

ML6102 Series Positive Voltage Detector (Inverted Output)

❖ Application

- ◆ Memory Battery Back-up Circuits
- ◆ Power Failure Detection
- ◆ Power-on Reset Circuit
- ◆ System Battery Life and Charge Voltage Monitor

❖ Features

- CMOS Low Power Consumption : Typical 1.0uA at $V_{in}=2.0V$
- Selectable Detect Voltage : 1.1V to 6.0V in 0.1V increments
- Highly Accurate : Detect Voltage 1.1V to 1.9V $\pm 3\%$
Detect Voltage 2.0V to 6.0V $\pm 2\%$
- Operating Voltage : 0.8V to 10.0V
- Package Available : SOT23 (150mW), SOT89 (500mW) & TO92 (300mW)

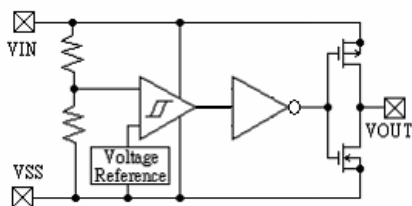
❖ General Description

The ML6102 is a group of high-precision and low-power voltage detectors.

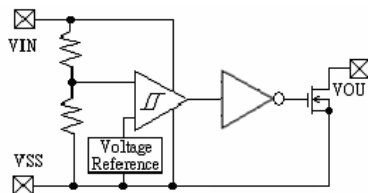
The ML6102 consists of a highly-accurate and low-power reference voltage source, a comparator, a hysteresis circuit, and an output driver. Detect voltage is very accurate and stable with N-channel open drain and CMOS, are available. Output Voltage is in inverted sense compared with ML61 series voltage detector.

❖ Block Diagram

(1) CMOS Output



(2) N-Channel Open Drain Output



❖ Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units
Input Voltage	V_{IN}	10	V
Output Current	I_{OUT}	50	mA
Output Voltage	V_{OUT}	$V_{SS}-0.3 \sim V_{IN}+0.3$	V
Continuous Total Power Dissipation	P_d	SOT-23	150
		SOT-89	500
		TO-92	300
Operating Ambient Temperature	T_{opr}	-40 ~ +70	$^{\circ}C$
Storage Temperature	T_{stg}	-40 ~ +70	$^{\circ}C$

❖ Electrical Characteristics

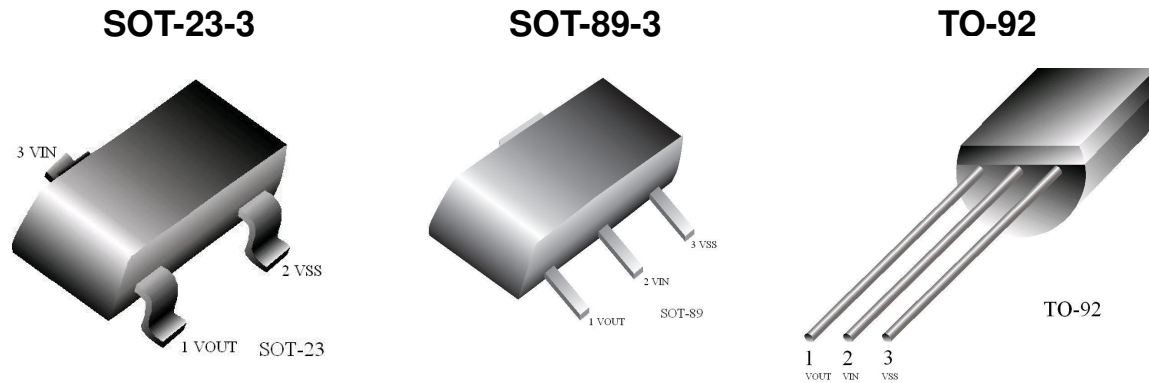
<i>Parameter</i>	<i>Symbol</i>	<i>Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Units</i>
<i>Detect Voltage</i>	V_{DF}	$V_{DF} = 1.1V \text{ to } 1.9V$	X0.97	V_{DF}	X1.03	V
		$V_{DF} = 2.0V \text{ to } 7.0V$	X0.98	V_{DF}	X1.02	V
<i>Hysteresis Range</i>	V_{HYS}	$V_{DF} = 1.1V \text{ to } 2.9V$	X0.04	$V_{DF} \times 0.05$	X0.06	V
		$V_{DF} = 3.0V \text{ to } 7.0V$	X0.015	$V_{DF} \times 0.025$	X0.035	V
<i>Supply Current</i>	I_{SS}	$V_{IN} = 1.0V$		0.8	2.0	uA
		$V_{IN} = 2.0V$		1.0	2.5	
		$V_{IN} = 3.0V$		1.3	3.0	
		$V_{IN} = 4.0V$		1.6	3.5	
		$V_{IN} = 5.0V$		2.0	4.0	
<i>Operating Voltage</i>	V_{IN}	$V_{DF} = 1.1 \sim 7.0V$	0.8		10.0	V
<i>Output Current</i>	I_{OUT}	<i>Nch</i>	$V_{DS} = 0.5V$		1.0	mA
			$V_{IN} = 1.0V$		3.0	
			$V_{IN} = 2.0V$		5.0	
			$V_{IN} = 3.0V$		11.0	
			$V_{IN} = 4.0V$		13.0	
			$V_{IN} = 5.0V$			
	<i>Pch</i>			$V_{DS} = 1.0V$		-5.0
			$V_{IN} = 5.0V$			
			(CMOS Output)			
<i>Transient Delay Time</i> ($V_{DR} \rightarrow V_{OUT}$ Inversion)	t_{DLY}	<i>While V_{IN} changes from 0.6V to 10V</i>			0.2	ms

