

**General Purpose NPN Epitaxial Planar Transistor**

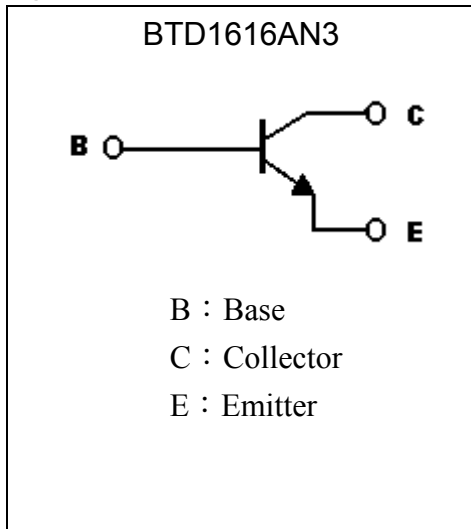
# BTD1616AN3

$BV_{CEO}$	60V
$I_C$	3A

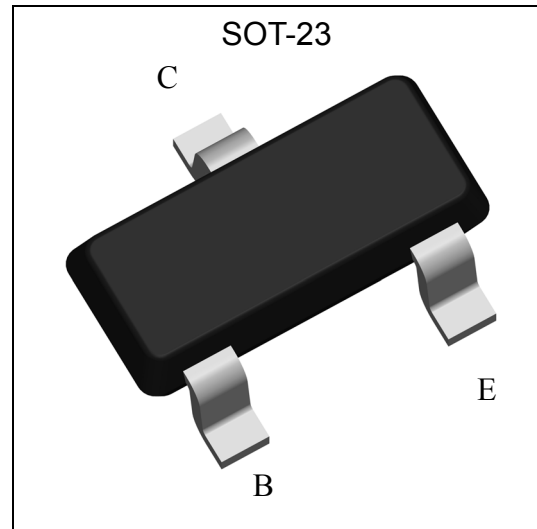
**Features**

- High breakdown voltage,  $BV_{CEO} \geq 60V$
- Large continuous collector current capability
- Low collector saturation voltage
- Pb-free lead plating and halogen-free package

**Symbol**

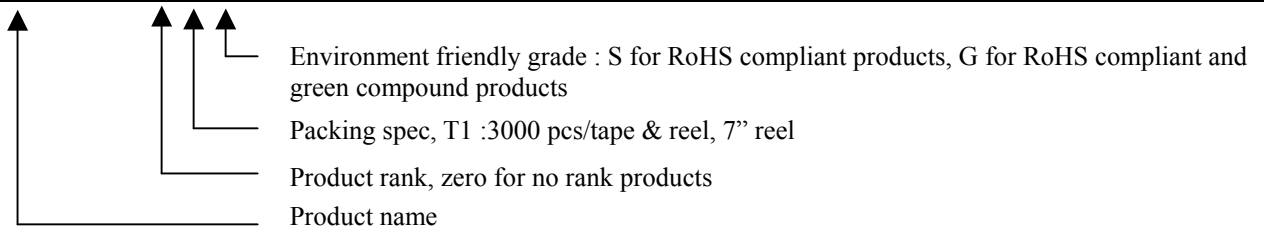


**Outline**



**Ordering Information**

Device	Package	Shipping
BTD1616AN3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel





**Absolute Maximum Ratings** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V <sub>CB0</sub>	120	V
Collector-Emitter Voltage	V <sub>CEO</sub>	60	
Emitter-Base Voltage	V <sub>EBO</sub>	7	
Collector Current (DC)	I <sub>C</sub>	3	A
Collector Current (pulse)	I <sub>CP</sub>	5	
Base Current	I <sub>B</sub>	0.5	
Power Dissipation	P <sub>D</sub>	310 (Note 1)	mW
		500 (Note 2)	
		660 (Note 3)	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	403 (Note 1)	°C/W
		250 (Note 2)	
		190 (Note 3)	
Operating Junction and Storage Temperature Range	T <sub>J</sub> ; T <sub>stg</sub>	-55~+150	°C

