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# 15GN03CA

## RF Transistor

10V, 70mA,  $f_T=1.5\text{GHz}$ , NPN Single CP

### Applications

- VHF, RF, MIXER, OSC, IF amplifier

### Features

- High cutoff frequency :  $f_T=1.5\text{GHz}$  typ
- High gain :  $|S_{21e}|^2=13\text{dB}$  typ ( $f=0.4\text{GHz}$ )

### Specifications

Absolute Maximum Ratings at  $T_a=25^\circ\text{C}$

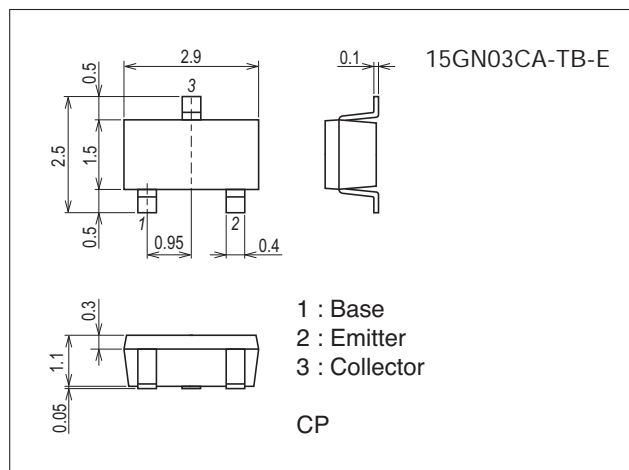
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CB0}$		20	V
Collector-to-Emitter Voltage	$V_{CE0}$		10	V
Emitter-to-Base Voltage	$V_{EB0}$		3	V
Collector Current	$I_C$		70	mA
Collector Dissipation	$P_C$		200	mW
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

unit : mm (typ)

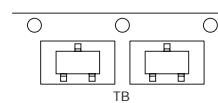
7013A-009



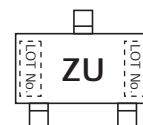
### Product & Package Information

- Package : CP
- JEITA, JEDEC : SC-59, TO-236, SOT-23, TO-236AB
- Minimum Packing Quantity : 3,000 pcs./reel

