



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 2SC5231A — NPN Epitaxial Planar Silicon Transistor VHF to UHF Wide-Band Low-Noise Amplifier Applications

### Features

- Low-noise : NF=1.0dB typ (f=1GHz)
- High gain :  $|S_{21e}|^2=12\text{dB}$  typ (f=1GHz)
- High cut-off frequency :  $f_T=7\text{GHz}$  typ
- Ultrasmall-sized package permitting applied sets to be made small and slim

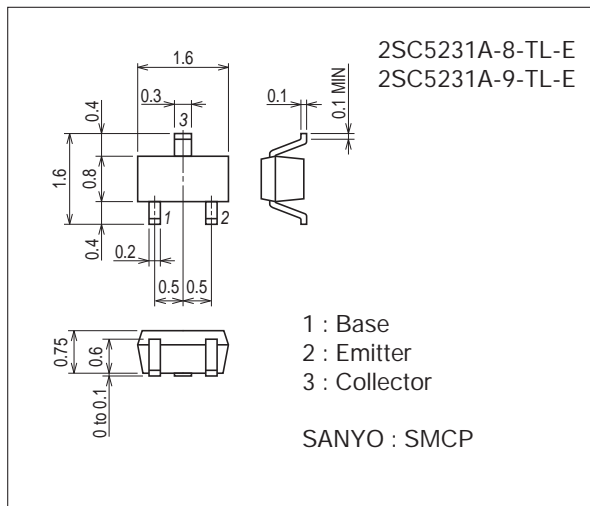
### Specifications

#### Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V <sub>CB0</sub>		20	V
Collector-to-Emitter Voltage	V <sub>CE0</sub>		10	V
Emitter-to-Base Voltage	V <sub>EB0</sub>		2	V
Collector Current	I <sub>C</sub>		70	mA
Collector Dissipation	P <sub>C</sub>		100	mW
Junction Temperature	T <sub>j</sub>		150	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

### Package Dimensions

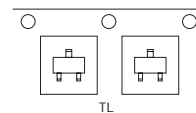
unit : mm (typ)  
7027A-002



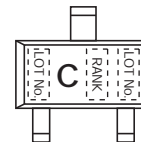
### Product & Package Information

- Package : SMCP
- JEITA, JEDEC : SC-75, SOT-416
- Minimum Packing Quantity : 3,000 pcs./reel