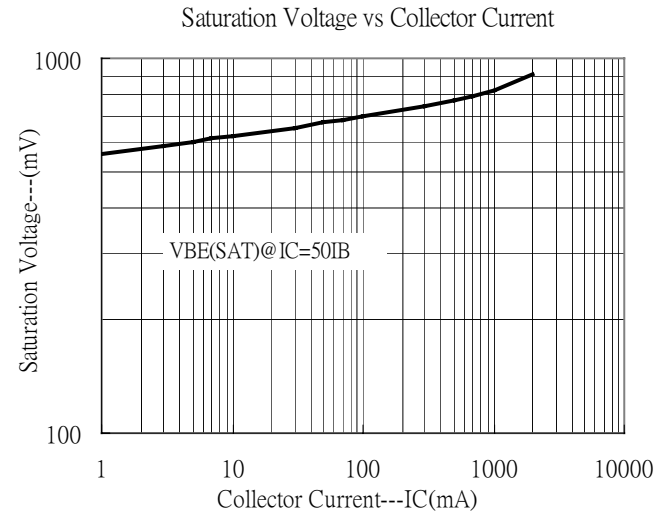
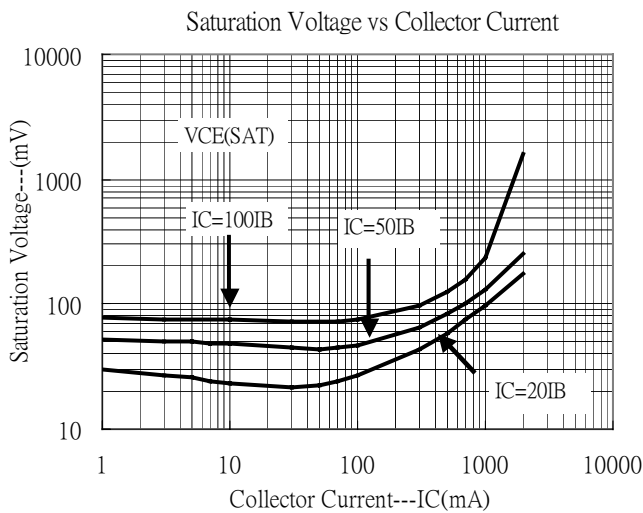
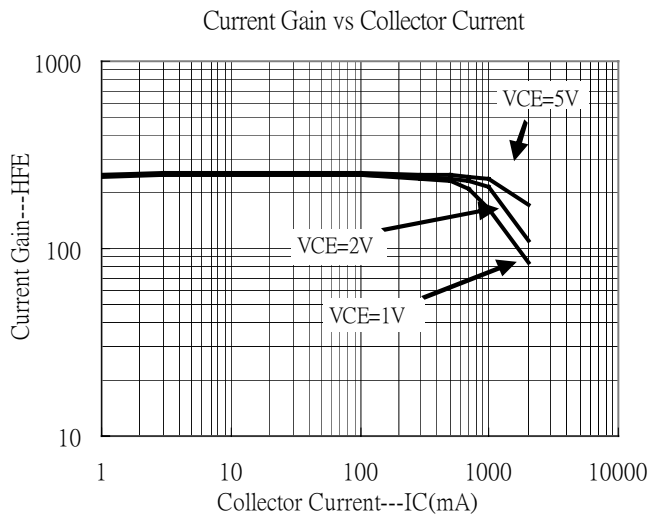
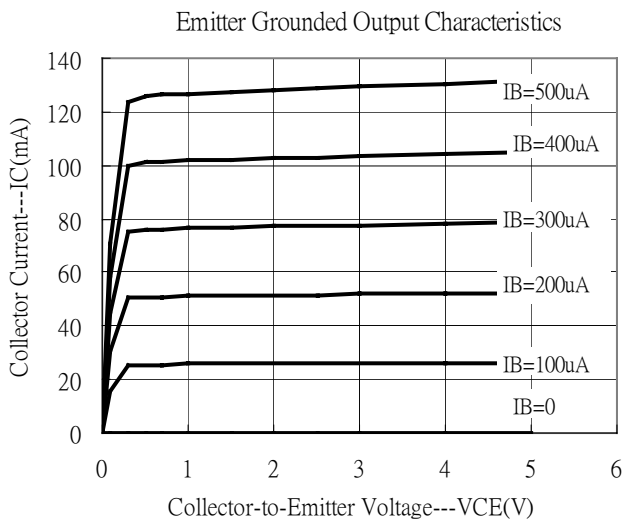
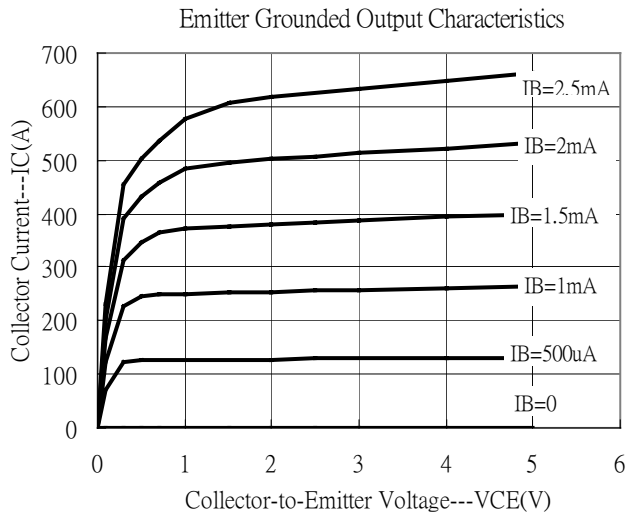
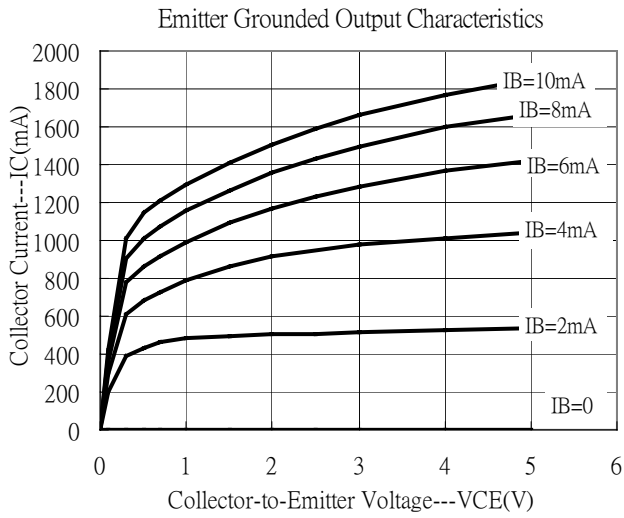
- Note : 1. Device mounted on FR-4 PCB with minimum pad.  
 2. Device mounted on FR-4 PCB with area of 4.5”x5”, mounting pad 0.02 in<sup>2</sup> of 2 oz. copper.  
 3. Device mounted on an FR-4 PCB, single sided copper, tin plated, mounting pad for collector 1cm<sup>2</sup>.

