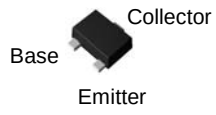
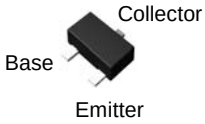
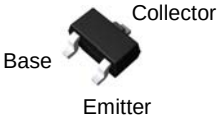
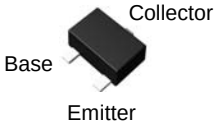
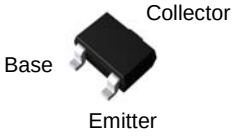
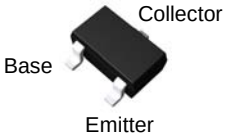
Parameter	Value
V_{CEO}	−50V
I_C	−150mA

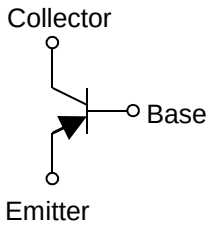
●Features

1) General Purpose.
2) Complementary NPN Types :
   2SC5658 (VMT3) / 2SC4617EB (EMT3F)
   / 2SC4617 (EMT3) / 2SC4081UB (UMT3F)
   / 2SC4081 (UMT3) / 2SC2412 (SMT3)
3) Complex transistors :
   EMT1 / EMT2 / EMT3 (EMT6)
   / UMT1N / UMT2N (UMT6)
   / IMT1A / IMT2A / IMT3A (SMT6)
4) Lead Free/RoHS Compliant.

●Outline

VMT3  2SA2029 (SC-105AA)	EMT3F  2SA1774EB (SC-89)
EMT3  2SA1774 SOT-416 (SC-75A)	UMT3F  2SA1576UB (SC-85)
UMT3  2SA1576A SOT-323 (SC-70)	SMT3  2SA1037AK SOT-346 (SC-59)

●Inner circuit



●Applications

Switching circuit, LED driver circuit

●Packaging specifications

Part No.	Package	Package size (mm)	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit (pcs)	Marking
2SA2029	VMT3	1212	T2L	180	8	8,000	Fx *1
2SA1774EB	EMT3F	1616	TL	180	8	3,000	Fx *1
2SA1774	EMT3	1616	TL	180	8	3,000	Fx *1
2SA1576UB	UMT3F	2021	TL	180	8	3,000	Fx *1
2SA1576A	UMT3	2021	T106	180	8	3,000	Fx *1
2SA1037AK	SMT3	2928	T146	180	8	3,000	Fx *1

*1 x : h_{FE} rank

●Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Values	Unit
Collector-base voltage		V_{CBO}	−60	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage		V_{EBO}	−6	V
Collector current		I_{CP} *1	−200	mA
		I_C	−150	mA
Power dissipation	2SA2029 2SA1774EB 2SA1774	P_D *2	150	mW
	2SA1576UB 2SA1576A 2SA1037AK		200	mW
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	−55 to +150	°C

●Electrical characteristics(Ta = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage	BV_{CEO}	I_C = −1mA	−50	-	-	V
Collector-base breakdown voltage	BV_{CBO}	I_C = −50μA	−60	-	-	V
Emitter-base breakdown voltage	BV_{EBO}	I_E = −50μA	−6	-	-	V
Collector cut-off current	I_{CBO}	V_{CB} = −60V	-	-	−100	nA
Emitter cut-off current	I_{EBO}	V_{EB} = −6V	-	-	−100	nA
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = −50mA, I_B = −5mA	-	-	−0.5	V
DC current gain	h_{FE}	V_{CE} = −6V, I_C = −1mA	120	-	560	-
Transition frequency	f_T	V_{CE} = −12V, I_E = 2mA f=100MHz	-	140	-	MHz
Output capacitance	C_{ob}	V_{CB} = −12V, I_E = 0mA f = 1MHz	-	4.0	5.0	pF

*1 P_W=10ms Single Pulse

*2 Each terminal mounted on a reference footprint

●h_{FE} rank categories

Rank	Q	R	S
h_{FE}	120 to 270	180 to 390	270 to 560

●**Electrical characteristic curves**(Ta = 25°C)