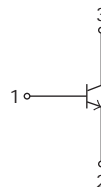
### Packing Type: TL



### Marking



### Electrical Connection



# 2SC5231A

## Electrical Characteristics at Ta=25°C

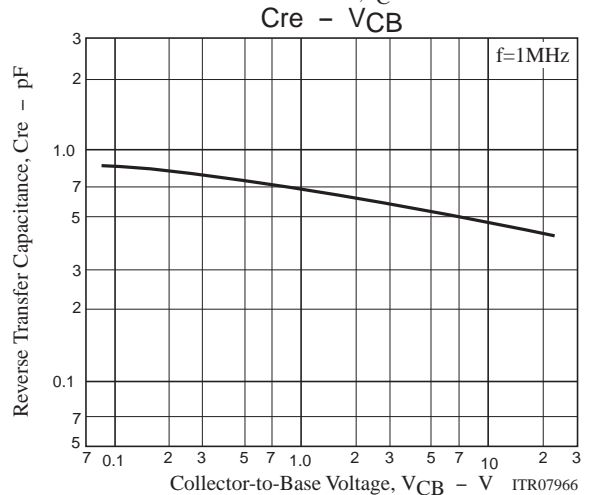
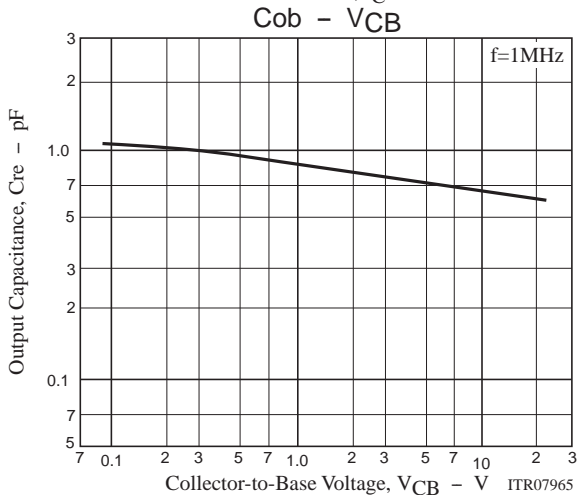
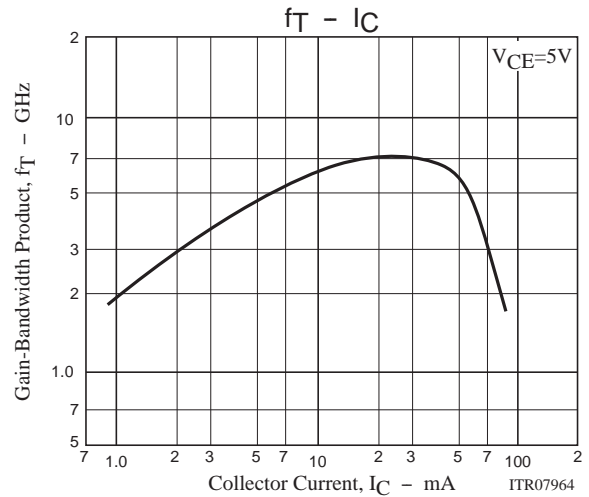
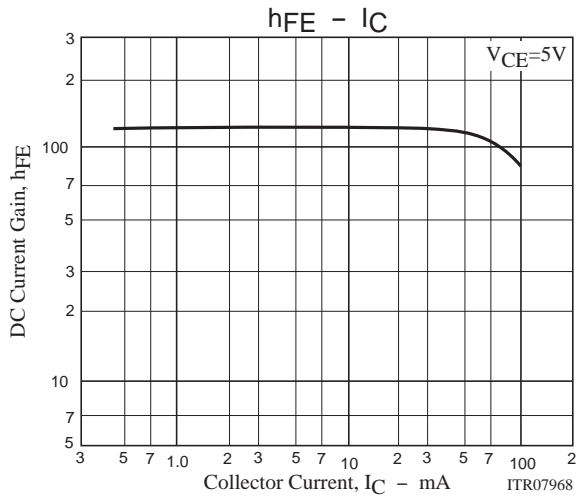
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=10V, I_E=0A$			1.0	$\mu A$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=1V, I_C=0A$			10	$\mu A$
DC Current Gain	$h_{FE}$	$V_{CE}=5V, I_C=20mA$	60*		270*	
Gain-Bandwidth Product	$f_T$	$V_{CE}=5V, I_C=20mA$	5	7		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10V, f=1MHz$		0.7	1.2	pF
Reverse Transfer Capacitance	$C_{re}$				0.45	
Forward Transfer Gain	$ S_{21e} ^{2_1}$	$V_{CE}=5V, I_C=20mA, f=1GHz$	9	12		dB
	$ S_{21e} ^{2_2}$	$V_{CE}=2V, I_C=3mA, f=1GHz$		8.5		dB
Noise Figure	NF	$V_{CE}=5V, I_C=7mA, f=1GHz$		1.0	1.8	dB

\* : The 2SC5231A is classified by 20mA  $h_{FE}$  as follows :

