

Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- Wide operating voltage (12V max.)
- TO92, SOT89 and SOT23-5 package

Applications

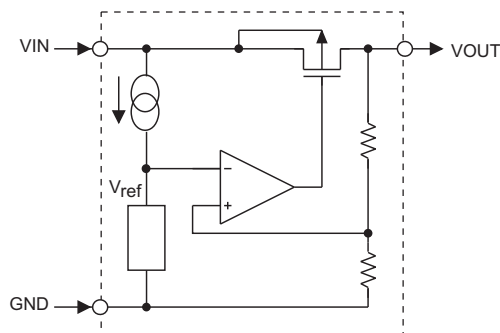
- Battery-powered equipment
- Communication equipment
- Audio/Video equipment

General Description

The HT1015-1 is a three-terminal low power voltage regulator implemented in CMOS technology. It is available with a fixed output voltage at 1.5V. CMOS technology ensures low voltage drop and low quiescent current.

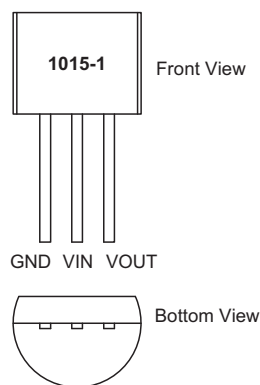
Although designed primarily as a fixed voltage regulator, this device can be used with external components to obtain variable voltages and currents.

Block Diagram

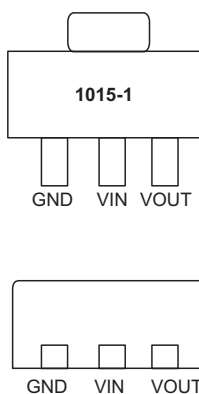


Pin Assignment

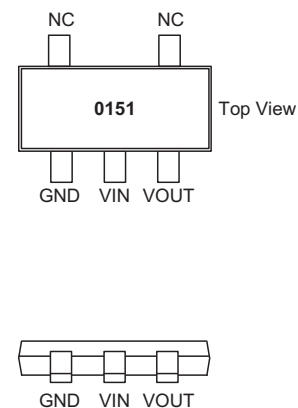
TO92



SOT89



SOT23-5



Note: For lead free devices, TO92 package will add a "#" mark at the end of the date code, whereas SOT89 and SOT23-5 packages will add a "#" mark at the end of the marking.

Absolute Maximum Ratings

Supply Voltage $V_{SS}-0.3V$ to $V_{SS}+13V$ Storage Temperature $-50^{\circ}C$ to $125^{\circ}C$
 Operating Temperature $-40^{\circ}C$ to $85^{\circ}C$

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.

Thermal Information

Symbol	Parameter	Package	Max.	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT23-5	500	$^{\circ}C/W$
		SOT89	200	$^{\circ}C/W$
		TO92	200	$^{\circ}C/W$
P_D	Power Dissipation	SOT23-5	0.20	W
		SOT89	0.50	W
		TO92	0.50	W

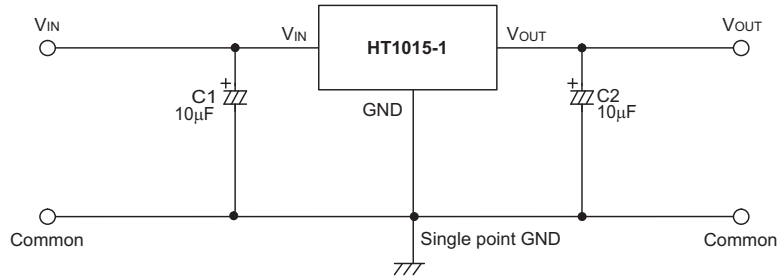
Note: P_D is measured at $T_a = 25^{\circ}C$