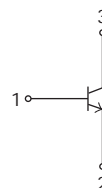
### Packing Type: TB



### Marking



### Electrical Connection



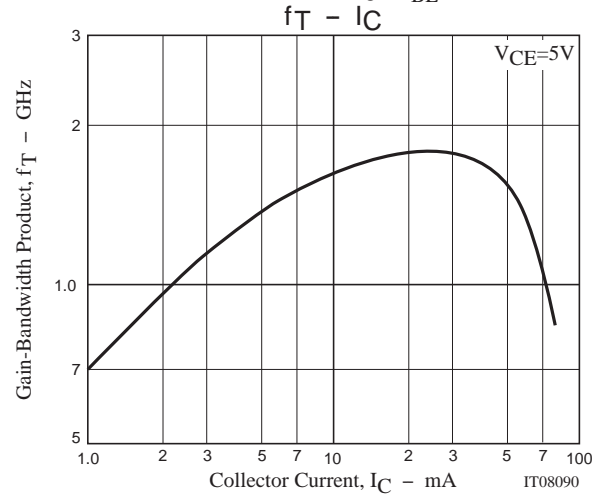
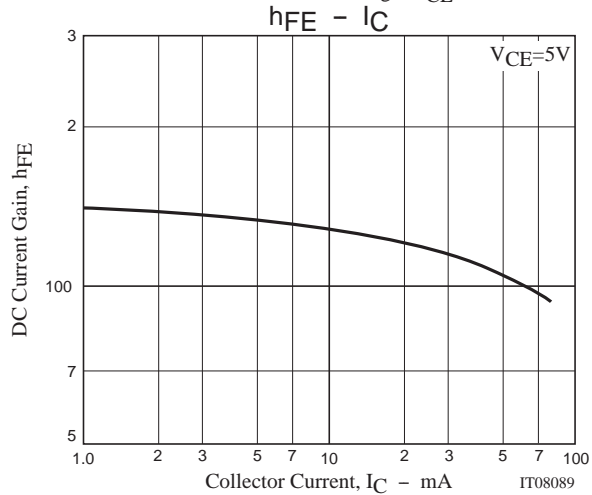
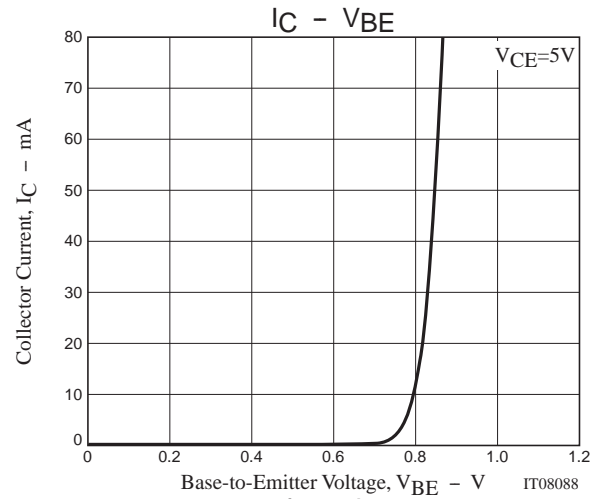
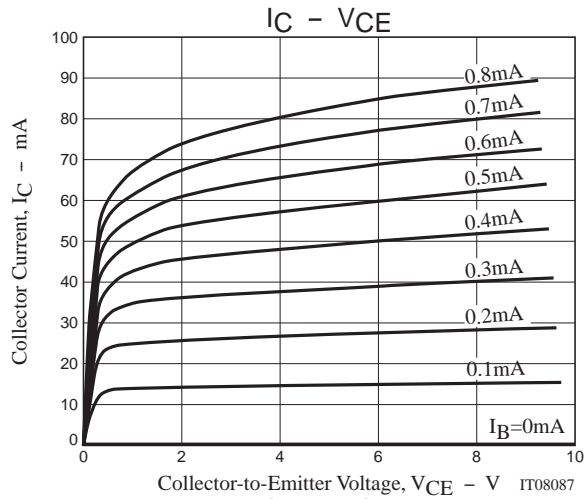
# 15GN03CA

