



# 2SC5231A

## RF Transistor 10V, 70mA, $f_T=7\text{GHz}$ , NPN Single SMCP

ON Semiconductor®

<http://onsemi.com>

### Features

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

### Specifications

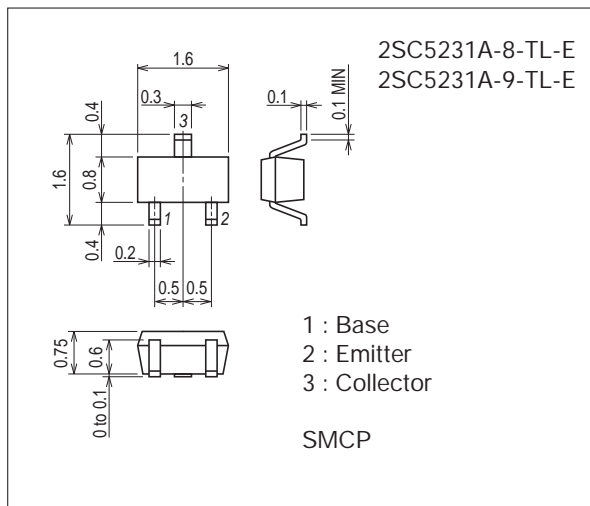
#### Absolute Maximum Ratings at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CBO}$		20	V
Collector-to-Emitter Voltage	$V_{CEO}$		10	V
Emitter-to-Base Voltage	$V_{EBO}$		2	V
Collector Current	$I_C$		70	mA
Collector Dissipation	$P_C$		100	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

