

Parameter	Value
$V_{CEO}$	50V
$I_C$	150mA

### ●Features

1)Low Cob.Cob=2.0pF(Typ.)

2)Complements the 2SA2029/  
2SA1774EB/2SA1774/2SA1576UB/  
2SA1576A/2SA1037AK.

### ●Application

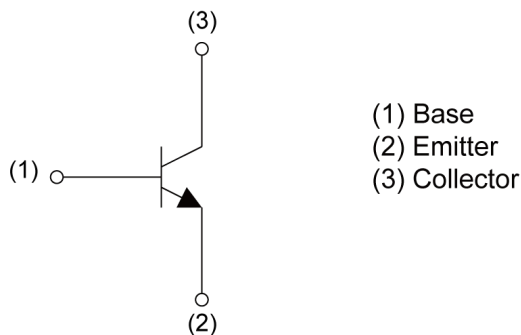
GENERAL PURPOSE SMALL SIGNAL  
AMPLIFIER

### ●Outline

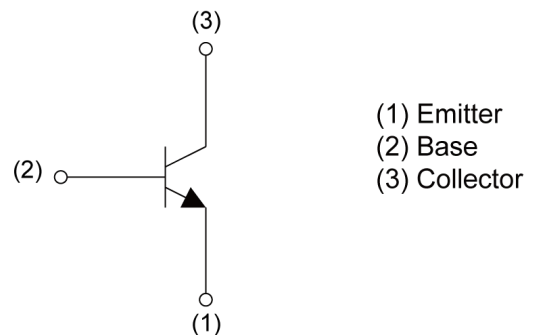
 SC-105AA 2SC5658 (VMT3)	 SOT-416FL 2SC4617EB (EMT3F)
 SOT-416 2SC4617 (EMT3)	 SOT-323FL 2SC4081UB (UMT3F)
 SOT-323 2SC4081 (UMT3)	 SOT-346 2SC2412K (SMT3)

### ●Inner circuit

2SC5658/2SC4617EB/2SC4081UB



2SC4617/2SC4081/2SC2412K



### ●Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	hFE rank	Marking
2SC5658	SC-105AA	1212	T2L	180	8	8000	QRS	B
2SC4617EB	SOT-416FL	1616	TL	180	8	3000	QRS	B
2SC4617	SOT-416	1616	TL	180	8	3000	QRS	B
2SC4081UB	SOT-323FL	2021	TL	180	8	3000	QRS	B
2SC4081	SOT-323	2021	T106	180	8	3000	QRS	B
2SC2412K	SOT-346	2928	T146	180	8	3000	QRS	B

● **Absolute maximum ratings** ( $T_a = 25^\circ\text{C}$ )

Parameter		Symbol	Values	Unit
Collector-base voltage		$V_{CBO}$	60	V
Collector-emitter voltage		$V_{CEO}$	50	V
Emitter-base voltage		$V_{EBO}$	7	V
Collector current		$I_C$	150	mA
		$I_{CP}^{*1}$	200	mA
Power dissipation	2SC5658	$P_D^{*2}$	150	mW
	2SC4617EB		150	
	2SC4617		150	
	2SC4081UB		200	
	2SC4081		200	
	2SC2412K		200	
Junction temperature		$T_j$	150	$^\circ\text{C}$
Range of storage temperature		$T_{stg}$	-55 to +150	$^\circ\text{C}$

● **Electrical characteristics** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector-base breakdown voltage	$BV_{CBO}$	$I_C = 50\mu\text{A}$	60	-	-	V
Collector-emitter breakdown voltage	$BV_{CEO}$	$I_C = 1\text{mA}$	50	-	-	V
Emitter-base breakdown voltage	$BV_{EBO}$	$I_E = 50\mu\text{A}$	7	-	-	V
Collector cut-off current	$I_{CBO}$	$V_{CB} = 60\text{V}$	-	-	100	nA
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 7\text{V}$	-	-	100	nA
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 50\text{mA}, I_B = 5\text{mA}$	-	-	400	mV
DC current gain	$h_{FE}$	$V_{CE} = 6\text{V}, I_C = 1\text{mA}$	120	-	560	-
Transition frequency	$f_T$	$V_{CE} = 12\text{V}, I_E = -2\text{mA}, f = 100\text{MHz}$	-	180	-	MHz
Output capacitance	$C_{ob}$	$V_{CB} = 12\text{V}, I_E = 0\text{A}, f = 1\text{MHz}$	-	2.0	3.5	pF

$h_{FE}$  values are classified as follows :

rank	Q	R	S	-	-
$h_{FE}$	120-270	180-390	270-560	-	-

\*1  $P_w=1\text{ms}$ , Single Pulse.

\*2 Each terminal mounted on a reference land.

● Electrical characteristic curves ( $T_a = 25^\circ\text{C}$ )