Fig.1 Ground Emitter Propagation Characteristics

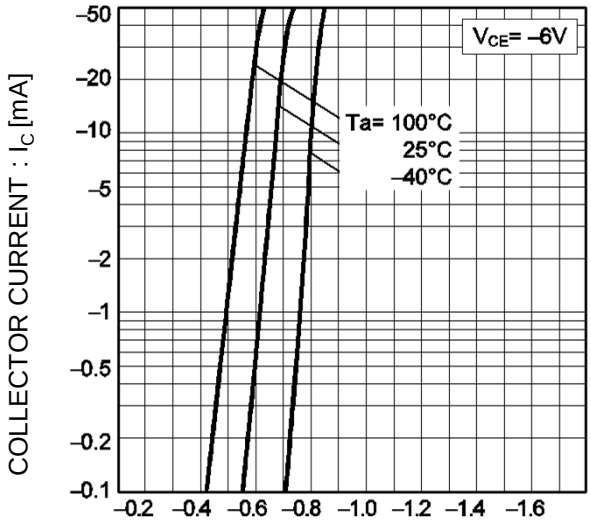


Fig.2 Typical Output Characteristics

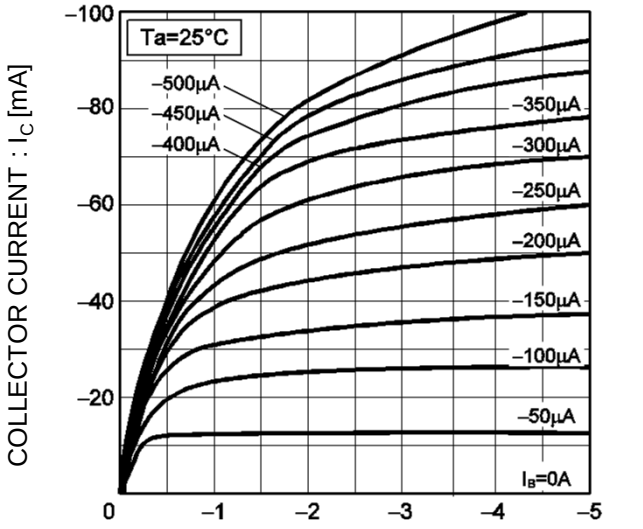


Fig.3 DC Current Gain vs. Collector Current(I)

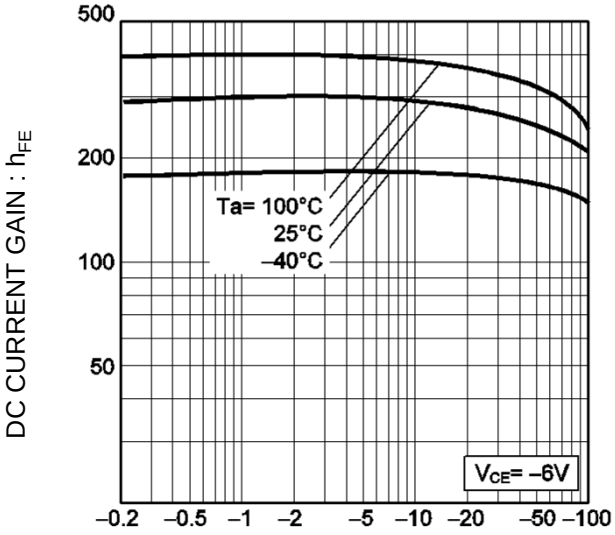
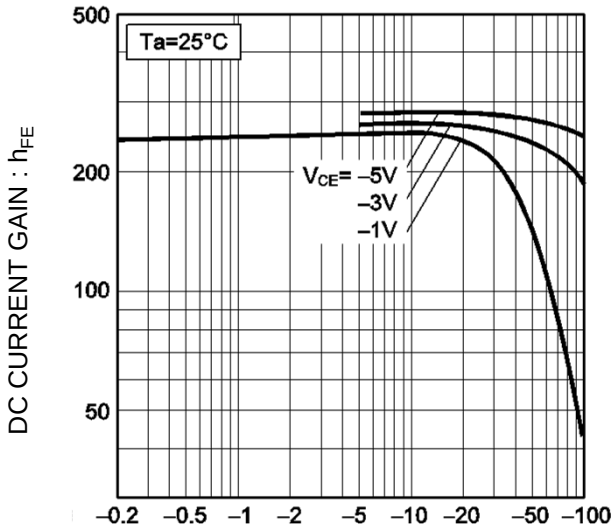


Fig.4 DC Current Gain vs. Collector Current(II)