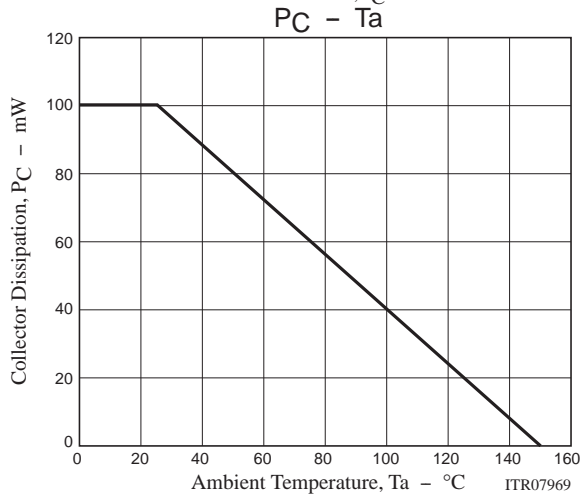
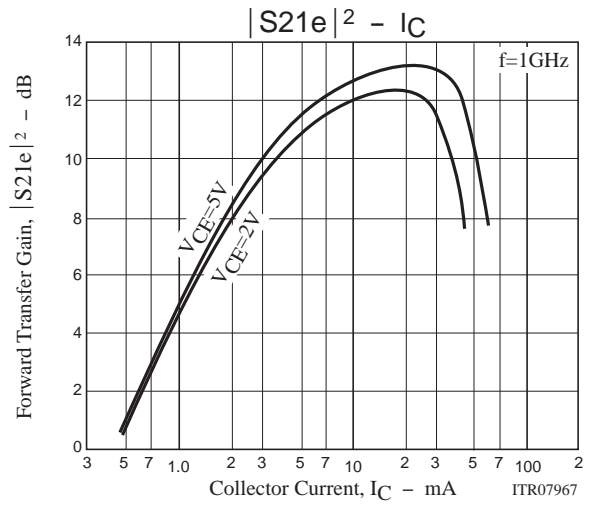
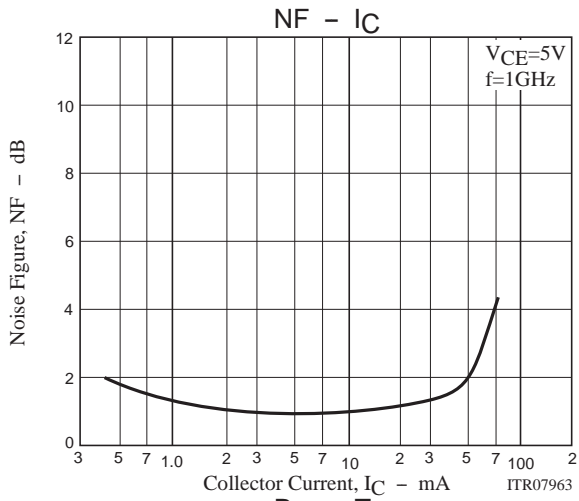
Rank	7	8	9
$h_{FE}$	60 to 120	90 to 180	135 to 270

## Ordering Information

Device	Package	Shipping	memo
2SC5231A-8-TL-E	SMCP	3,000pcs./reel	Pb Free
2SC5231A-9-TL-E	SMCP	3,000pcs./reel	



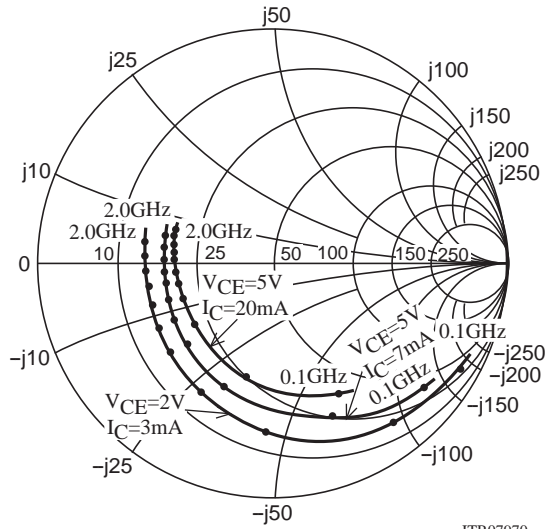
# 2SC5231A



# 2SC5231A

S11e

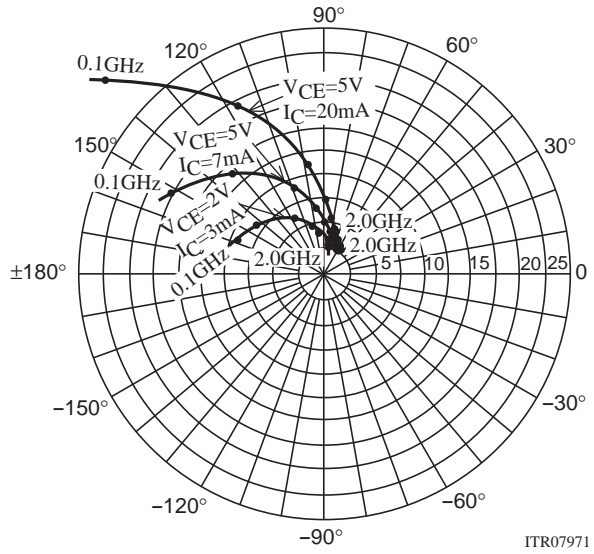
f=100MHz, f=200MHz to 2000MHz(200MHz Step)