❖ Electrical Characteristics By Detector Threshold

Part Number	Standard Detector Accuracy	Detector Threshold			Hysteresis Range		Supply Current											
		V _{DF} (V)			V _{HYS} (V)		I _{SS} (uA)											
		MIN.	TYP.	MAX.	MIN.	MAX.	Condition	TYP.	MAX.									
ML6102X113XX	3%	1.067	1.100	1.133	V _{DF} x 0.04	V _{DF} x 0.06	V _{IN} = 1.0V	0.8	2.0									
ML6102X123XX																		
ML6102X133XX																		
ML6102X143XX																		
ML6102X153XX																		
ML6102X163XX																		
ML6102X173XX																		
ML6102X183XX																		
ML6102X193XX																		
ML6102X202XX																		
ML6102X212XX	2%	2.058	2.100	2.142	V _{DF} x 0.015	V _{DF} x 0.035	V _{IN} = 2.0V	1.0	2.5									
ML6102X222XX																		
ML6102X232XX																		
ML6102X242XX																		
ML6102X252XX																		
ML6102X262XX																		
ML6102X272XX																		
ML6102X282XX																		
ML6102X292XX																		
ML6102X302XX																		
ML6102X312XX		3%	3.038	3.100			3.162	V _{DF} x 0.015	V _{DF} x 0.035	V _{IN} = 3.0V	1.3	3.0						
ML6102X322XX																		
ML6102X332XX																		
ML6102X342XX																		
ML6102X352XX																		
ML6102X362XX																		
ML6102X372XX			2%	3.626			3.700			3.774	V _{DF} x 0.015	V _{DF} x 0.035	V _{IN} = 4.0V	1.6	3.5			
ML6102X382XX																		
ML6102X392XX																		
ML6102X402XX																		
ML6102X412XX																		
ML6102X422XX																		
ML6102X432XX				3%			4.214			4.300			4.386	V _{DF} x 0.015	V _{DF} x 0.035	V _{IN} = 5.0V	2.0	4.0
ML6102X442XX																		
ML6102X452XX																		
ML6102X462XX																		
ML6102X472XX																		
ML6102X482XX																		
ML6102X492XX																		
ML6102X502XX																		
ML6102X512XX																		
ML6102X522XX																		
ML6102X532XX	2%	5.194	5.300	5.406	V _{DF} x 0.015	V _{DF} x 0.035	V _{IN} = 5.0V	2.0	4.0									
ML6102X542XX																		
ML6102X552XX																		
ML6102X562XX																		
ML6102X572XX																		
ML6102X582XX																		
ML6102X592XX																		
ML6102X602XX																		