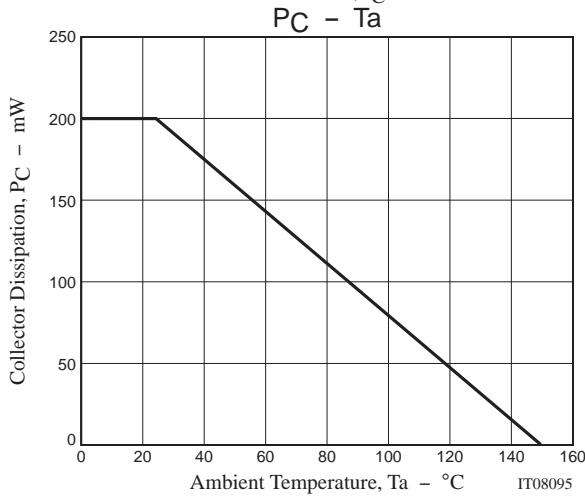
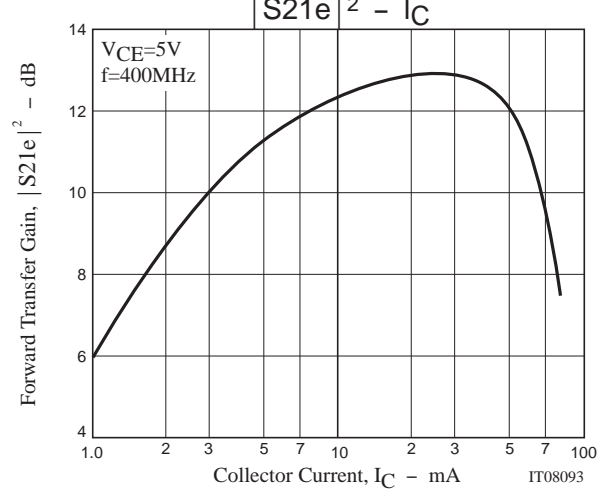
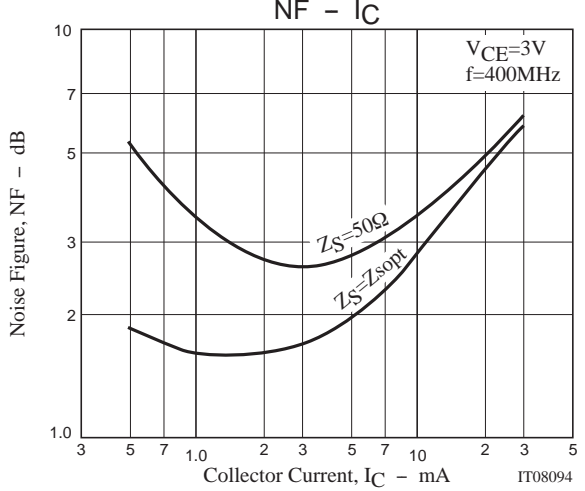
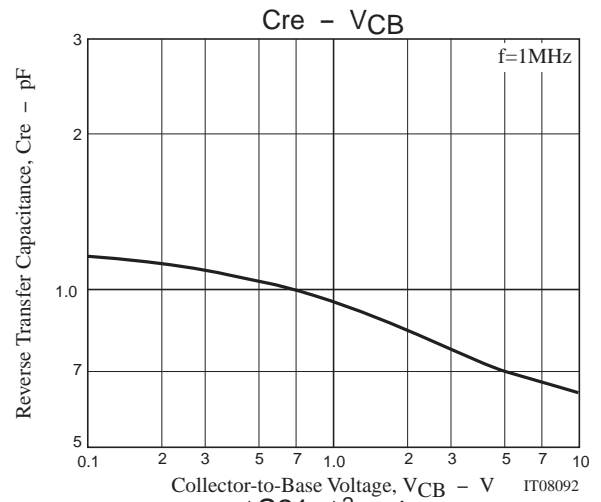
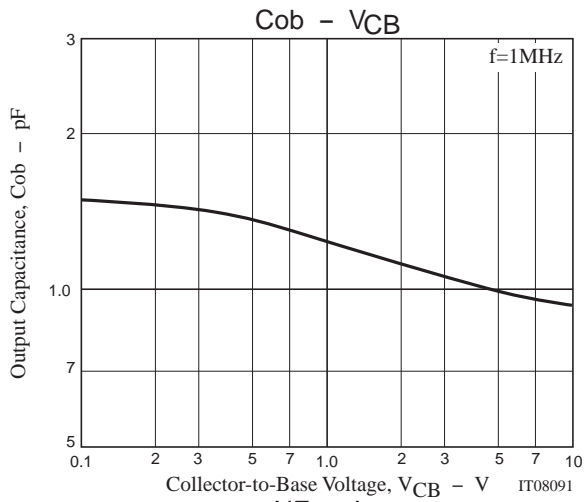
## Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	ICBO	V <sub>CB</sub> =10V, I <sub>E</sub> =0A			0.1	μA
Emitter Cutoff Current	IEBO	V <sub>EB</sub> =2V, I <sub>C</sub> =0A			1	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =10mA	100		180	
Gain-Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =20mA	1.0	1.5		GHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> =10V, f=1MHz		0.95	1.25	pF
Reverse Transfer Capacitance	C <sub>re</sub>			0.65		pF
Forward Transfer Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> =5V, I <sub>C</sub> =20mA, f=0.4GHz	10	13		dB
Noise Figure	NF	V <sub>CE</sub> =3V, I <sub>C</sub> =2mA, f=0.4GHz		1.6		dB