**Characteristics** (Ta=25°C)

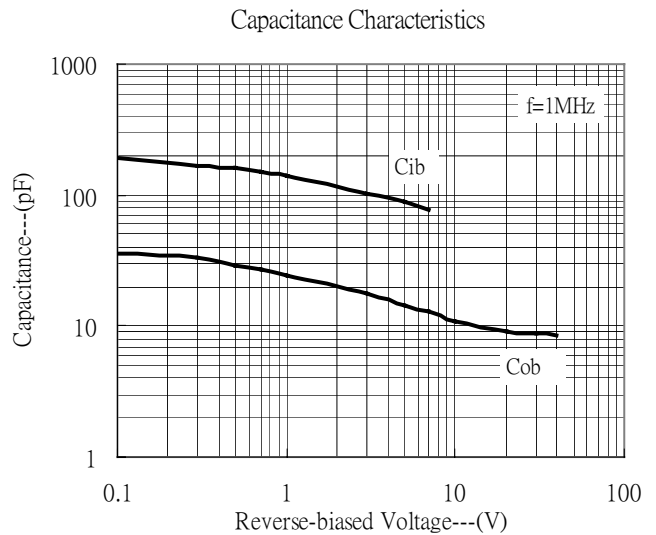
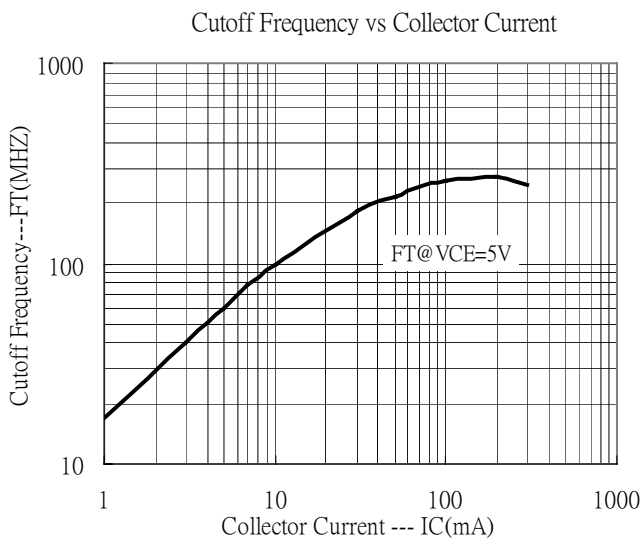
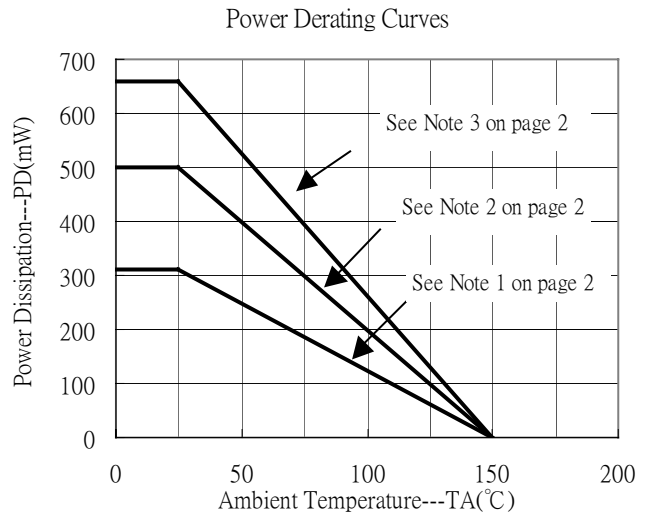
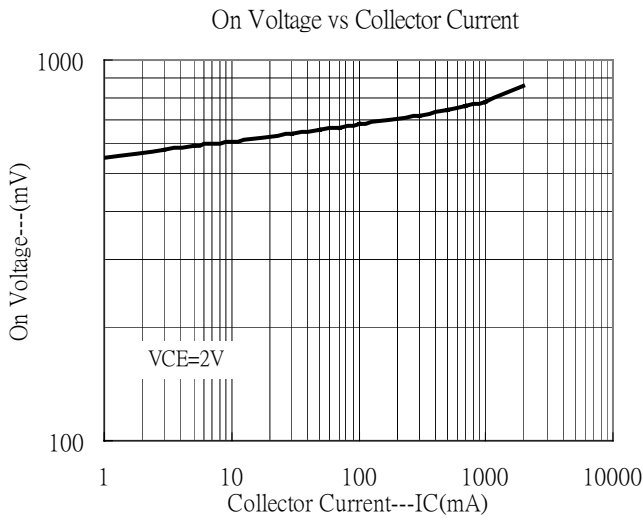
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CB0</sub>	120	-	-	V	I <sub>C</sub> =100μA
BV <sub>CEO</sub>	60	-	-	V	I <sub>C</sub> =1mA
BV <sub>EBO</sub>	7	-	-	V	I <sub>E</sub> =50μA
I <sub>CB0</sub>	-	-	100	nA	V <sub>CB</sub> =120V
I <sub>EBO</sub>	-	-	100	nA	V <sub>EB</sub> =7V
*V <sub>CE(sat)</sub>	-	98	150	mV	I <sub>C</sub> =1A, I <sub>B</sub> =50mA
*V <sub>CE(sat)</sub>	-	131	200	mV	I <sub>C</sub> =1A, I <sub>B</sub> =20mA
*V <sub>CE(sat)</sub>	-	90	250	mV	I <sub>C</sub> =1A, I <sub>B</sub> =100mA
*V <sub>CE(sat)</sub>	-	150	300	mV	I <sub>C</sub> =2A, I <sub>B</sub> =200mA