●Electrical characteristic curves(Ta = 25°C)

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

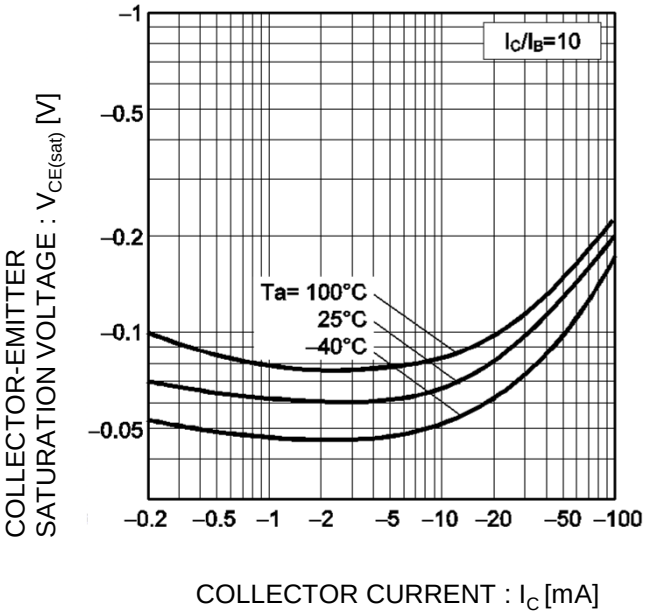


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (II)

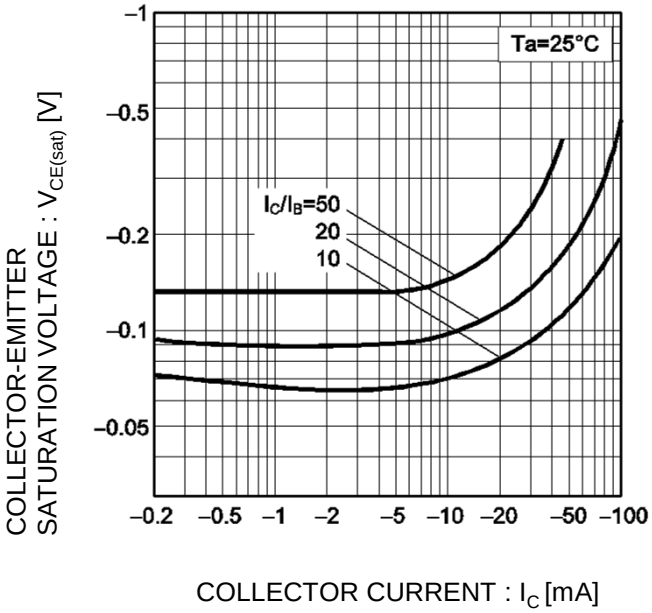


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

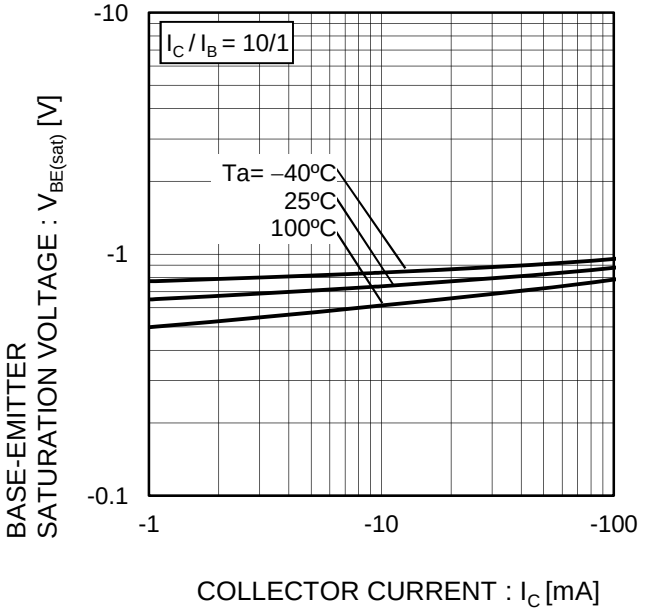
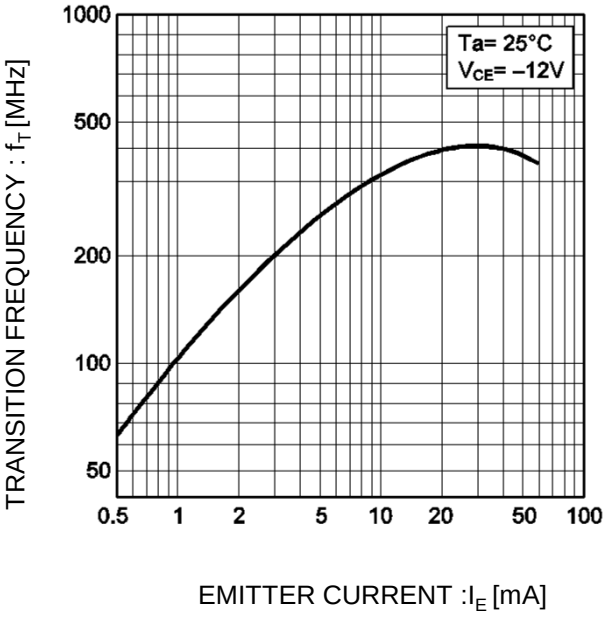