## Ordering Information

Device	Package	Shipping	memo
15GN03CA-TB-E	CP	3,000pcs./reel	Pb Free





# 15GN03CA

## S Parameters (Common emitter)

$V_{CE}=5V$ ,  $I_C=1mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.918	-34.17	3.328	154.00	0.040	67.14	0.963	-9.32
200	0.816	-63.46	2.833	133.91	0.063	50.52	0.897	-15.61
300	0.719	-87.48	2.349	118.47	0.075	39.90	0.847	-19.59
400	0.650	-106.66	1.974	106.31	0.081	33.68	0.816	-22.72
500	0.603	-123.45	1.709	96.50	0.081	30.41	0.795	-25.65
600	0.579	-137.17	1.492	88.62	0.078	30.45	0.785	-28.56
700	0.562	-149.31	1.328	81.55	0.074	30.61	0.779	-31.42
800	0.557	-159.59	1.197	75.34	0.070	34.97	0.777	-34.68
900	0.557	-168.64	1.094	70.12	0.068	41.63	0.773	-38.02
1000	0.560	-176.38	1.003	65.13	0.066	50.34	0.773	-41.22

$V_{CE}=5V$ ,  $I_C=3mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.799	-55.14	7.483	141.00	0.033	59.88	0.886	-14.45
200	0.641	-93.26	5.412	118.03	0.047	44.28	0.773	-18.84
300	0.553	-118.80	4.036	104.19	0.050	40.23	0.719	-21.00
400	0.512	-136.73	3.182	94.58	0.052	40.73	0.693	-22.61
500	0.492	-150.89	2.627	86.95	0.055	44.74	0.683	-24.93
600	0.488	-161.99	2.244	80.86	0.056	49.28	0.677	-27.44
700	0.487	-171.08	1.958	75.25	0.059	55.44	0.675	-30.18
800	0.492	-178.68	1.749	70.37	0.063	62.40	0.675	-33.31
900	0.502	-174.60	1.575	65.89	0.068	67.82	0.674	-36.39
1000	0.508	-168.93	1.433	61.61	0.078	74.10	0.677	-39.25

$V_{CE}=5V$ ,  $I_C=5mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.703	-69.63	10.162	132.63	0.030	54.51	0.821	-16.94
200	0.550	-109.80	6.625	110.25	0.037	43.19	0.704	-19.31
300	0.490	-133.75	4.733	98.16	0.041	44.91	0.660	-20.36
400	0.464	-149.68	3.666	89.82	0.045	49.05	0.643	-21.83
500	0.458	-161.66	3.003	83.25	0.049	56.14	0.635	-23.97
600	0.460	-170.95	2.537	77.83	0.054	60.18	0.632	-26.46
700	0.465	-178.51	2.212	72.71	0.058	65.91	0.631	-29.05
800	0.472	-174.93	1.962	68.10	0.067	71.03	0.633	-32.06
900	0.482	-169.11	1.764	64.09	0.075	76.57	0.634	-35.26
1000	0.491	-164.18	1.602	59.88	0.085	78.96	0.635	-38.26

$V_{CE}=5V$ ,  $I_C=10mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.568	-91.34	13.492	121.50	0.022	51.19	0.729	-18.79
200	0.463	-130.04	7.837	102.18	0.030	50.01	0.628	-18.37
300	0.435	-149.86	5.435	92.29	0.035	56.54	0.598	-18.84
400	0.427	-162.69	4.153	85.23	0.041	59.99	0.587	-20.20
500	0.431	-171.77	3.374	79.57	0.047	67.05	0.586	-22.36
600	0.438	-179.07	2.842	74.63	0.055	70.37	0.585	-24.64
700	0.446	-174.71	2.460	69.90	0.062	74.51	0.587	-27.44
800	0.457	-169.18	2.181	65.54	0.072	78.16	0.588	-30.30
900	0.469	-164.67	1.954	61.61	0.080	80.51	0.592	-33.49
1000	0.482	-160.55	1.775	57.60	0.092	82.60	0.596	-36.43