Electrical Characteristics
 $T_a = 25^{\circ}C$

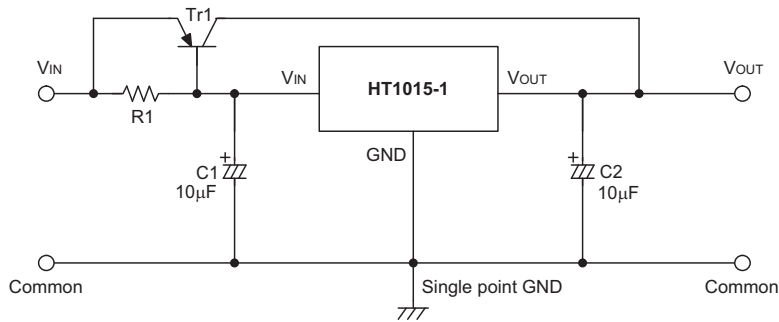
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage Tolerance	3.5V	$I_{OUT} = 0.5mA$	1.455	1.5	1.545	V
I_{OUT}	Output Current	3.5V	—	7.0	18	—	mA
ΔV_{OUT}	Load Regulation	3.5V	$1mA \leq I_{OUT} \leq 7mA$	—	15	—	mV
V_{DIF}	Voltage Drop	—	$I_{OUT} = 0.5mA$	—	250	—	mV
I_{SS}	Current Consumption	3.5V	No load	—	2.2	5.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	$2.5V \leq V_{IN} \leq 12V$ $I_{OUT} = 0.5mA$	—	0.1	—	%/V
V_{IN}	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.5V	$I_{OUT} = 0.5mA$ $-40^{\circ}C \sim 85^{\circ}C$	—	-0.75	—	mV/ $^{\circ}C$

Application Circuits

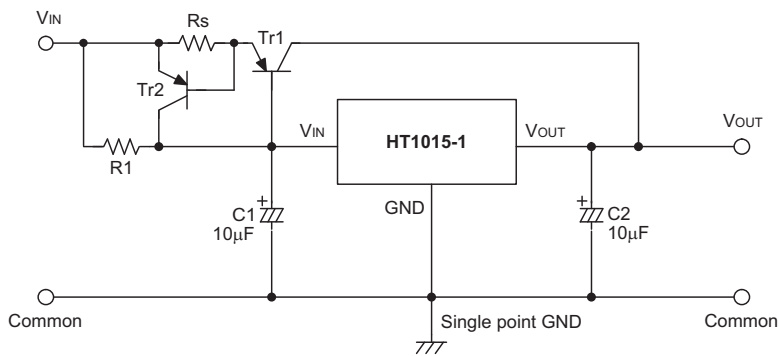
Basic Circuit



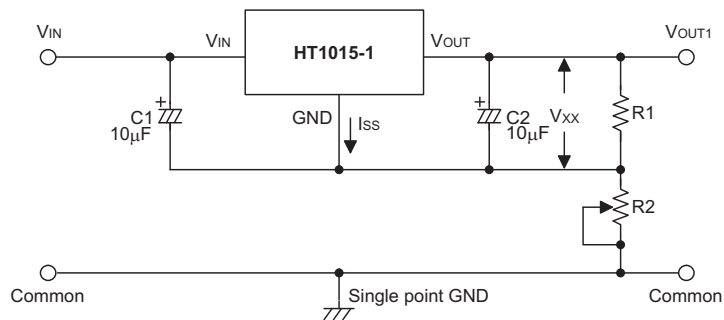
High Output Current Positive Voltage Regulator



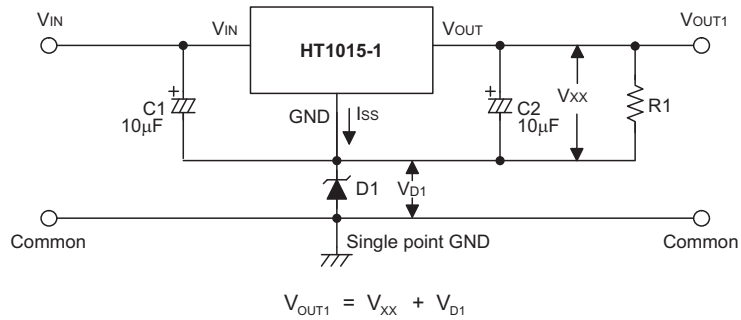
Short-Circuit Protection Using External Transistors