Fig.1 Ground Emitter Propagation Characteristics

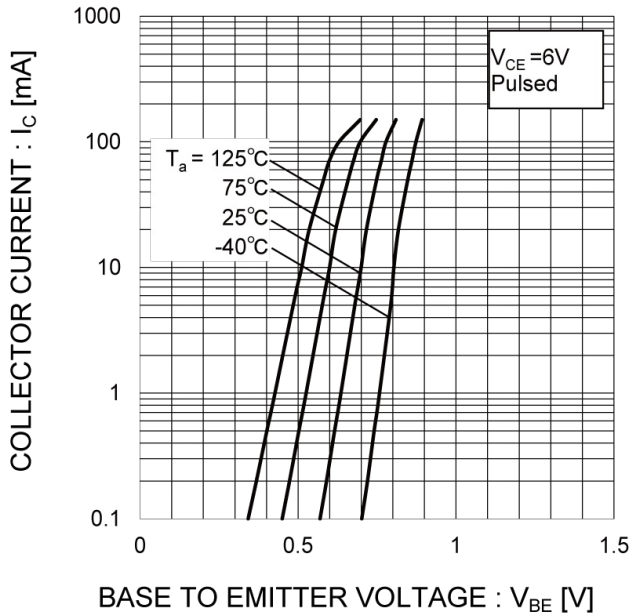


Fig.2 Grounded Emitter Output Characteristics

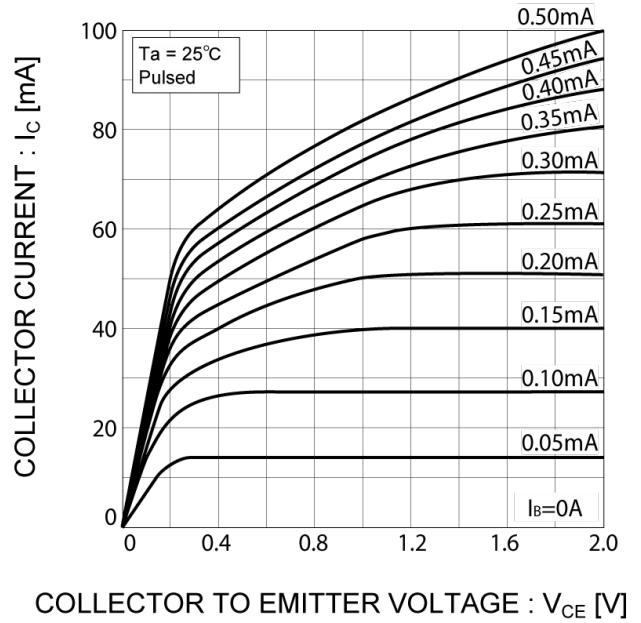


Fig.3 DC Current Gain vs. Collector Current (I)

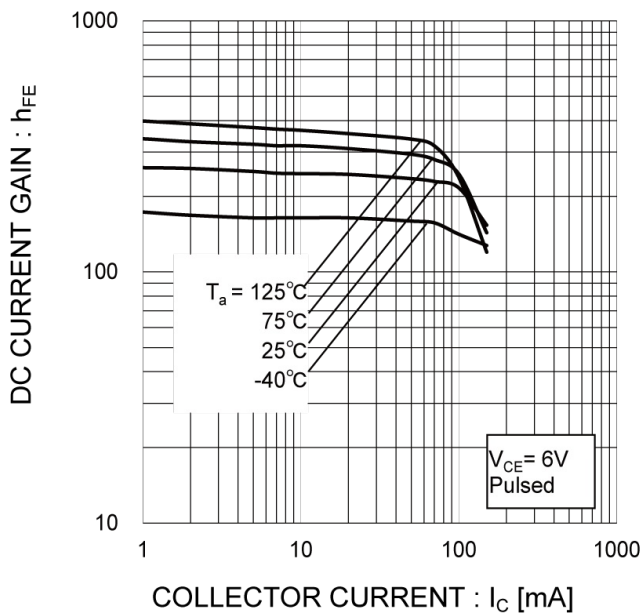
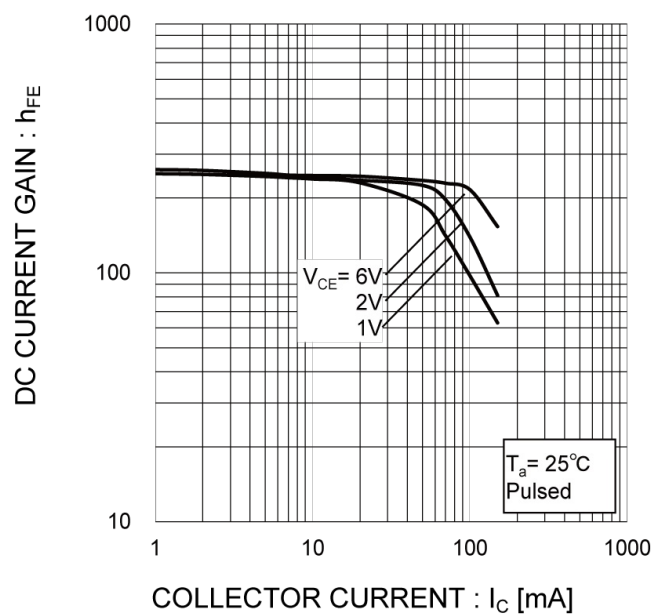


Fig.4 DC Current Gain vs. Collector Current (II)



● Electrical characteristic curves ( $T_a = 25^\circ\text{C}$ )

Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current(I)

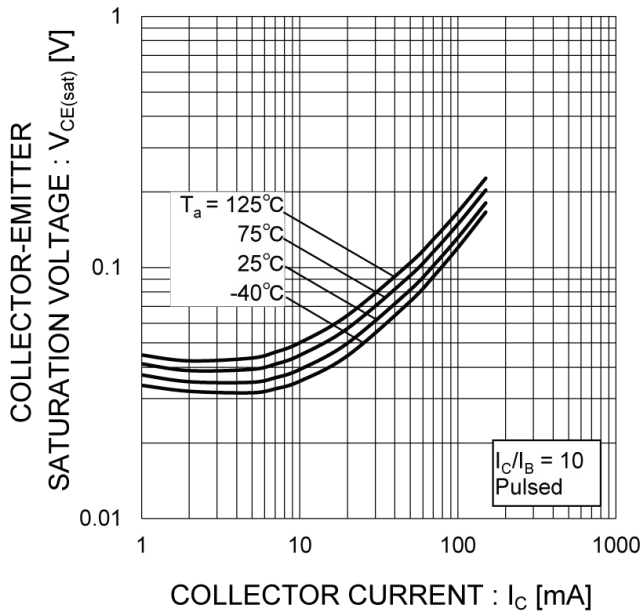


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current(II)