Fig.8 Gain Bandwidth Product vs. Emitter Current



●Electrical characteristic curves(Ta = 25°C)

Fig.9 Emitter input capacitance vs. Emitter-Base Voltage
Collector output capacitance vs. Collector-Base Voltage

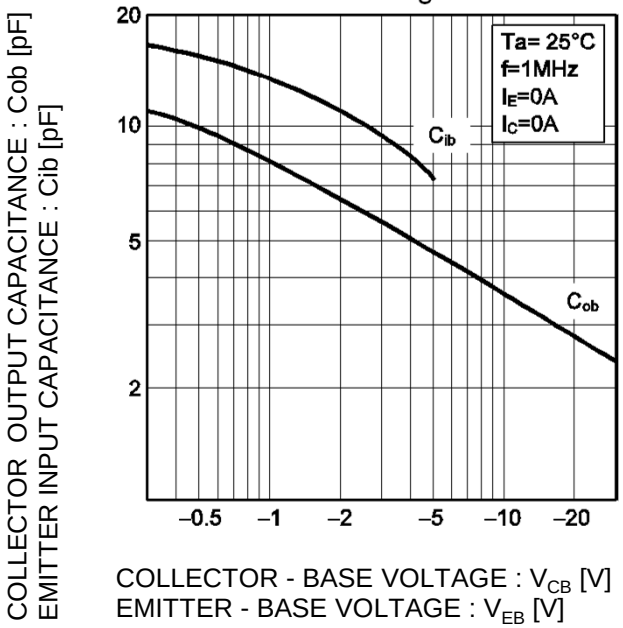


Fig.10 Safe Operating Area

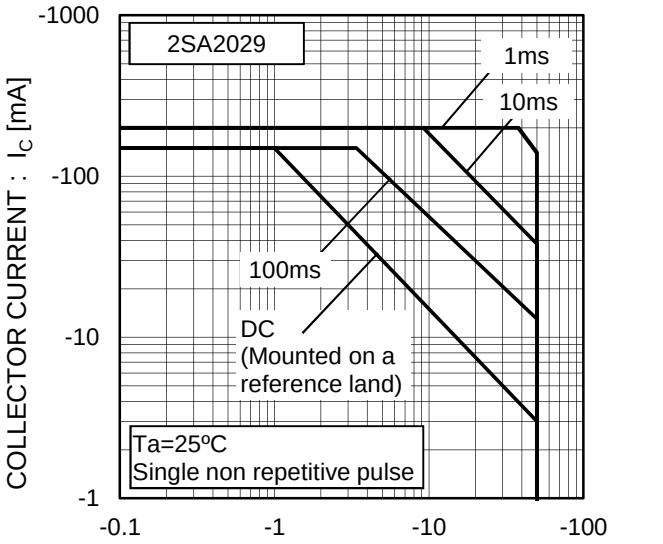