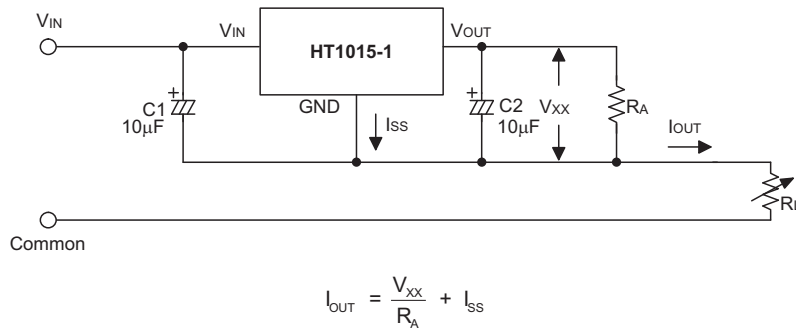
Increased Output Voltage Circuits



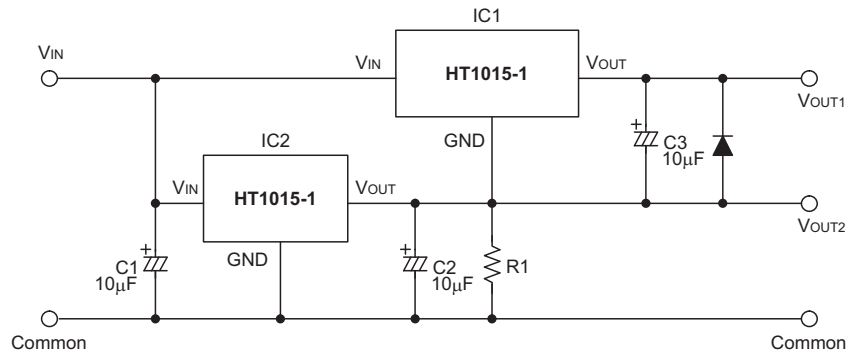
$$V_{OUT1} = V_{xx} \left(1 + \frac{R2}{R1} \right) + I_{SS} R2$$