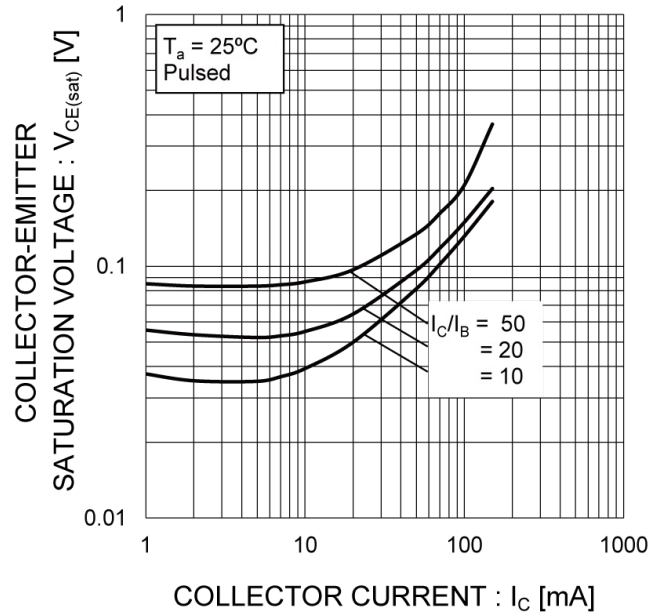


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current (I)

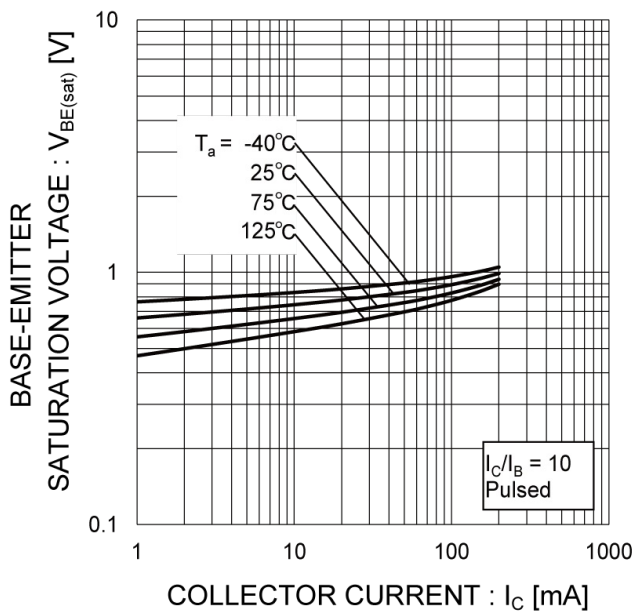
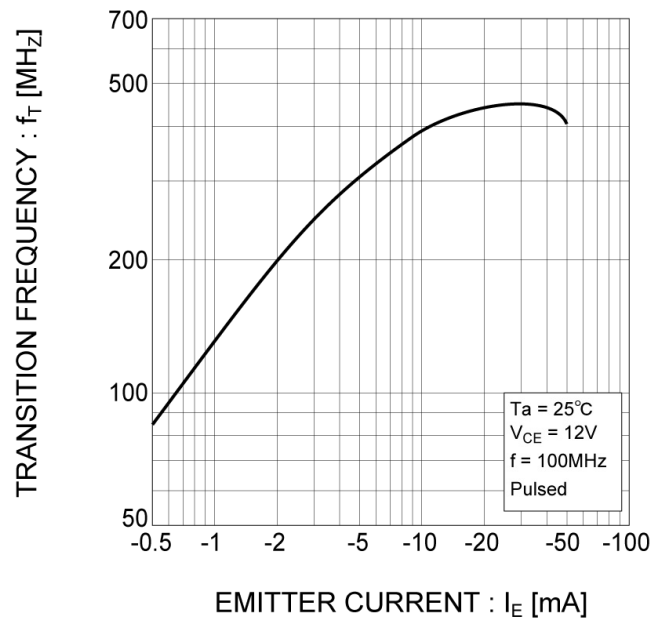


Fig.8 Gain Bandwidth Product vs. Emitter Current



● Electrical characteristic curves ( $T_a = 25^\circ\text{C}$ )

Fig.9 Collector Output Capacitance vs. Collector-Base Voltage  
Emitter Input Capacitance vs. Emitter-Base Voltage