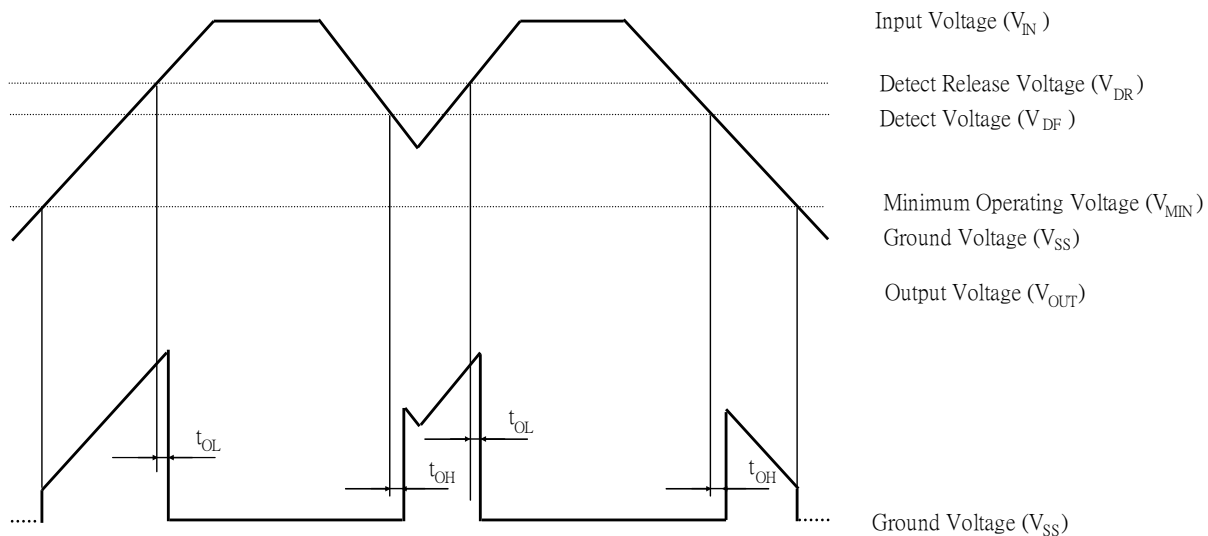
Part Number	Operating Voltage		Pch Output Current		Nch Output Current		Transient Delay Time
	V_{IN} (V)		Pch I_{OUT} (mA)		Nch I_{OUT} (mA)		t_{DLY} (ms)
	MIN.	MAX.	Condition	TYP.	Condition	TYP.	MAX.
ML6102X113XX	0.8V	10V	$V_{DS} = 1.0V$ $V_{IN} = 5.0V$	-5.0	$V_{DS} = 0.5V$ $V_{IN} = 1.0V$	1.0	0.2
ML6102X123XX							
ML6102X133XX							
ML6102X143XX							
ML6102X153XX							
ML6102X163XX							
ML6102X173XX							
ML6102X183XX							
ML6102X193XX							
ML6102X202XX							
ML6102X212XX							
ML6102X222XX							
ML6102X232XX							
ML6102X242XX							
ML6102X252XX							
ML6102X262XX							
ML6102X272XX							
ML6102X282XX							
ML6102X292XX							
ML6102X302XX							
ML6102X312XX							
ML6102X322XX							
ML6102X332XX							
ML6102X342XX							
ML6102X352XX							
ML6102X362XX							
ML6102X372XX							
ML6102X382XX							
ML6102X392XX							
ML6102X402XX							
ML6102X412XX							
ML6102X422XX							
ML6102X432XX							
ML6102X442XX							
ML6102X452XX							
ML6102X462XX							
ML6102X472XX							
ML6102X482XX							
ML6102X492XX							
ML6102X502XX							
ML6102X512XX							
ML6102X522XX							
ML6102X532XX							
ML6102X542XX							
ML6102X552XX							
ML6102X562XX							
ML6102X572XX							
ML6102X582XX							
ML6102X592XX							
ML6102X602XX							

❖ *Pin Configuration*



Package Pin Number			Pin Name	Function
SOT-23-3	SOT-89-3	TO-92		
1	1	1	VOUT	Supply Voltage Output
3	2	2	VIN	Supply Voltage Input
2	3	3	VSS	Ground

❖ *Functional Description (Refers to CMOS Output)*



Notes :

1. Output cannot be specified for power supply voltage under V_{MIN} (ie. 0.8V) because operation is not guaranteed for that range.
2. V_{DF} : Detect Voltage for drop in power supply voltage
3. V_{DR} : Detect Release Voltage for rise in power supply voltage
4. $V_{HYS} = V_{DR} - V_{DF}$
5. t_{OL} : Time lag between the time that the power supply voltage rises to the detect release voltage (V_{DR}) and the time that the output pin (OUT) goes to “L” level.
6. t_{OH} : Time lag between the time that the power supply voltage falls to the detect voltage (V_{DF}) and the time that the output pin (OUT) goes to “H” level.
7. These characteristics for the N-channel open drain output are when a load resistor is connected between the OUT and IN pins.