ITR07970

S21e

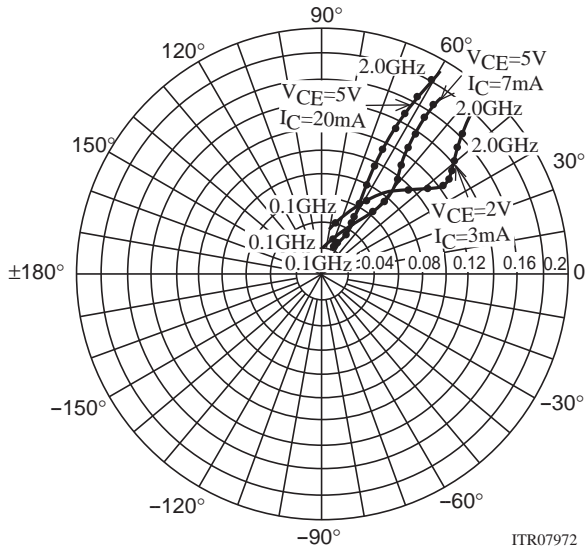
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ITR07971

S12e

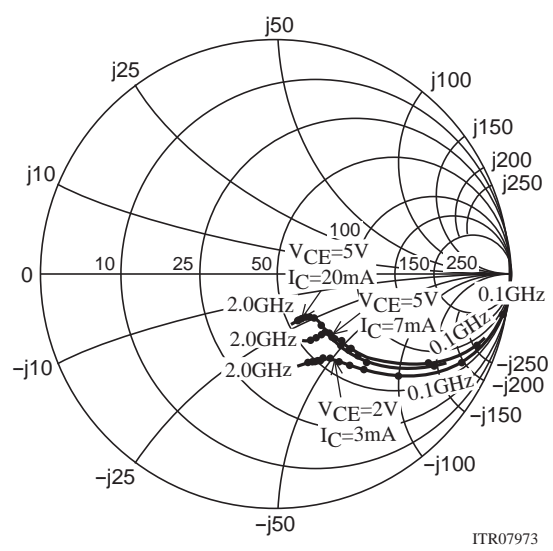
f=100MHz, f=200MHz to 2000MHz(200MHz Step)



ITR07972

S22e

f=100MHz, f=200MHz to 2000MHz(200MHz Step)



ITR07973

## 2SC5231A

### S Parameters (Common emitter)

$V_{CE}=5V, I_C=7mA, Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.786	-40.7	17.507	151.3	0.028	70.1	0.898	-20.4
200	0.677	-72.4	13.998	131.4	0.046	58.0	0.739	-33.4
400	0.546	-112.7	9.061	108.6	0.064	49.6	0.525	-43.7
600	0.492	-135.2	6.442	96.1	0.076	49.3	0.423	-46.7
800	0.473	-150.0	5.005	87.3	0.087	50.8	0.374	-44.4
1000	0.465	-160.0	4.073	80.4	0.099	52.6	0.346	-49.7
1200	0.457	-169.5	3.449	74.0	0.111	54.0	0.332	-51.6
1400	0.451	-176.2	2.989	68.6	0.124	55.2	0.321	-54.1
1600	0.449	177.8	2.658	63.8	0.138	56.6	0.319	-56.2
1800	0.454	172.5	2.378	58.4	0.151	56.7	0.313	-60.0
2000	0.460	167.1	2.154	54.0	0.166	56.7	0.311	-63.2

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

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.601	-65.8	28.967	137.1	0.023	64.1	0.757	-32.9
200	0.497	-103.7	19.309	116.6	0.035	57.0	0.534	-50.3
400	0.435	-139.6	10.891	98.6	0.050	58.7	0.345	-50.3
600	0.419	-156.6	7.461	89.3	0.065	61.3	0.280	-50.7
800	0.414	-166.6	5.695	82.5	0.081	63.1	0.251	-51.3
1000	0.413	-174.0	4.613	77.0	0.098	63.8	0.235	-52.9
1200	0.413	178.6	3.870	71.8	0.114	63.9	0.226	-55.1
1400	0.411	173.8	3.345	66.9	0.131	63.6	0.221	-57.7
1600	0.413	169.6	2.960	62.7	0.148	63.2	0.220	-60.2
1800	0.416	165.1	2.655	58.0	0.165	61.8	0.219	-64.8
2000	0.422	160.3	2.406	54.0	0.182	60.6	0.218	-68.3