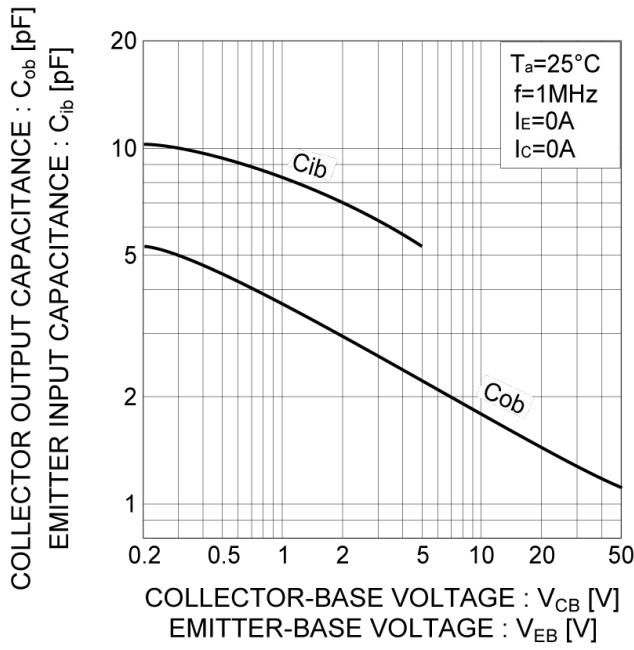


Fig.10 Safe Operating Area

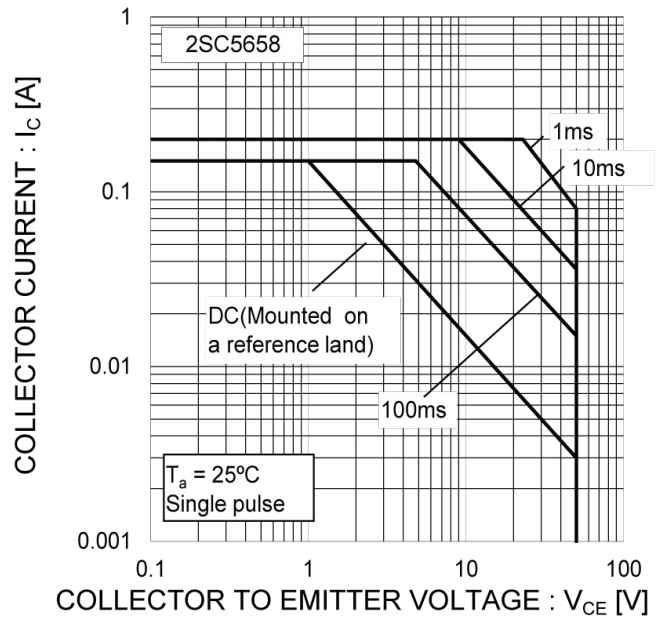


Fig.11 Safe Operating Area

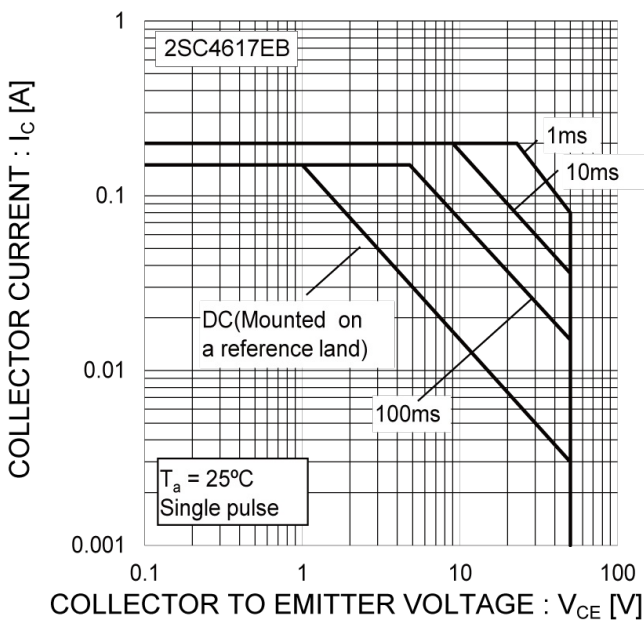
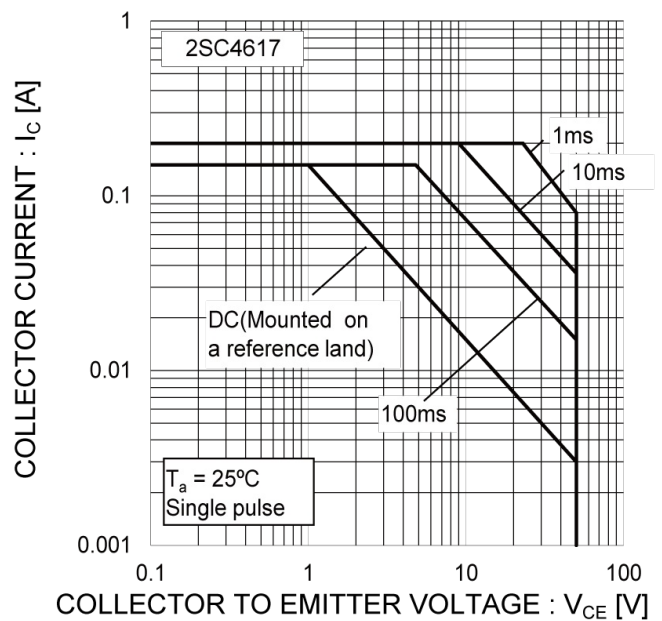


Fig.12 Safe Operating Area



●Electrical characteristic curves(Ta=25°C)