Constant Current Regulator

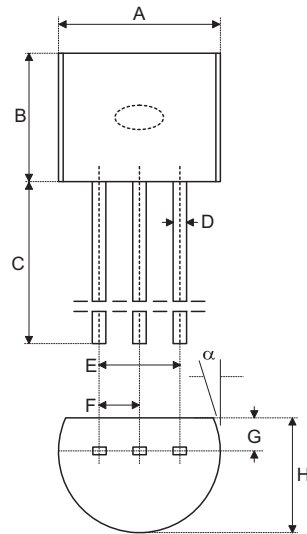


Dual Supply



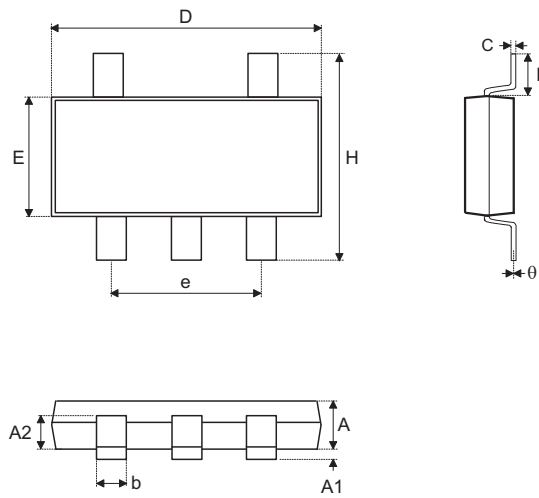
Package Information

3-pin TO92 Outline Dimensions



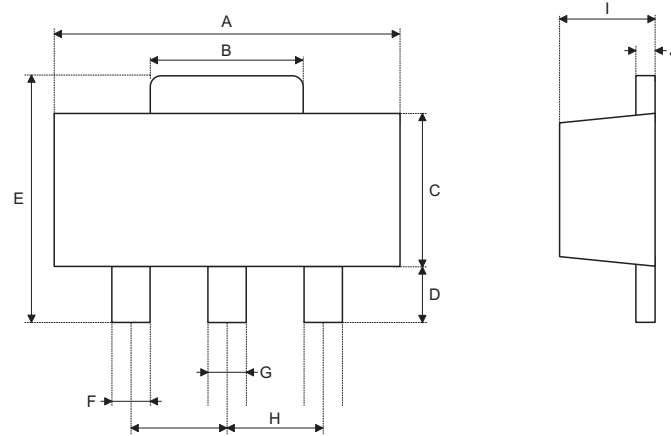
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	170	—	200
B	170	—	200
C	500	—	—
D	11	—	20
E	90	—	110
F	45	—	55
G	45	—	65
H	130	—	160
I	8	—	18
α	4°	—	6°

5-pin SOT23-5 Outline Dimensions



Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	1.00	—	1.30
A1	—	—	0.10
A2	0.70	—	0.90
b	0.35	—	0.50
C	0.10	—	0.25
D	2.70	—	3.10
E	1.40	—	1.80
e	—	1.90	—
H	2.60	—	3.00
L	0.37	—	—
θ	1°	—	9°