❖ Ordering Information

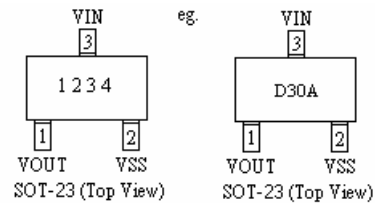
Designator	Description
a	Output Configuration C = CMOS Output N = N-Channel Output
b	Detect Voltage eg. 30=3.0V 50=5.0V
c	Detect Voltage Accuracy 2 = ±2.0% 3 = ±3.0%
d	Package Type M = SOT-23-3 P = SOT-89 T = TO-92
e	Device Orientation R = Embossed Tape (Orientation of Device : Right) L = Embossed Tape (Orientation of Device : Left) B = Bag (TO-92) H = Paper Tape (TO-92)
G	G = Lead Free Part

ML6102 x x x x x x G
 † † † † † †
 a b c d e

❖ Marking

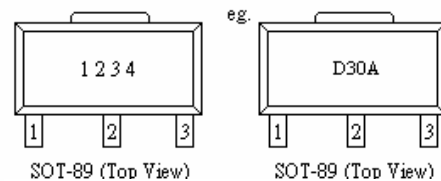
SOT-23-3 :

Designator	Description
1	Type D = Voltage Detector (CMOS Output) E = Voltage Detector (N-channel Output)
2,3	Output Voltage eg. 30 = 3.0V
4	Internal Code



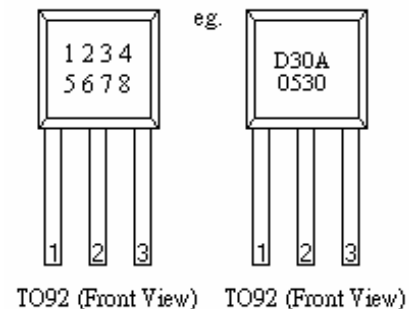
SOT-89-3 :

Designator	Description
1	Type D = Voltage Detector (CMOS Output) E = Voltage Detector (N-channel Output)
2,3	Output Voltage eg. 30 = 3.0V
4	Internal Code

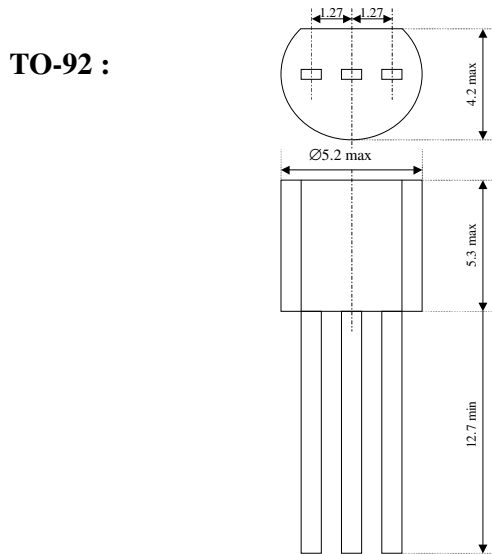
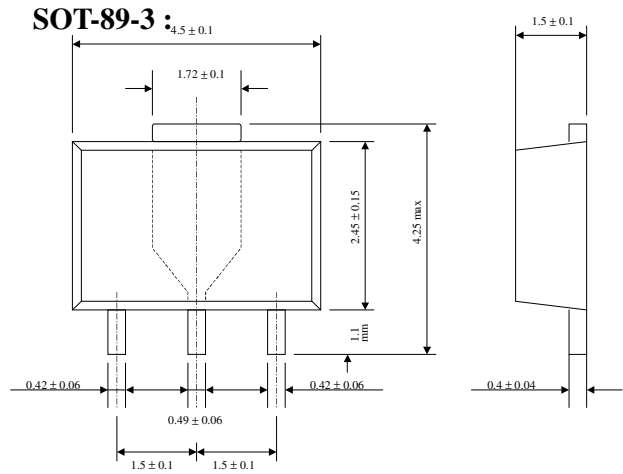
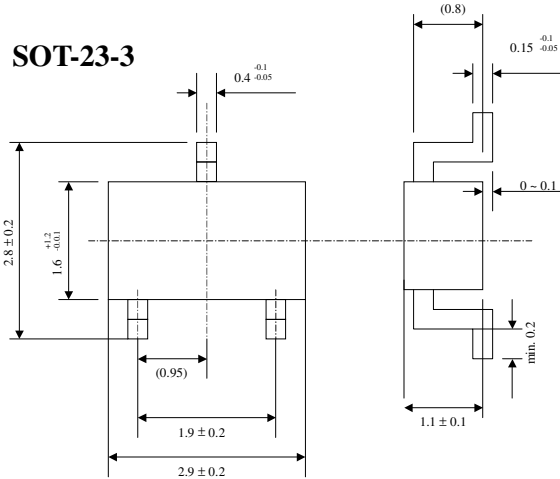