$V_{CE}=2V, I_C=3mA, Z_O=50\Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.888	-30.2	9.280	158.6	0.038	73.6	0.949	-15.1
200	0.815	-56.4	8.218	141.3	0.067	60.5	0.849	-26.9
400	0.690	-96.0	6.074	116.7	0.098	45.1	0.657	-41.1
600	0.616	-120.7	4.517	101.4	0.112	38.4	0.539	-47.6
800	0.584	-138.0	3.610	90.4	0.120	35.8	0.475	-51.2
1000	0.566	-150.7	2.995	81.9	0.125	35.7	0.434	-54.5
1200	0.555	-161.2	2.540	74.2	0.131	36.5	0.410	-57.5
1400	0.546	-169.3	2.213	67.5	0.137	38.4	0.393	-60.7
1600	0.541	-176.4	1.982	62.0	0.143	40.7	0.391	-64.0
1800	0.545	177.1	1.774	55.9	0.152	42.5	0.382	-67.8
2000	0.547	170.9	1.614	50.9	0.163	44.7	0.381	-72.1

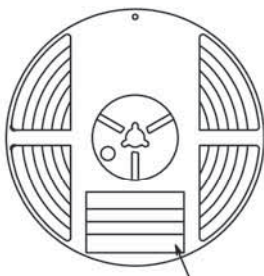
Embossed Taping Specification

2SC5231A-8-TL-E, 2SC5231A-9-TL-E

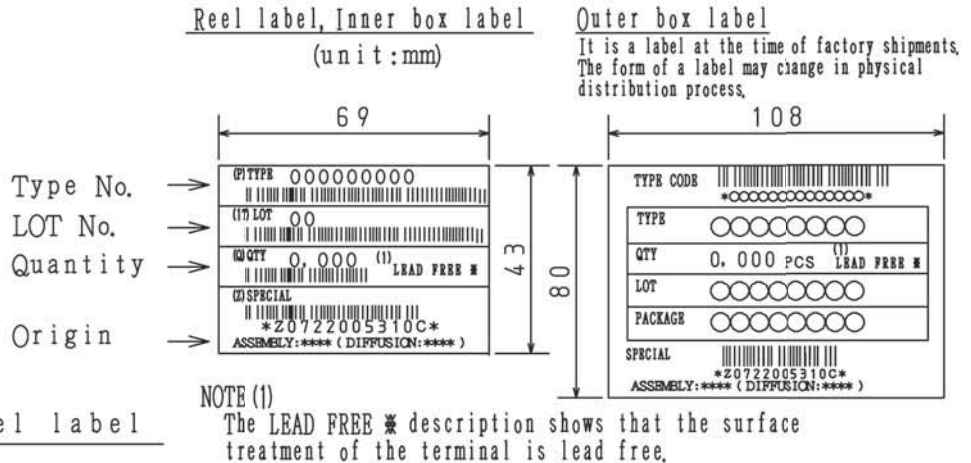
1. Packing Format

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)
SMCP	SMCP	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

Packing method



Reel label



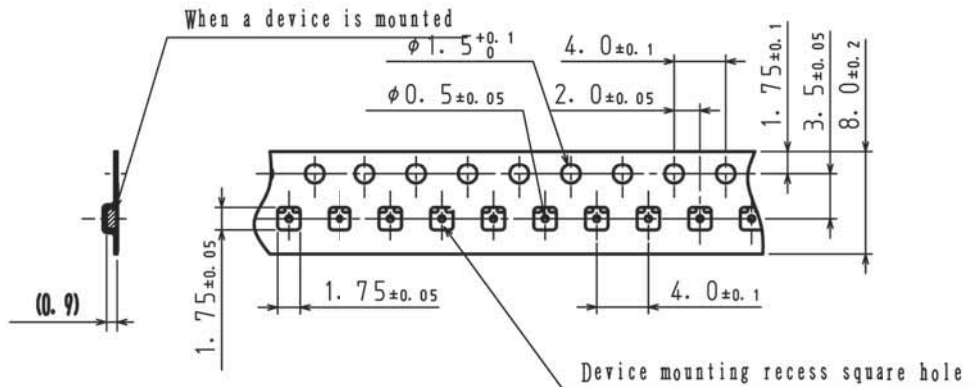
NOTE (1)

The LEAD FREE # description shows that the surface treatment of the terminal is lead free.

