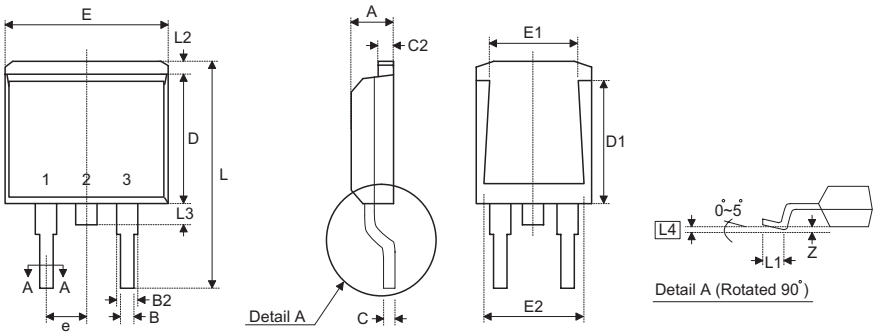
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	170	—	185
b	15	—	40
b(1)	50	—	65
C	14	—	20
D	575	—	610
E	395	—	410
e	95	—	105
e(1)	195	—	210
F	45	—	55
H(1)	235	—	265
J(1)	95	—	110
L	515	—	560
L(1)	145	—	155

3-pin TO-252 Outline Dimensions



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	87	—	94
A1	35	—	45
A2	1	—	9
B	25	—	35
b1	30	—	45
b2	206	—	215
C	18	—	23
C1	18	—	23
D	235	—	245
D1	177	—	197
E	255	—	265
E1	165	—	175
e1	175	—	185
H	380	—	410
L	20	—	—
L1	25	—	40
L2	35	—	50
L3	40	—	60

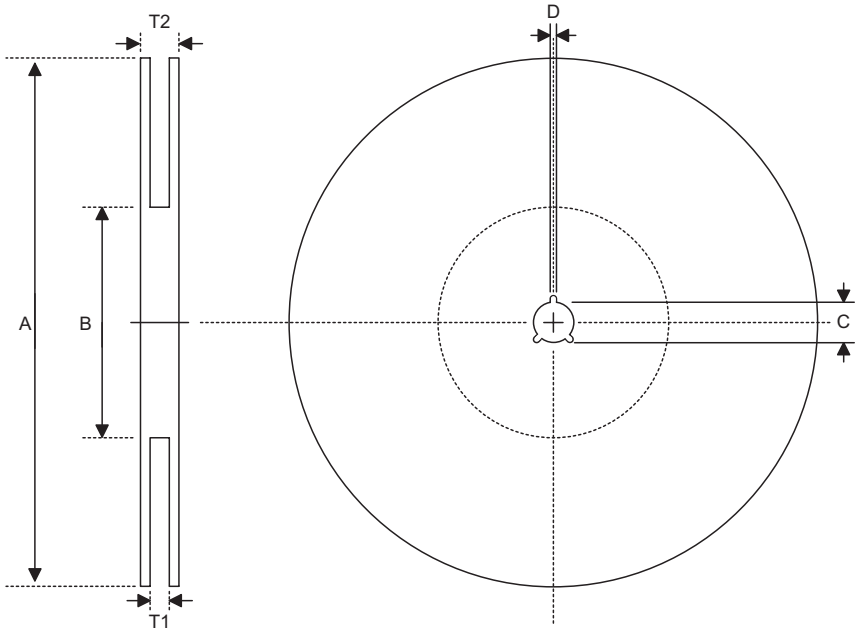
3-pin TO-263 Outline Dimensions



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	170	—	185
B	28	—	40
B2	50	—	65
C	13	—	20
C2	45	—	55
D	340	—	380
D1	220	—	240
E	395	—	410
E1	310	—	340
E2	355	—	375
e	95	—	105
L	575	—	625
L1	90	—	110
L2	40	—	55
L3	50	—	70
L4	6	—	14

Product Tape and Reel Specifications

Reel Dimensions



SOT-223

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330±1
B	Reel Inner Diameter	62±1.5
C	Spindle Hole Diameter	12.75±0.15
D	Key Slit Width	2+0.6
T1	Space Between Flange	12.4+0.2
T2	Reel Thickness	16.4−0.4

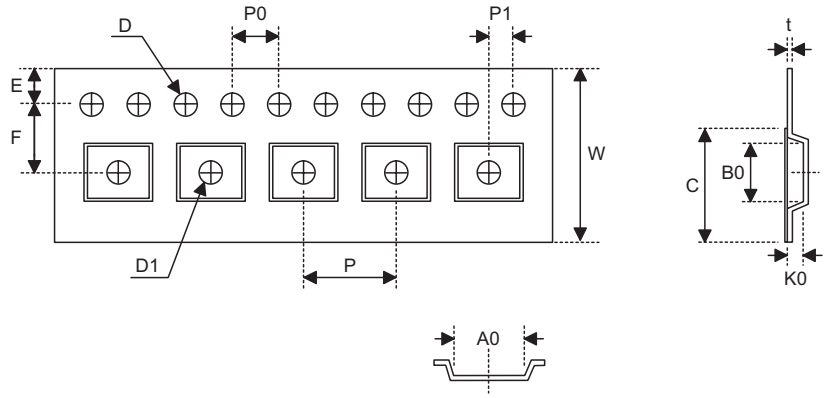
TO-252

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330±3
B	Reel Inner Diameter	100±2
C	Spindle Hole Diameter	13±0.5
D	Key Slit Width	2±0.5
T1	Space Between Flange	16.4+0.3 −0.2
T2	Reel Thickness	21.4+0.4

TO-263

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	380±3
B	Reel Inner Diameter	80±2
C	Spindle Hole Diameter	13±0.5
D	Key Slit Width	2±0.5
T1	Space Between Flange	24±0.4
T2	Reel Thickness	28.4+0.4

Carrier Tape Dimensions



SOT-223

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	12±0.3
P	Cavity Pitch	8±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	5.5±0.05
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.1
P0	Perforation Pitch	4±0.1
P1	Cavity to Perforation (Length Direction)	2±0.05
A0	Cavity Length	6.9±0.1
B0	Cavity Width	7.5±0.1
K0	Cavity Depth	2.1±0.1
t	Carrier Tape Thickness	0.3±0.05
C	Cover Tape Width	9.3

TO-252

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	16+0.3 −0.1
P	Cavity Pitch	8±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	7.5±0.1
D	Perforation Diameter	1.5±0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4±0.1
P1	Cavity to Perforation (Length Direction)	2±0.1
A0	Cavity Length	6.8±0.1
B0	Cavity Width	10.4±0.1
K0	Cavity Depth	2.5±0.1
t	Carrier Tape Thickness	0.3±0.05
C	Cover Tape Width	13.3

TO-263

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	24+0.3 −0.1
P	Cavity Pitch	16±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	11.5±0.1
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4±0.1
P1	Cavity to Perforation (Length Direction)	2±0.1
A0	Cavity Length	10.8±0.1
B0	Cavity Width	16.1±0.1
K0	Cavity Depth	5.2±0.1
t	Carrier Tape Thickness	0.35±0.013
C	Cover Tape Width	21.3

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