TO-92 :

Designator	Description
1	Type D = Voltage Detector (CMOS Output) E = Voltage Detector (N-channel Output)
2,3	Output Voltage eg. 30 = 3.0V
4	Internal code
5, 6	Year Code eg. 05 = Year 2005
7, 8	Week Code eg. 30 = Week 30



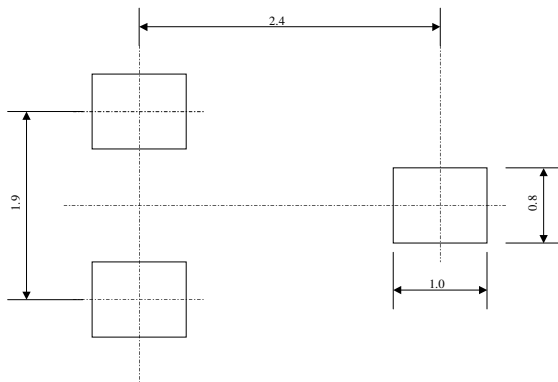
❖ *Packaging Information*



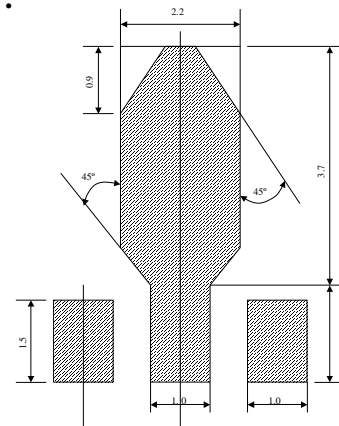
Units : mm

❖ *Recommended Pattern Layout*

SOT-23-3 :

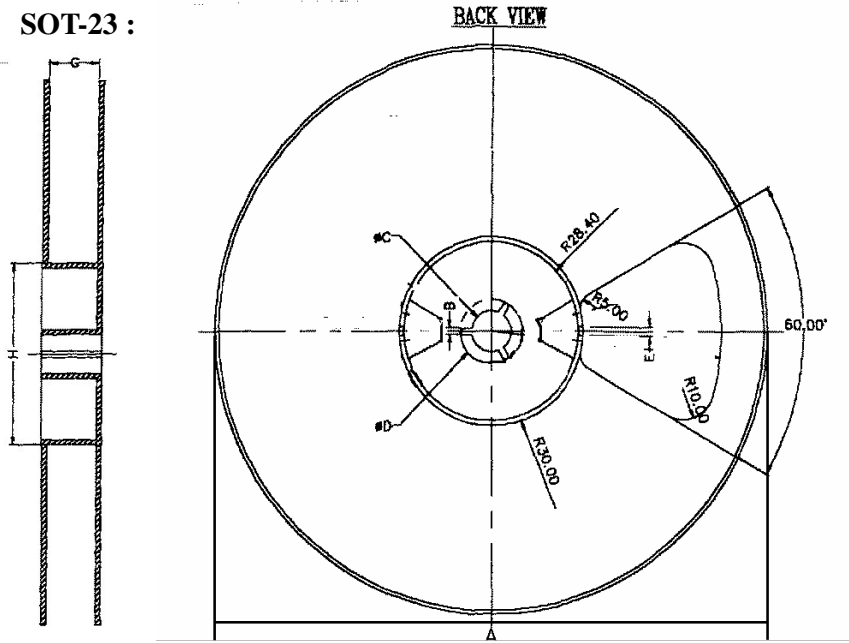


SOT-89-3 :