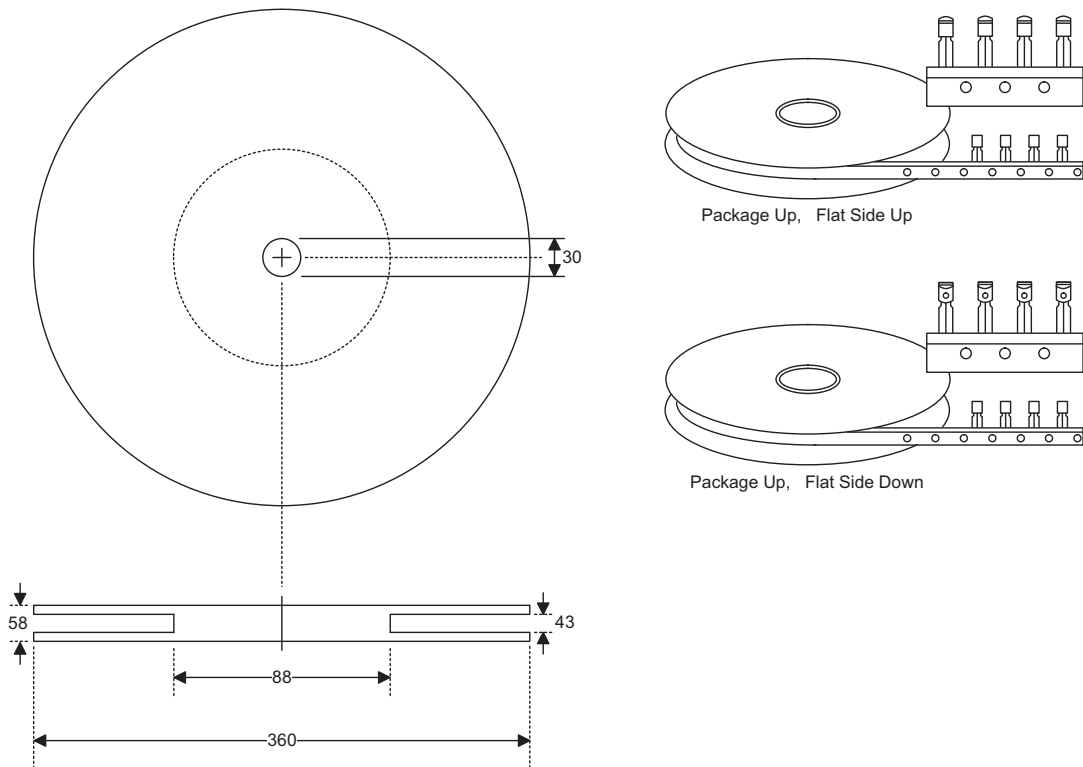
3-pin SOT89 Outline Dimensions



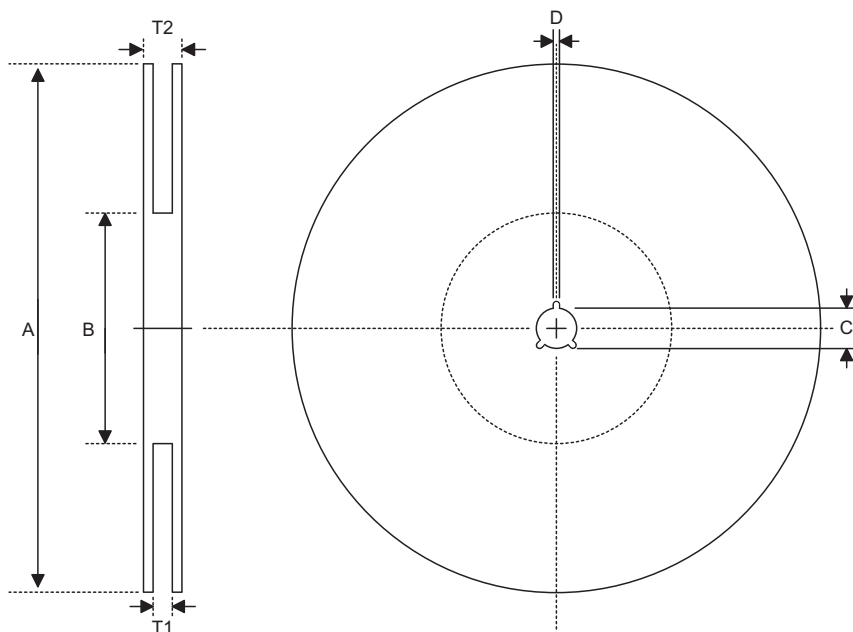
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	173	—	181
B	59	—	72
C	90	—	102
D	35	—	47
E	155	—	167
F	14	—	19
G	17	—	22
H	—	59	—
I	55	—	63
J	14	—	17

Product Tape and Reel Specifications

TO92 Reel Dimensions (Unit: mm)



Reel Dimensions

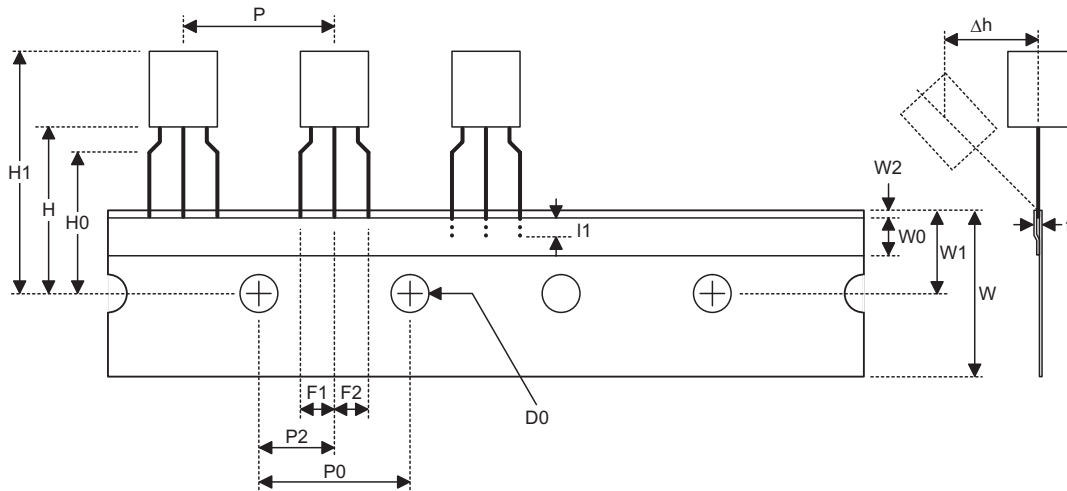


SOT23-5

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	178.0±1.0
B	Reel Inner Diameter	62.0±1.0
C	Spindle Hole Diameter	13.0±0.2
D	Key Slit Width	2.50±0.25
T1	Space Between Flange	8.4 ^{+1.5/-0.0}
T2	Reel Thickness	11.4 ^{+1.5/-0.0}