Fig.13 Safe Operating Area

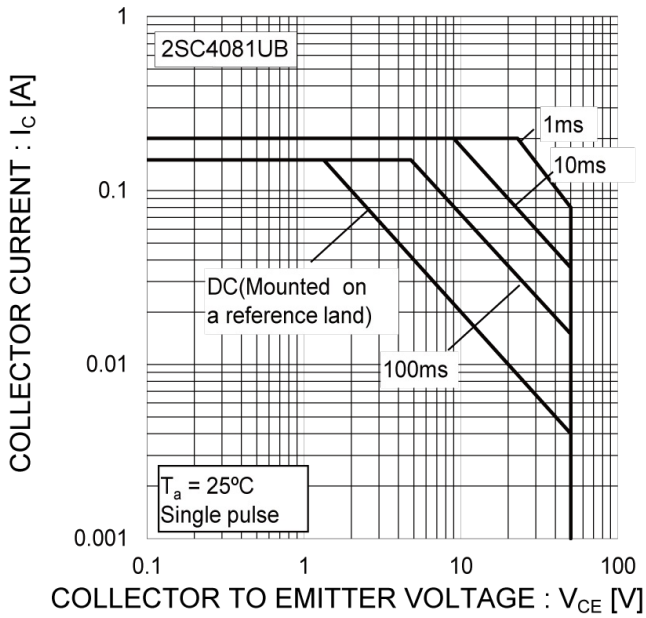


Fig.14 Safe Operating Area

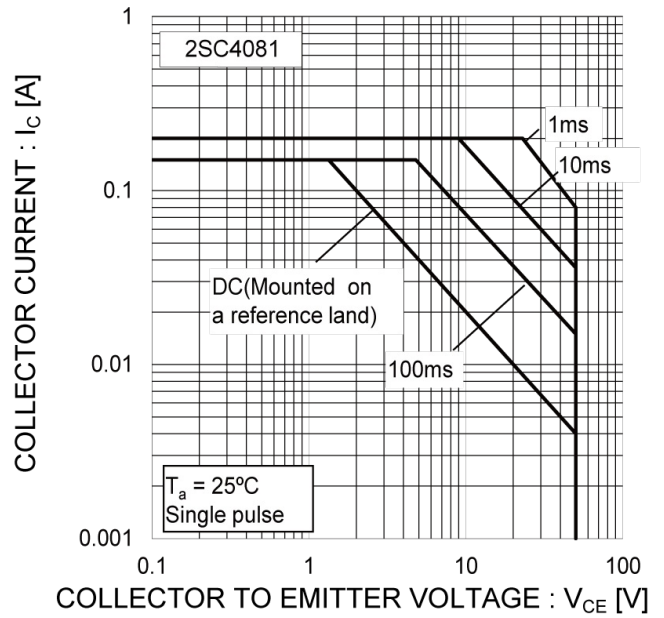
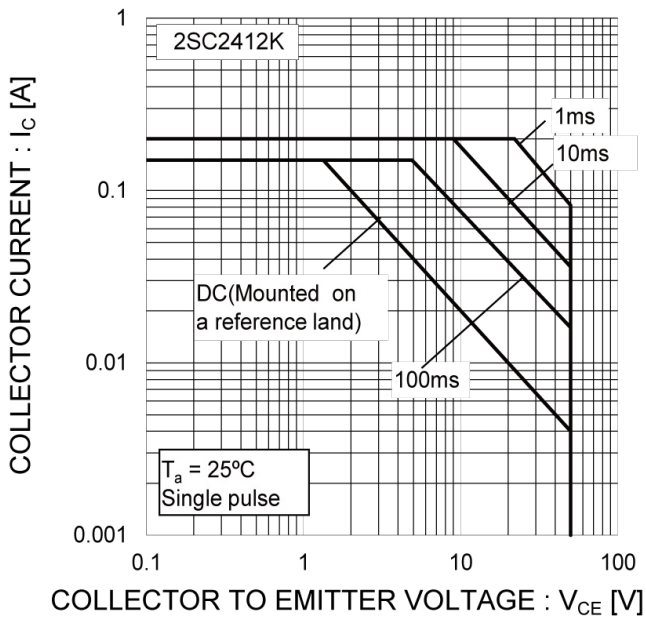
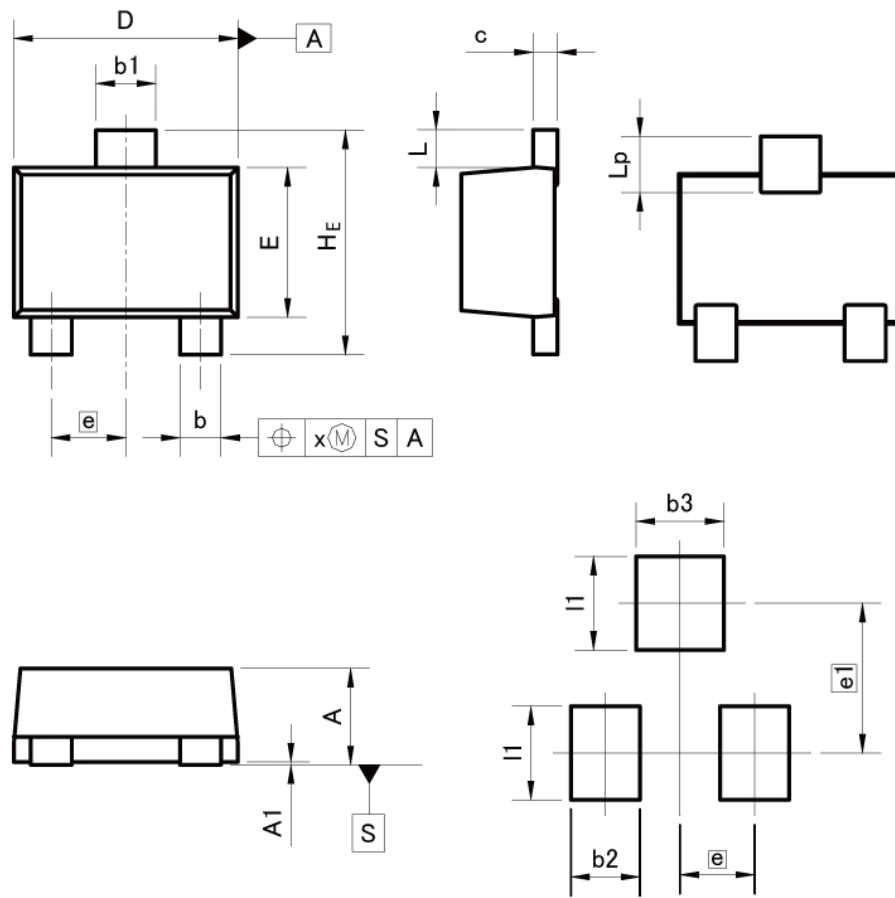


Fig.15 Safe Operating Area



●Dimensions

SOT-723  
SC-105AA  
(VMT3)



Pattern of terminal position areas  
[Not a pattern of soldering pads]