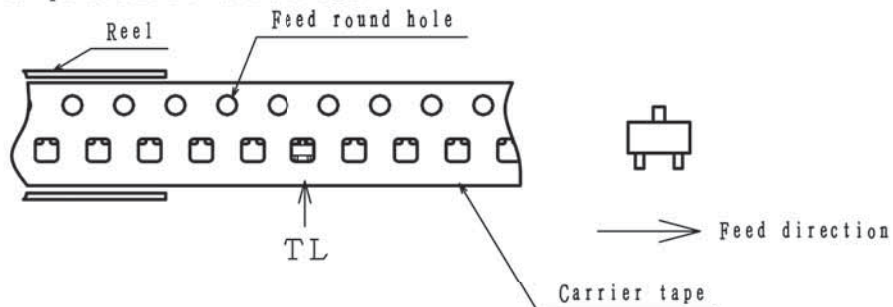
Label	JEITA Phase
.....	JEITA Phase 3

2. Taping configuration

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



2-2. Device placement direction

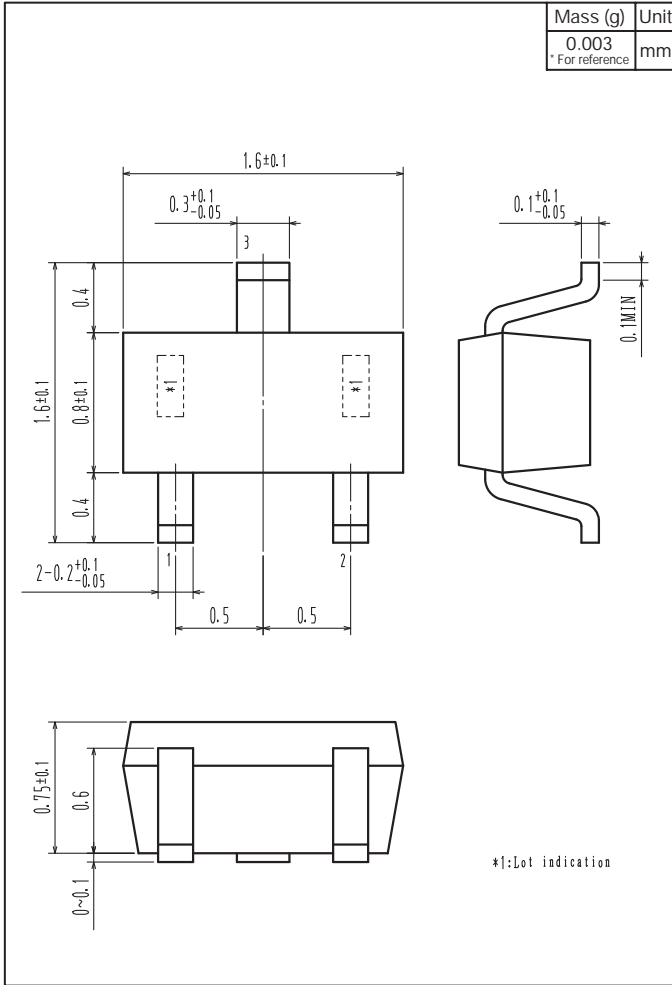


Those with one electrode terminal on the feed hole side.....TL

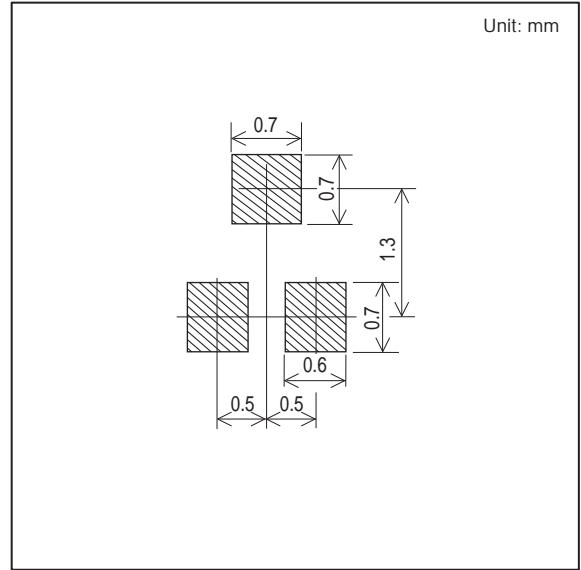
# 2SC5231A

## Outline Drawing

2SC5231A-8-TL-E, 2SC5231A-9-TL-E



## Land Pattern Example



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