SOT89

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	180.0±1.0
B	Reel Inner Diameter	62.0±1.5
C	Spindle Hole Diameter	12.75 ^{+0.15/-0.00}
D	Key Slit Width	1.90±0.15
T1	Space Between Flange	12.4 ^{+0.2/-0.0}
T2	Reel Thickness	17.0 ^{+0.0/-0.4}

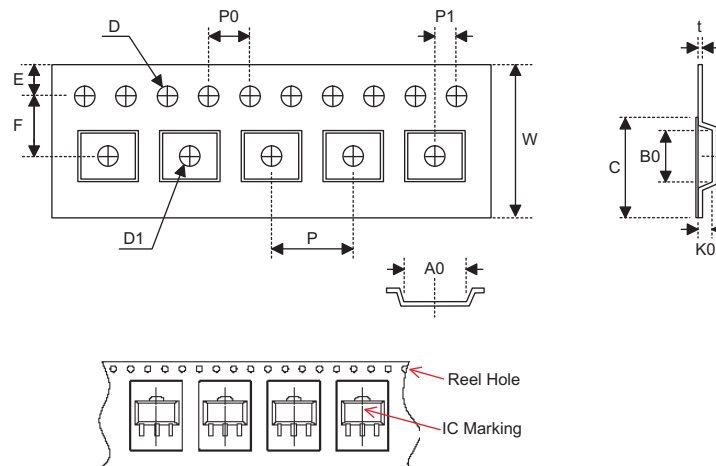
Carrier Tape Dimensions

TO92

Symbol	Description	Dimensions in mm
l1	Taped Lead Length	(2.5)
P	Component Pitch	12.7±1.0
P ₀	Perforation Pitch	12.7±0.3
P ₂	Component to Perforation (Length Direction)	6.35±0.40
F ₁	Lead Spread	2.5 ^{+0.4/-0.1}
F ₂	Lead Spread	2.5 ^{+0.4/-0.1}
Δh	Component Alignment	0.0±0.1
W	Carrier Tape Width	18.0 ^{+1.0/-0.5}
W ₀	Hold-down Tape Width	6.0±0.5
W ₁	Perforation Position	9.0±0.5
W ₂	Hold-down Tape Position	(0.5)
H ₀	Lead Clinch Height	16.0±0.5
H ₁	Component Height	Less than 24.7
D ₀	Perforation Diameter	4.0±0.2
t	Taped Lead Thickness	0.7±0.2
H	Component Base Height	19.0±0.5

Note: Thickness less than 0.38±0.05mm~0.5mm

P₀ Accumulated pitch tolerance: ±1mm/20pitches.

() Bracketed figures are for consultation only

Carrier Tape Dimensions

SOT23-5

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	8.0±0.3
P	Cavity Pitch	4.0±0.1
E	Perforation Position	1.75±0.10
F	Cavity to Perforation (Width Direction)	3.50±0.05
D	Perforation Diameter	1.5 ^{+0.1/-0.0}
D1	Cavity Hole Diameter	1.5 ^{+0.1/-0.0}
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.00±0.05
A0	Cavity Length	3.15±0.10
B0	Cavity Width	3.2±0.1
K0	Cavity Depth	1.4±0.1
t	Carrier Tape Thickness	0.20±0.03
C	Cover Tape Width	5.3±0.1

SOT89

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	12.0 ^{+0.3/-0.1}
P	Cavity Pitch	8.0±0.1
E	Perforation Position	1.75±0.10
F	Cavity to Perforation (Width Direction)	5.50±0.05
D	Perforation Diameter	1.5 ^{+0.1/-0.0}
D1	Cavity Hole Diameter	1.5 ^{+0.1/-0.0}
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	4.8±0.1
B0	Cavity Width	4.5±0.1
K0	Cavity Depth	1.8±0.1
t	Carrier Tape Thickness	0.300±0.013
C	Cover Tape Width	9.3±0.1