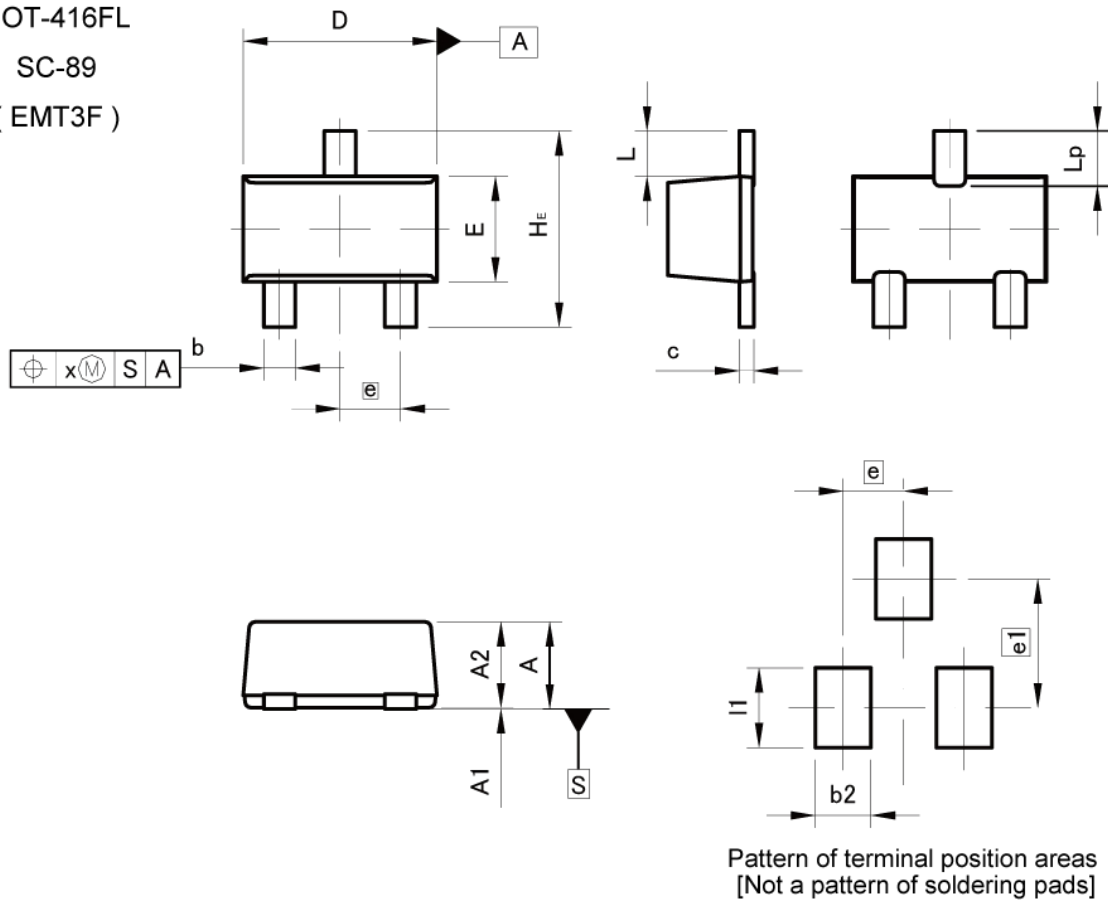
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.55	0.018	0.022
A1	0.00	0.10	0.000	0.004
b	0.17	0.27	0.007	0.011
b1	0.27	0.37	0.011	0.015
c	0.08	0.18	0.003	0.007
D	1.10	1.30	0.043	0.051
E	0.70	0.90	0.028	0.035
e	0.40		0.02	
HE	1.10	1.30	0.043	0.051
L	0.10	0.30	0.004	0.012
Lp	0.20	0.40	0.008	0.016
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.37	-	0.015
b3	-	0.47	-	0.019
e1	0.80		0.031	
I1	-	0.50	-	0.020

Dimension in mm/inches

●Dimensions

SOT-416FL  
SC-89  
( EMT3F )



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.65	0.85	0.026	0.033
A1	0.00	0.10	0.000	0.004
A2	0.60	0.80	0.024	0.031
b	0.21	0.36	0.008	0.014
c	0.08	0.18	0.003	0.007
D	1.50	1.70	0.059	0.067
E	0.76	0.96	0.030	0.038
e	0.50		0.020	
HE	1.50	1.70	0.059	0.067
L	0.37		0.015	
Lp	0.35	0.55	0.014	0.022
x	-	0.10	-	0.004

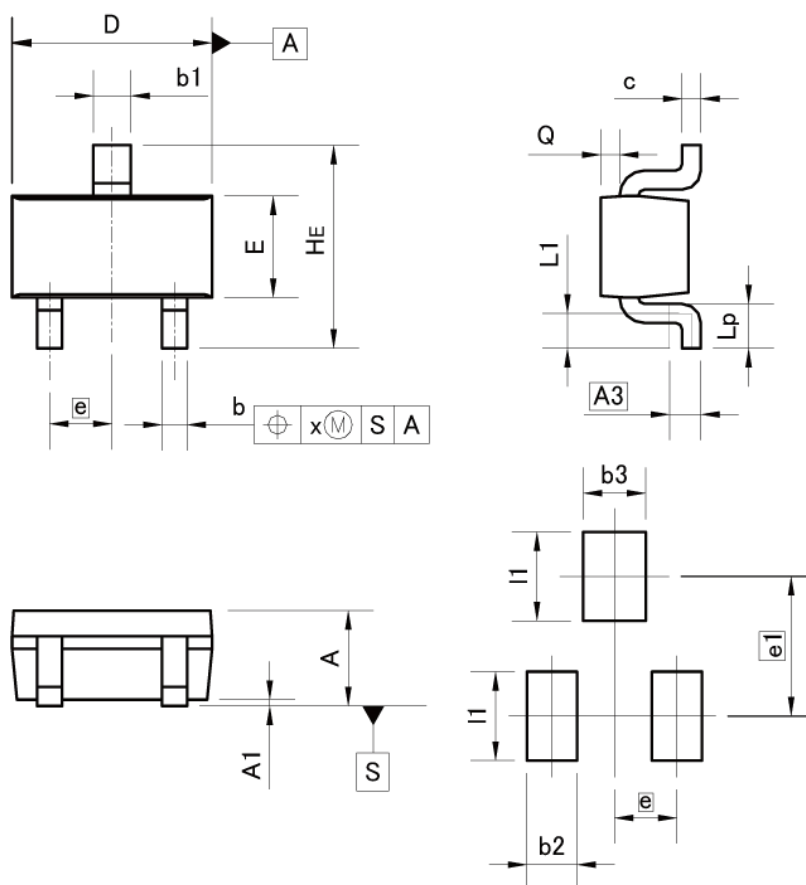
  

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.46	-	0.018
e1	-	1.05	-	0.041
l1	-	0.65	-	0.026

Dimension in mm/inches

●Dimensions

SOT-416  
SC-75A  
(EMT3)