❖ *Tape and Reel Information*

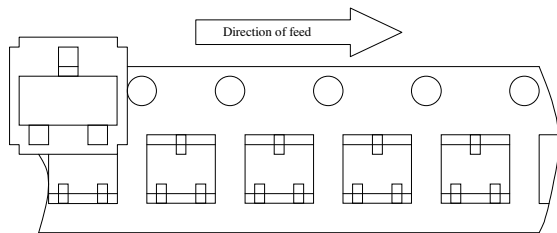
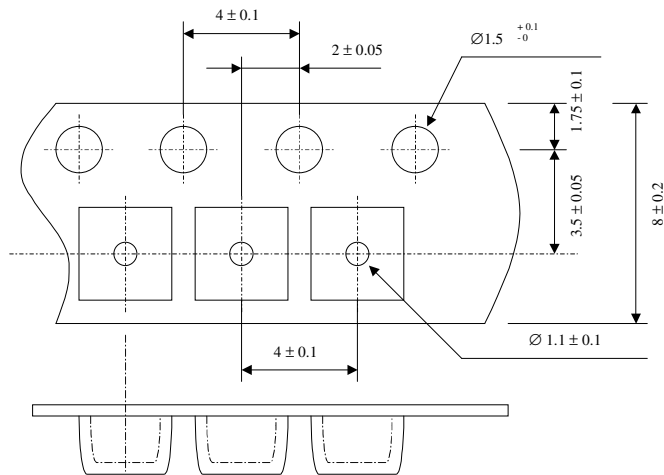
SOT-23 :



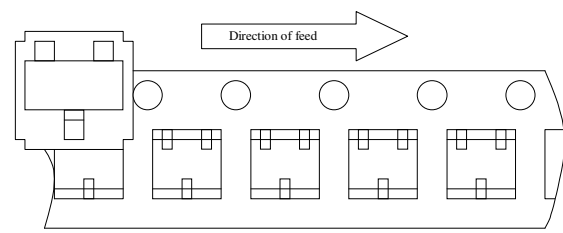
	SIZE (mm)
A	∅ 178 ± 0.8
B	2 ± 0.2
C	∅ 13 ± 0.2
D	∅ 21 ± 0.8
G	8 ± 0.5
H	∅ 60

3,000 pcs / reel

SOT-23 Taping Specifications :