*V <sub>BE(sat)</sub>	-	-	1	V	I <sub>C</sub> =1A, I <sub>B</sub> =50mA
*V <sub>BE(sat)</sub>	-	-	1.2	V	I <sub>C</sub> =1A, I <sub>B</sub> =100mA
*V <sub>BE(on)</sub>	-	-	1	V	V <sub>CE</sub> =2V, I <sub>C</sub> =1A
*h <sub>FE</sub> 1	150	-	-	-	V <sub>CE</sub> =2V, I <sub>C</sub> =100mA
*h <sub>FE</sub> 2	180	-	390	-	V <sub>CE</sub> =2V, I <sub>C</sub> =500mA
*h <sub>FE</sub> 3	100	-	-	-	V <sub>CE</sub> =2V, I <sub>C</sub> =1A
*h <sub>FE</sub> 4	50	-	-	-	V <sub>CE</sub> =2V, I <sub>C</sub> =2A
f <sub>T</sub>	100	-	-	MHz	V <sub>CE</sub> =2V, I <sub>C</sub> =100mA, f=100MHz
Cob	-	11	18	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHz
ton	-	40	-	ns	V <sub>CC</sub> =30V, I <sub>C</sub> =1A, I <sub>B1</sub> =-I <sub>B2</sub> =33mA, RL=30Ω
tstg	-	500	-		
tf	-	120	-		