# 15GN03CA

## S Parameters (Common emitter)

$V_{CE}=5V$ ,  $I_C=15mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.506	-103.02	14.843	116.40	0.020	52.22	0.680	-19.13
200	0.433	-139.11	8.300	98.87	0.027	55.27	0.595	-17.41
300	0.418	-156.74	5.691	89.86	0.032	60.47	0.571	-17.79
400	0.416	-167.49	4.336	83.26	0.040	65.01	0.567	-19.20
500	0.423	-175.59	3.518	77.72	0.047	70.77	0.564	-21.38
600	0.434	177.94	2.949	72.99	0.056	75.36	0.566	-23.76
700	0.441	172.60	2.558	68.36	0.064	77.18	0.566	-26.43
800	0.454	167.70	2.257	64.14	0.073	80.34	0.573	-29.43
900	0.468	163.21	2.026	60.20	0.084	82.23	0.576	-32.58
1000	0.478	159.35	1.833	56.21	0.094	82.82	0.579	-35.40

$V_{CE}=5V$ ,  $I_C=20mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.473	-110.94	15.555	113.24	0.018	48.75	0.651	-18.99
200	0.420	-144.96	8.504	96.80	0.025	55.46	0.577	-16.75
300	0.412	-160.51	5.806	88.35	0.032	64.32	0.556	-16.94
400	0.412	-170.47	4.415	81.97	0.040	69.43	0.553	-18.38
500	0.423	-177.81	3.567	76.52	0.047	73.49	0.552	-20.62
600	0.434	176.33	2.998	72.06	0.054	76.85	0.554	-23.22
700	0.443	171.32	2.597	67.40	0.064	79.43	0.555	-25.76
800	0.457	166.61	2.289	62.99	0.075	80.21	0.562	-28.77
900	0.470	162.56	2.044	58.98	0.084	82.61	0.567	-31.92
1000	0.484	159.03	1.849	54.97	0.095	83.62	0.572	-34.90

$V_{CE}=5V$ ,  $I_C=30mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.444	-121.15	16.032	109.59	0.018	56.45	0.620	-18.33
200	0.414	-151.46	8.590	94.42	0.023	58.54	0.558	-15.68
300	0.413	-164.93	5.826	86.42	0.031	69.33	0.543	-15.93
400	0.418	-173.75	4.420	80.00	0.040	71.41	0.541	-17.58
500	0.429	179.87	3.560	74.72	0.048	75.89	0.545	-19.95
600	0.442	174.95	2.980	69.97	0.056	78.14	0.546	-22.37
700	0.454	170.06	2.575	65.31	0.067	79.78	0.550	-25.11
800	0.467	165.62	2.268	61.02	0.077	81.97	0.556	-27.94
900	0.485	161.83	2.027	57.14	0.086	83.95	0.563	-31.50
1000	0.497	158.27	1.829	53.02	0.096	84.97	0.570	-34.37

$V_{CE}=5V$ ,  $I_C=50mA$ ,  $Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.436	-135.54	15.112	105.16	0.016	53.23	0.591	-16.61
200	0.431	-160.16	7.915	91.13	0.021	62.83	0.547	-14.06
300	0.439	-170.89	5.332	83.37	0.030	71.57	0.538	-15.05
400	0.447	-177.86	4.022	77.04	0.039	75.43	0.538	-16.92
500	0.462	176.77	3.231	71.43	0.046	77.82	0.543	-19.30
600	0.477	172.03	2.708	66.71	0.057	81.23	0.548	-22.35
700	0.490	167.59	2.318	61.92	0.065	82.45	0.553	-25.43
800	0.507	163.59	2.037	57.52	0.076	84.13	0.559	-28.69
900	0.523	159.90	1.813	53.42	0.087	86.15	0.566	-32.45
1000	0.539	156.32	1.629	49.36	0.099	87.07	0.573	-35.73