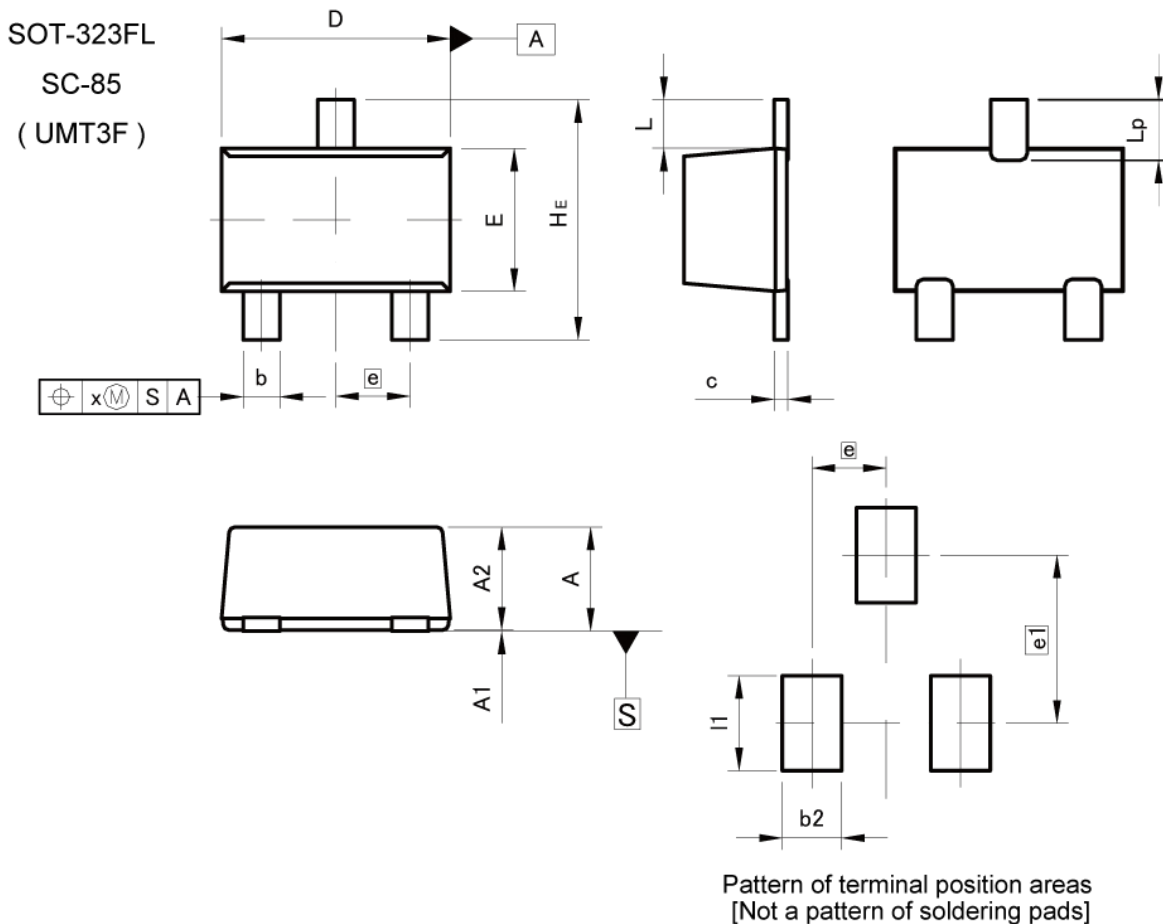
Pattern of terminal position areas  
[Not a pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.60	0.80	0.024	0.031
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.15	0.30	0.006	0.012
b1	0.25	0.40	0.010	0.016
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
e	0.50		0.020	
HE	1.40	1.80	0.055	0.071
L1	0.10	-	0.004	-
Lp	0.15	-	0.006	-
Q	0.05	0.25	0.002	0.010
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.40	-	0.016
b3	-	0.50	-	0.020
e1	1.10		0.043	
l1	-	0.70	-	0.028

Dimension in mm/inches

●Dimensions



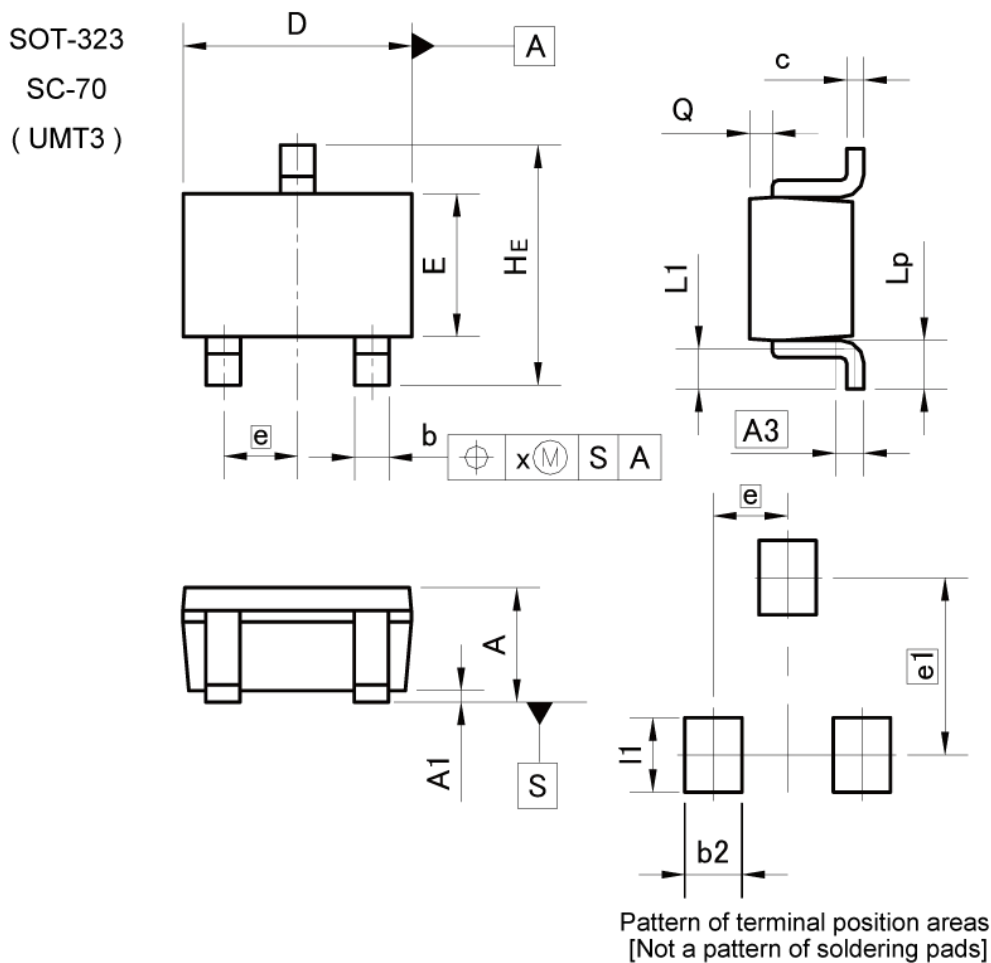
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.85	1.05	0.033	0.041
A1	0.00	0.10	0.000	0.004
A2	0.80	1.00	0.031	0.039
b	0.27	0.42	0.011	0.017
c	0.08	0.18	0.003	0.007
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L	0.43		0.017	
Lp	0.43	0.63	0.017	0.025
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.52	-	0.020
e1	1.47		0.058	
l1	-	0.83	-	0.033