\*Pulse Test: Pulse Width ≤380μs, Duty Cycles≤2%

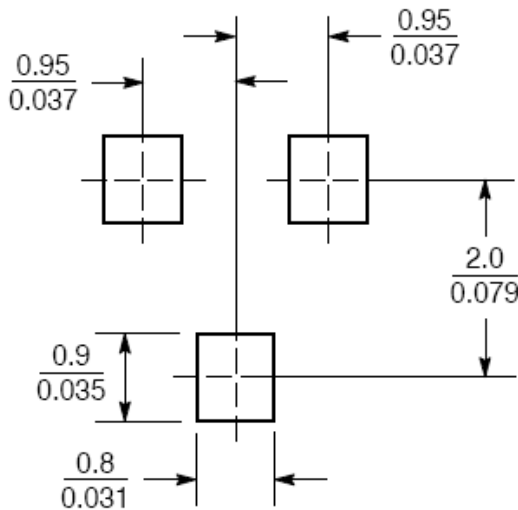
## Typical Characteristics



**Typical Characteristic Curves(Cont.)**

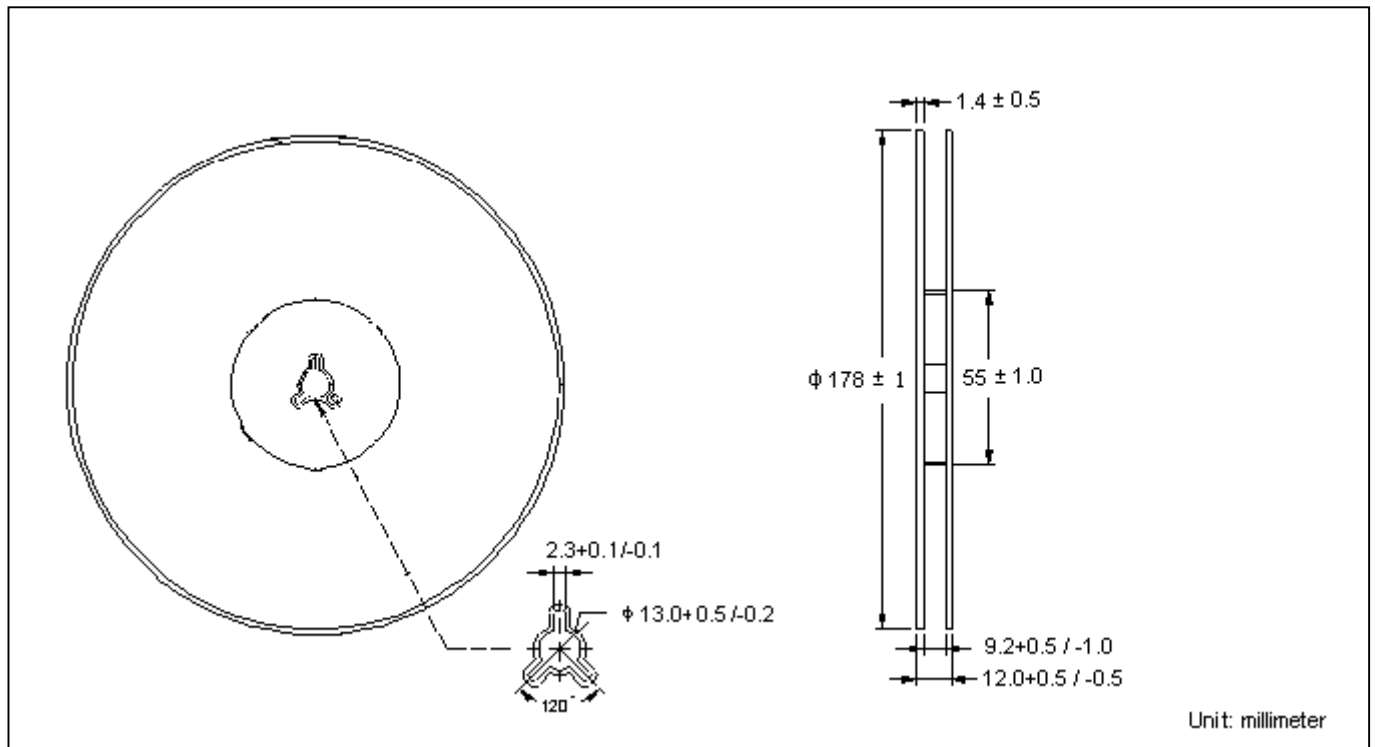


**Recommended soldering footprint**

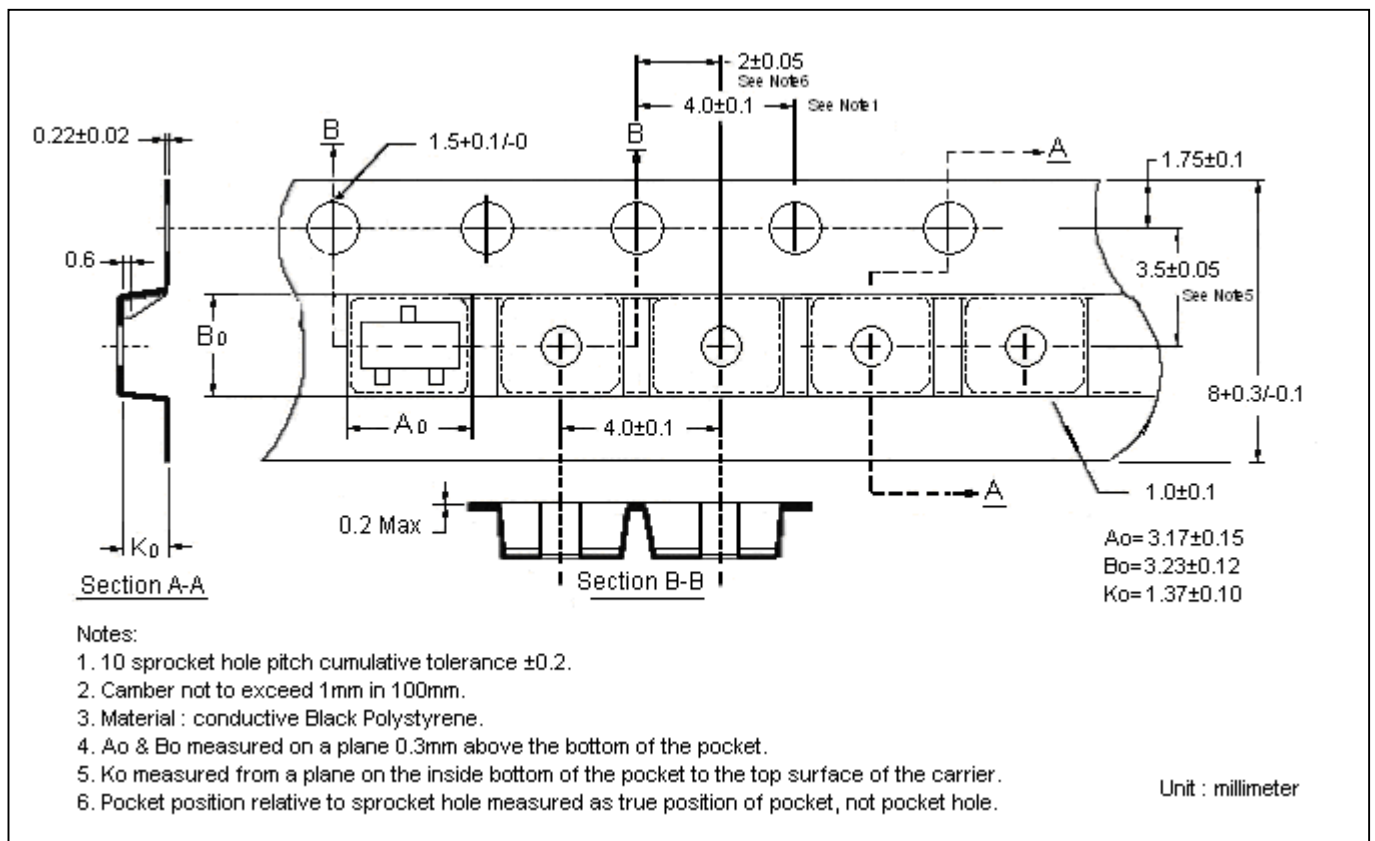


Unit :  $\frac{\text{mm}}{\text{inches}}$

### Reel Dimension



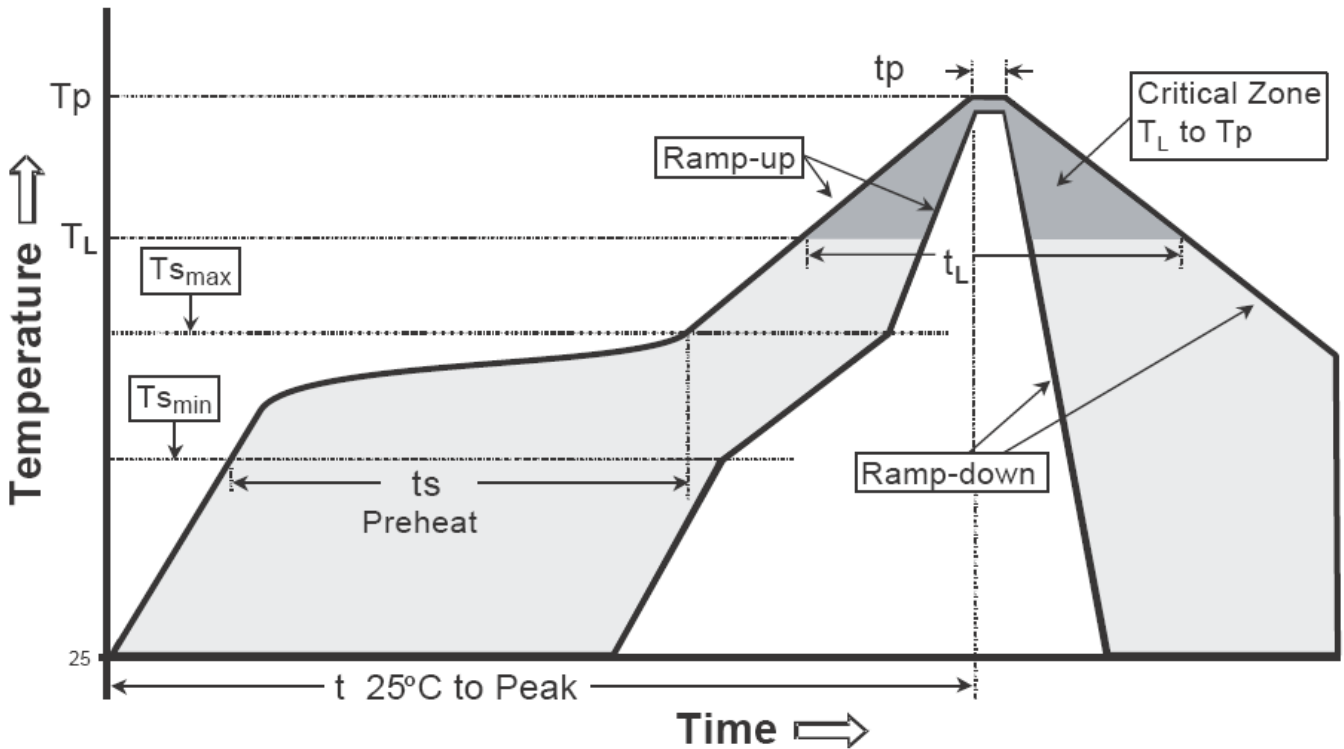
### Carrier Tape Dimension



**Recommended wave soldering condition**

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

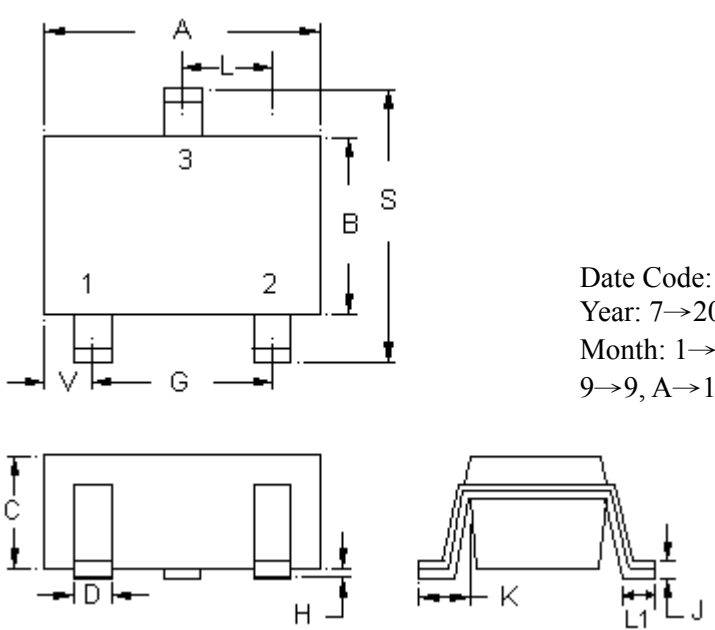
**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

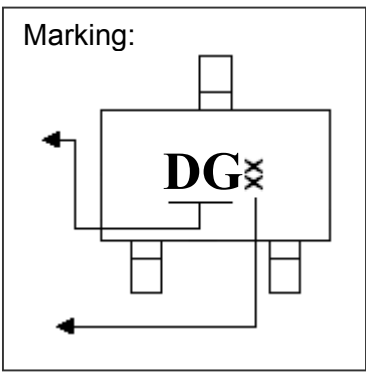
Note : All temperatures refer to topside of the package, measured on the package body surface.