## Embossed Taping Specification

## 15GN03CA-TB-E

## 1. Packing Format

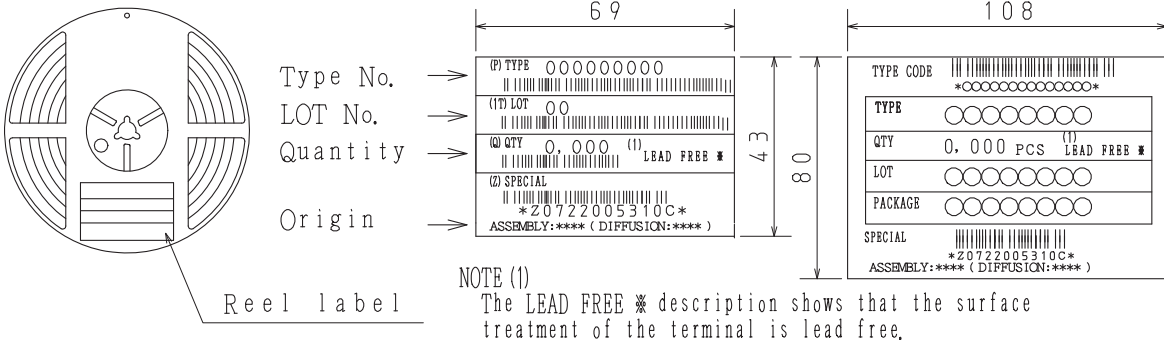
Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
CP	CP	3,000	15,000	90,000	5 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

Reel label, Inner box label  
(unit:mm)

Outer box label

It is a label at the time of factory shipments.  
The form of a label may change in physical  
distribution process.

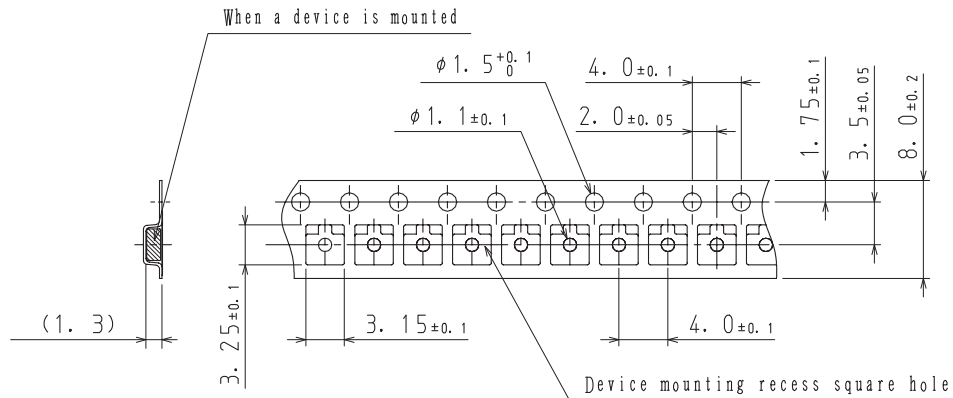
## Packing method



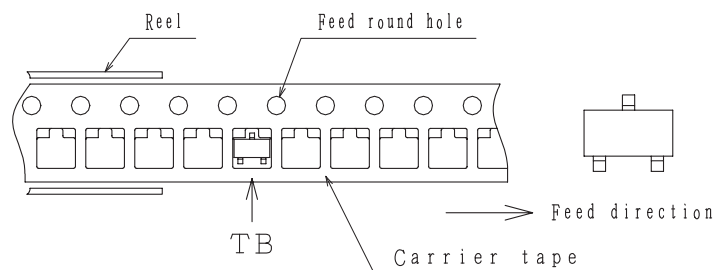
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