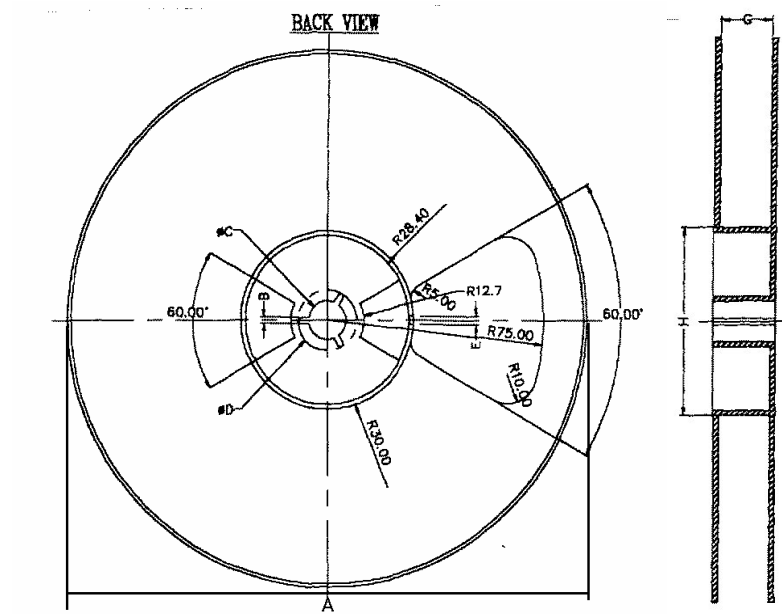


"R" type [Orientation of Device: Right]
Standard Type



"L" type [Orientation of Device: Left]
Reverse Type

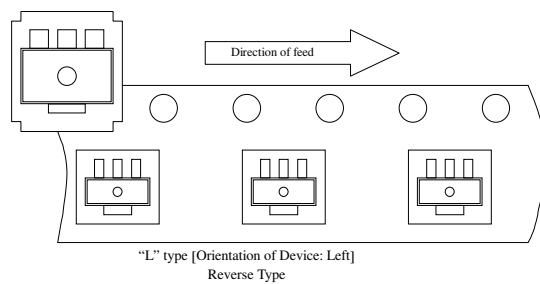
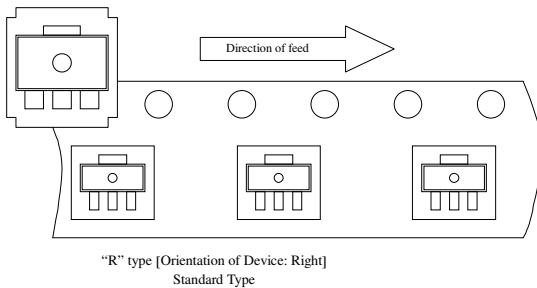
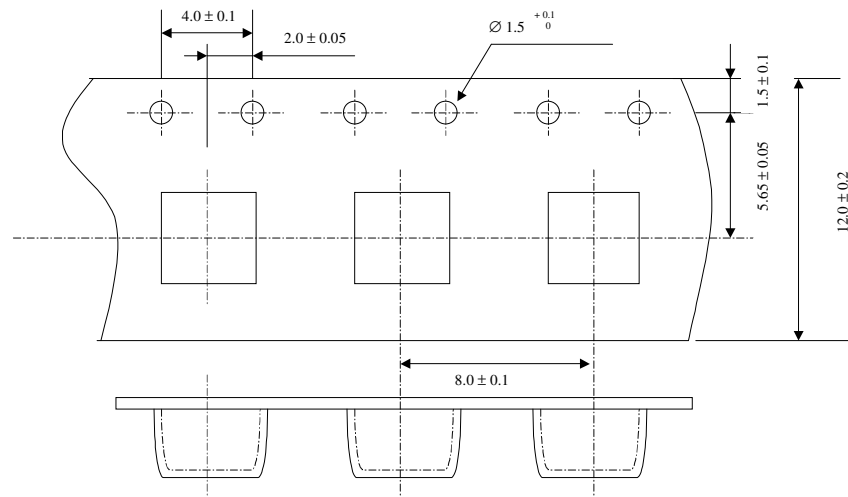
SOT-89 :

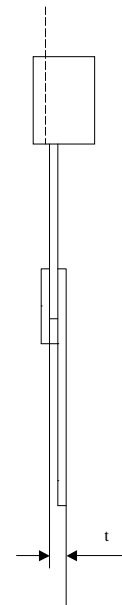
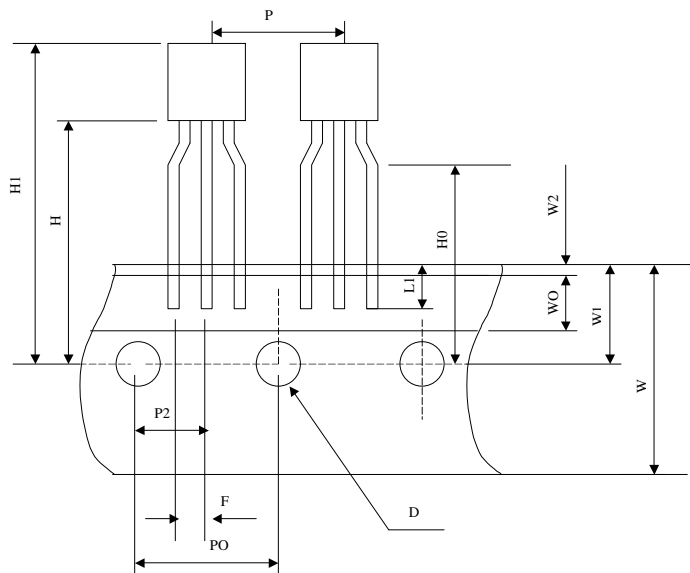


	SIZE (mm)
A	∅ 178 ± 0.8
B	2 ± 0.2
C	∅ 13 ± 0.2
D	∅ 21 ± 0.8
G	12 ± 0.5
H	∅ 60

1,000 pcs / reel

SOT-89 Taping Specifications :



TO-92 Taping Specifications :


	SIZE (mm)
P	12.7 ± 1.0
PO	12.7 ± 0.3
P2	6.35 ± 0.4
F	2.5 ^{+0.45} _{-0.15}
W	18.0 ± 1.0
W0	6.0 ± 0.3
W1	9.0 ± 0.5
W2	0.5 MAX
H	19.0 ± 0.5
H0	16.0 ± 0.5
H1	32.25 MAX
D	∅ 4.0 ± 0.2
t	0.6 ± 0.2
L1	3.5 MIN

2,000 pcs / box

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use.