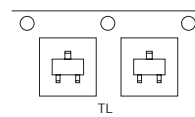
unit : mm (typ)  
7027A-002



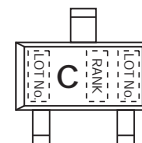
### Product & Package Information

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

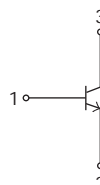
### Packing Type: TL



### Marking



### Electrical Connection



# 2SC5231A

## Electrical Characteristics at Ta=25°C

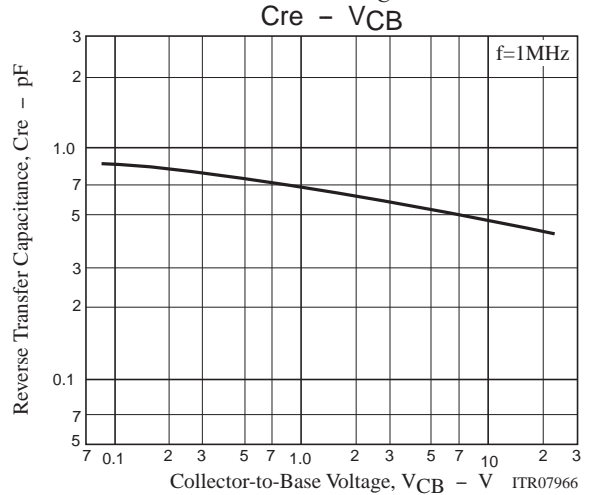
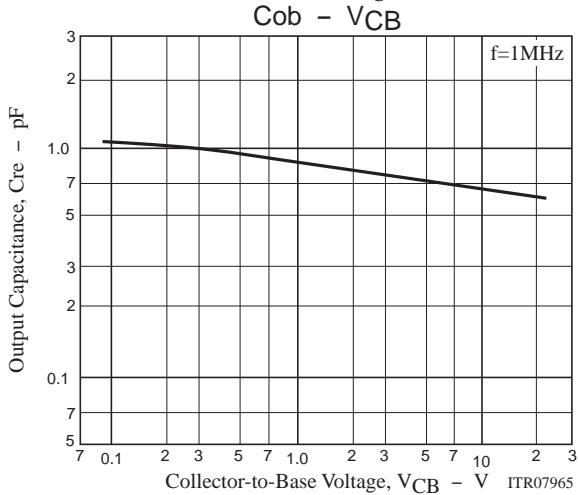
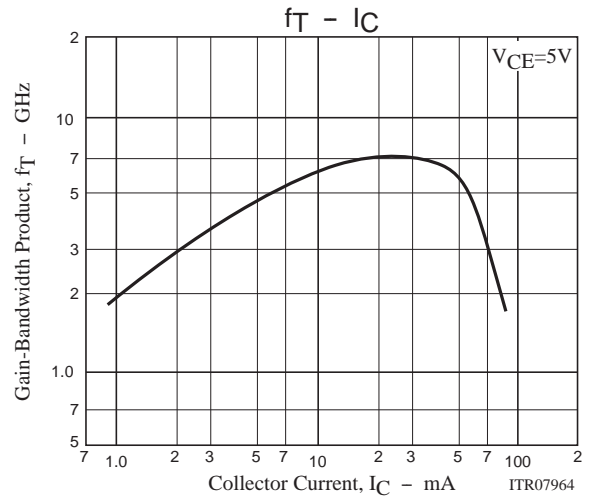
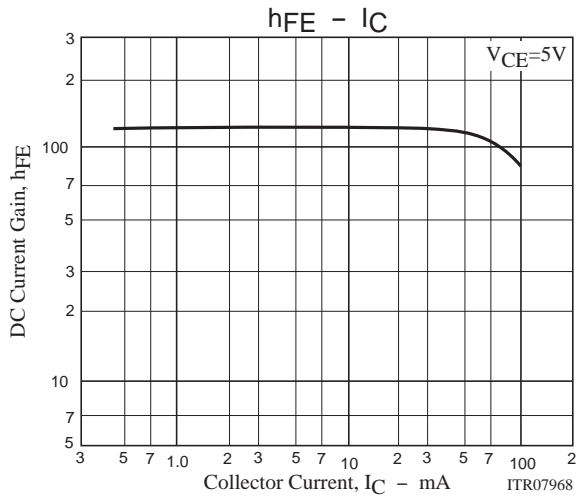
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=10V, I_E=0A$			1.0	$\mu A$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=1V, I_C=0A$			10	$\mu A$
DC Current Gain	$h_{FE}$	$V_{CE}=5V, I_C=20mA$	60*		270*	
Gain-Bandwidth Product	$f_T$	$V_{CE}=5V, I_C=20mA$	5	7		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10V, f=1MHz$		0.7	1.2	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=10V, f=1MHz$		0.45		pF
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 :

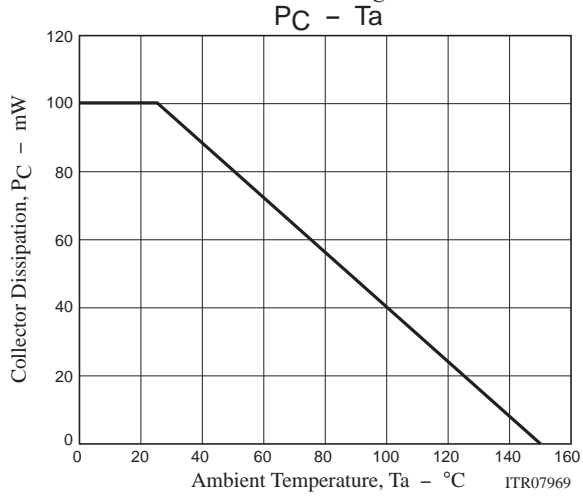
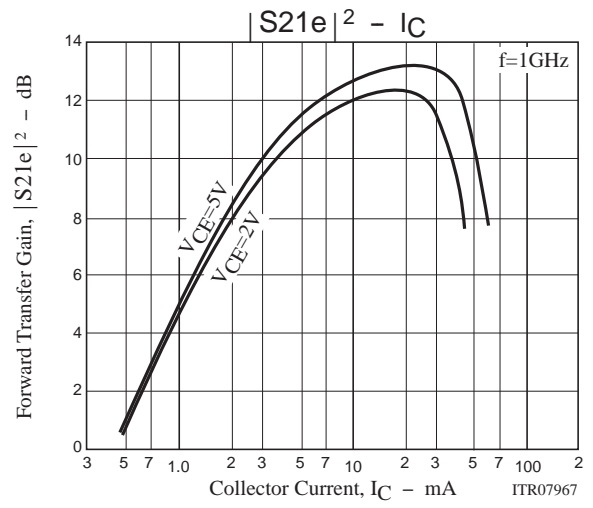
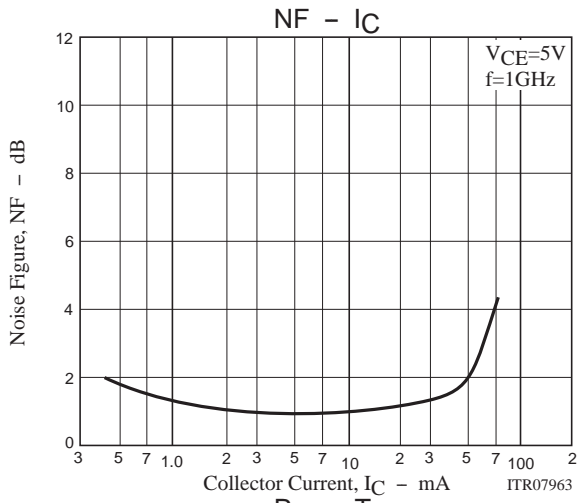
Rank	7	8	9
$h_{FE}$	60 to 120	90 to 180	135 to 270