## 2. Taping configuration

## 2-1. Carrier tape size (unit:mm)

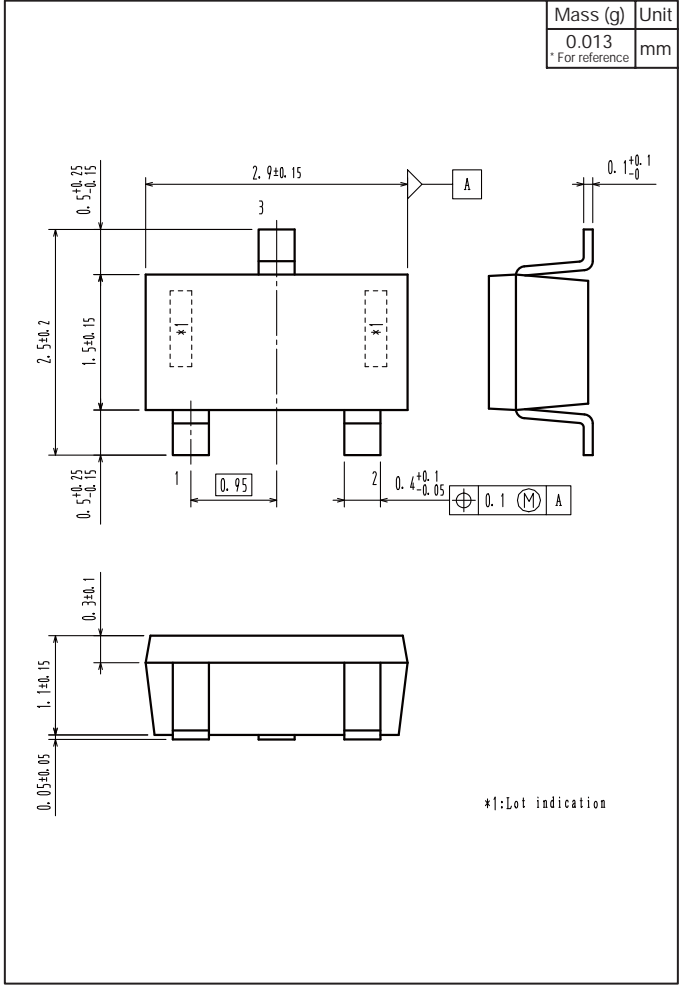


## 2-2. Device placement direction

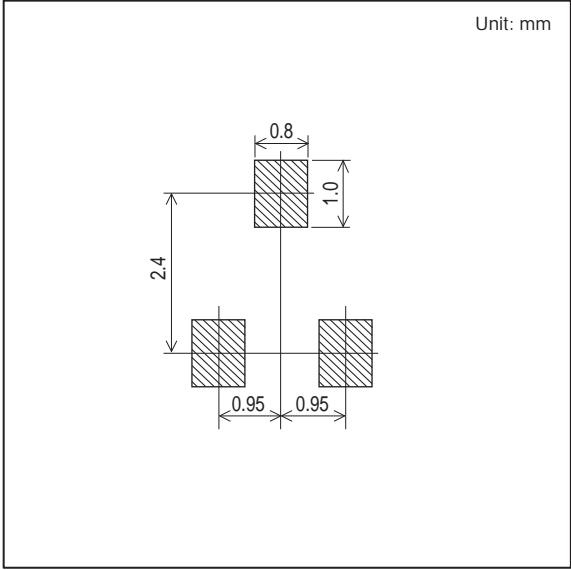


Those with one electrode terminal on the feed hole side.....TB

Outline Drawing  
15GN03CA-TB-E



Land Pattern Example



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