Dimension in mm/inches

●Dimensions

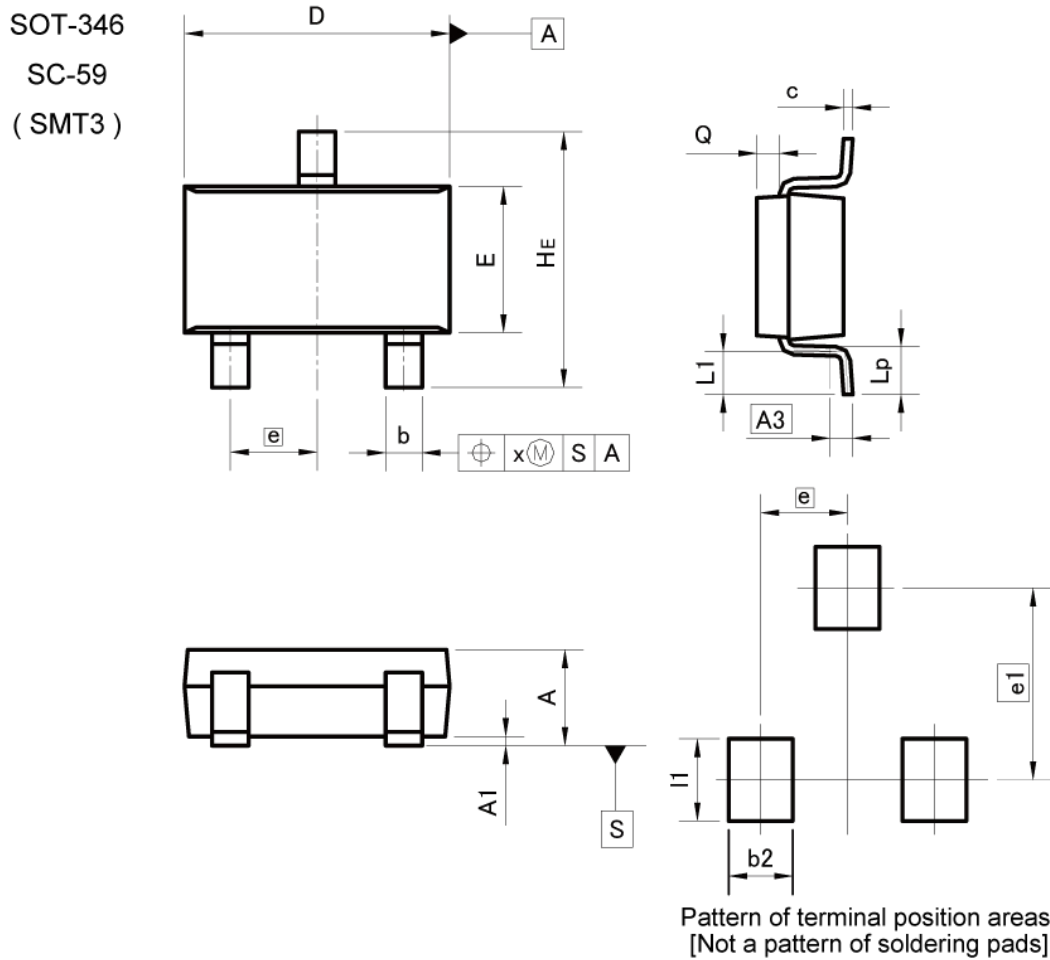


DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0	0.004
A3	0.25		0.01	
b	0.25	0.40	0.01	0.016
c	0.10	0.20	0.004	0.008
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.03	
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.02
Lp	0.25	0.55	0.01	0.022
Q	0.10	0.30	0.004	0.012
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	1.55		0.06	
b2	-	0.50	-	0.02
l1	-	0.65	-	0.026

Dimension in mm/inches

●Dimensions



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.35	0.50	0.014	0.020
c	0.09	0.25	0.004	0.010
D	2.80	3.00	0.110	0.118
E	1.50	1.80	0.059	0.071
e	0.95		0.037	
HE	2.60	3.00	0.102	0.118
L1	0.30	0.60	0.012	0.024
Lp	0.40	0.70	0.016	0.028
Q	0.20	0.30	0.008	0.012
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.60	-	0.024
e1	2.10		0.083	
I1	-	0.90	-	0.035

Dimension in mm/inches

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