## Ordering Information

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



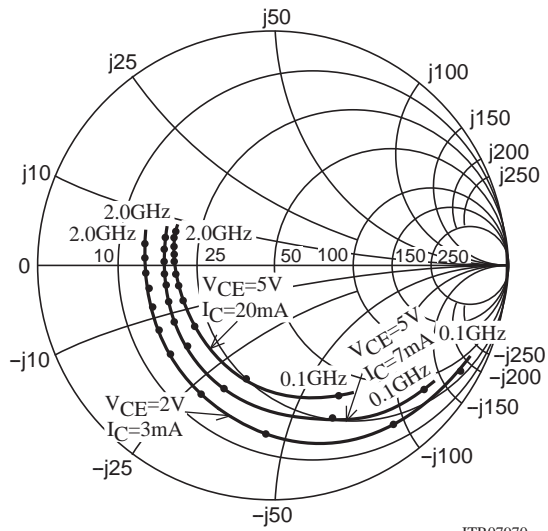
# 2SC5231A



# 2SC5231A

S11e

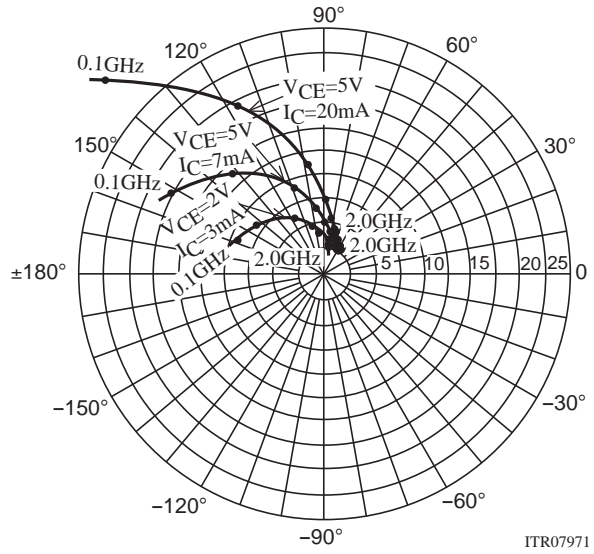
f=100MHz, f=200MHz to 2000MHz(200MHz Step)



ITR07970

S21e

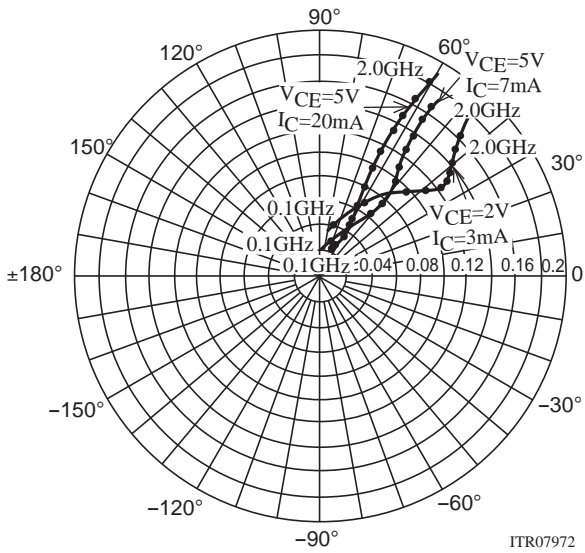
f=100MHz, f=200MHz to 2000MHz(200MHz Step)