**SOT-23 Dimension**



The diagram shows three views of the SOT-23 package: a top view with dimensions A, L, B, S, 1, 2, 3, V, and G; a side view with dimensions C, D, H, and J; and a perspective view with dimensions K, L1, and L2. The top view labels 1, 2, and 3 correspond to the pins Base, Emitter, and Collector respectively.

**Marking:**



The marking diagram shows a rectangular package with a central marking 'DG' and a small symbol to its right. Arrows point to the locations of the three pins.

**Product Code**

**Date Code: Year+Month**  
 Year: 7→2017, 8→2018  
 Month: 1→1, 2→2, . . .  
 9→9, A→10, B→11, C→12

**3-Lead SOT-23 Plastic Surface Mounted Package**  
 CYStek Package Code: N3

**Style : Pin 1.Base 2.Emitter 3.Collector**

\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0032	0.0079	0.08	0.20
B	0.0472	0.0669	1.20	1.70	K	0.0118	0.0266	0.30	0.67
C	0.0335	0.0512	0.89	1.30	L	0.0335	0.0453	0.85	1.15
D	0.0118	0.0197	0.30	0.50	S	0.0830	0.1161	2.10	2.95
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0000	0.0040	0.00	0.10	L1	0.0118	0.0197	0.30	0.50

- Notes:** 1.Controlling dimension: millimeters.  
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.  
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

**Material:**

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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