ITR07971

S12e

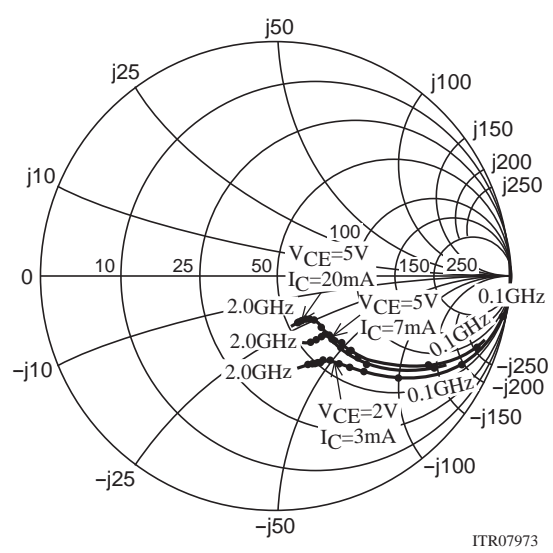
f=100MHz, f=200MHz to 2000MHz(200MHz Step)



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

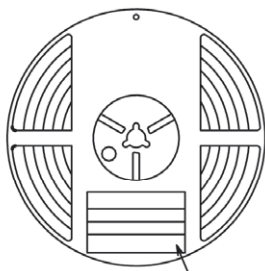
Embossed Taping Specification

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

1. Packing Format

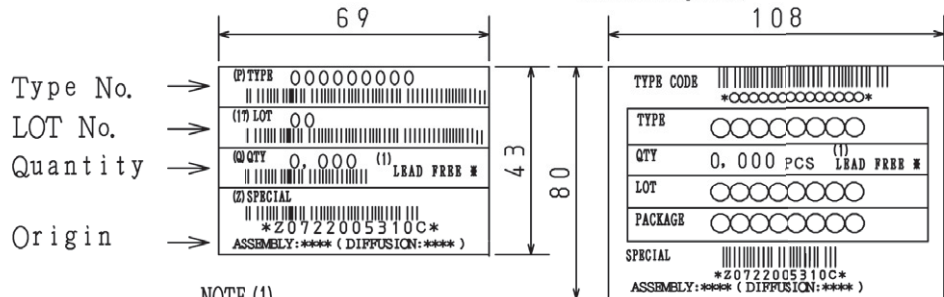
Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
SMCP	SMCP	3,000	15,000	90,000	5 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

Packing method



Reel label, 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.



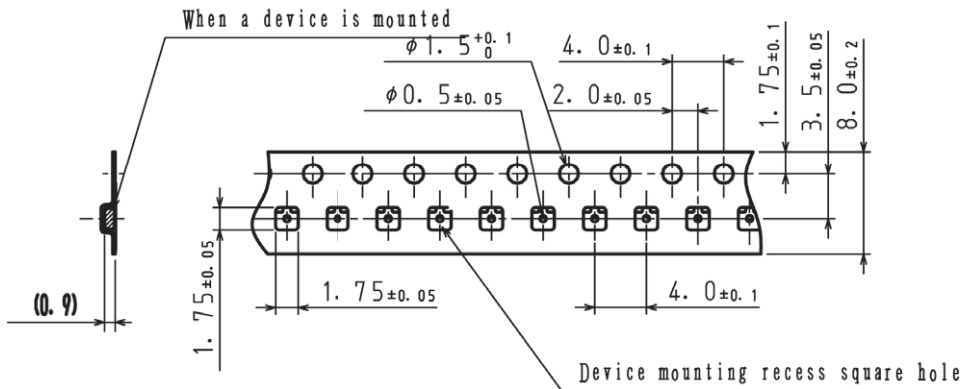
NOTE (1)

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

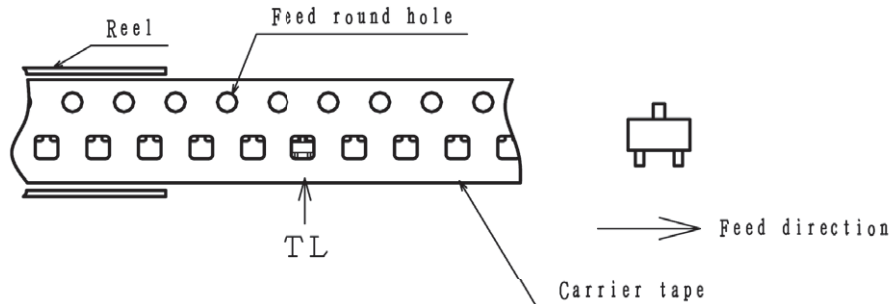
Label	JEITA Phase
.....	JEITA Phase 3

2. Taping configuration

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



2-2. Device placement direction

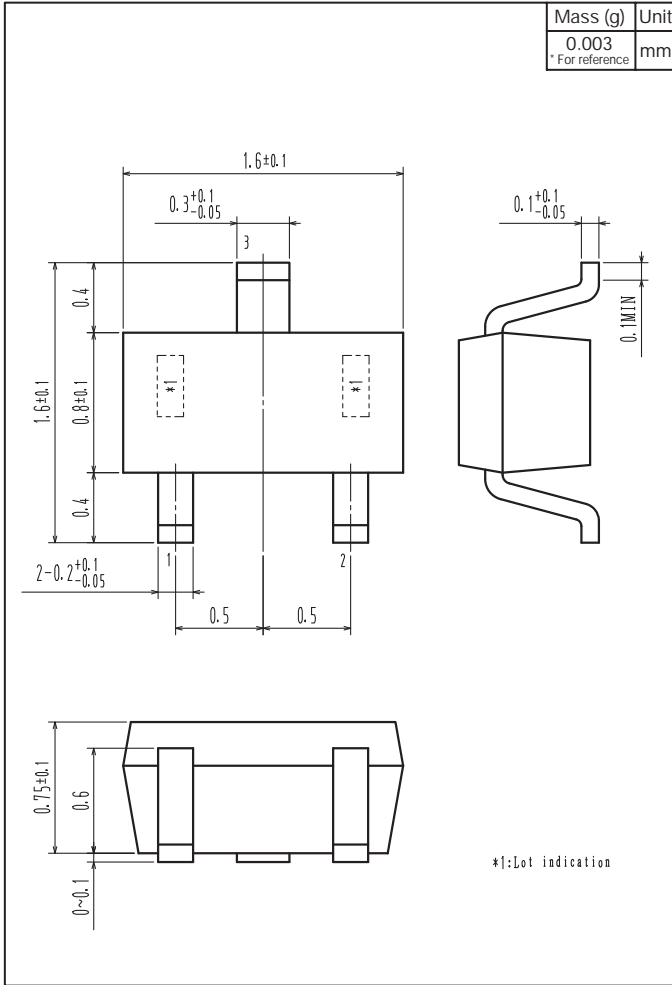


Those with one electrode terminal on the feed hole side.....TL

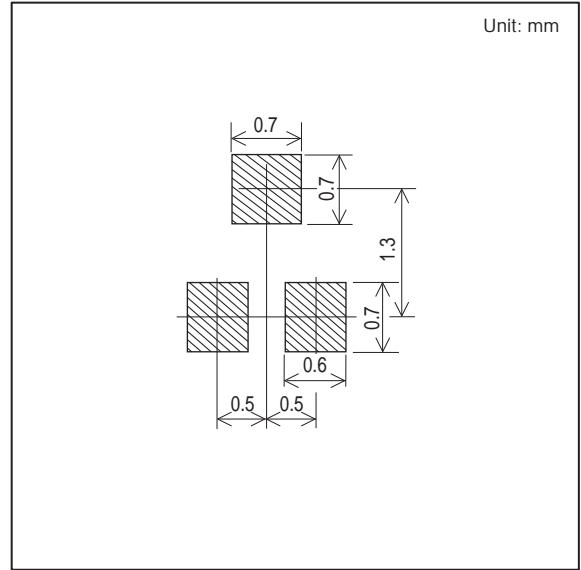
# 2SC5231A

## Outline Drawing

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



## Land Pattern Example



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