Fig.11 Safe Operating Area

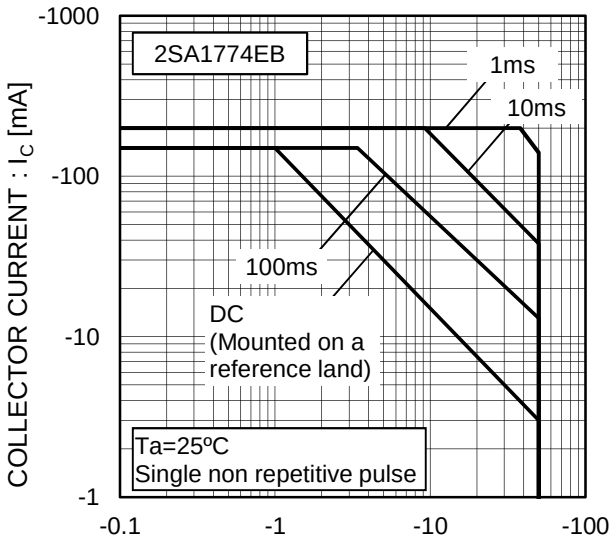
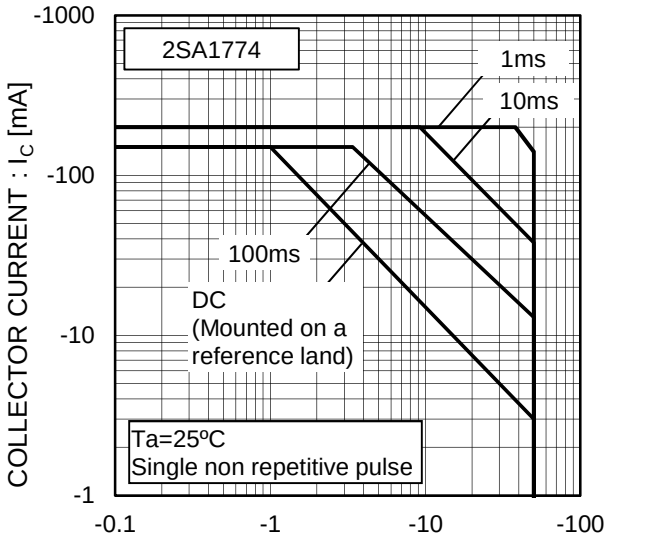


Fig.12 Safe Operating Area



●**Electrical characteristic curves**(Ta = 25°C)

Fig.13 Safe Operating Area

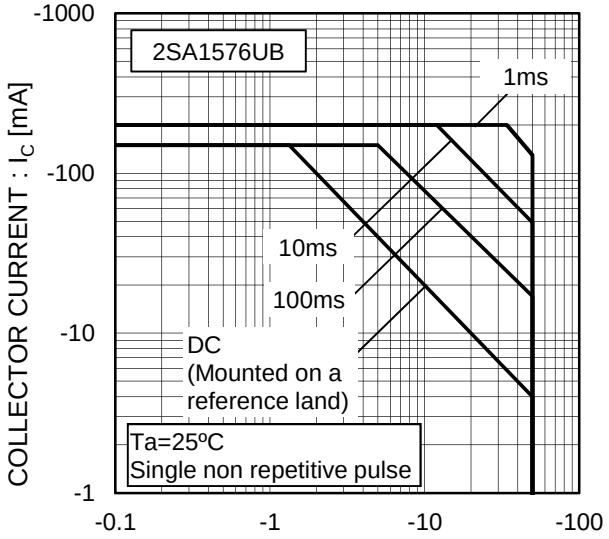


Fig.14 Safe Operating Area

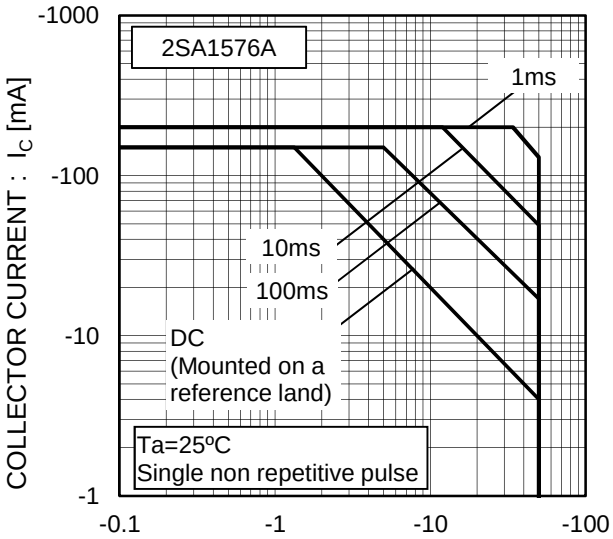
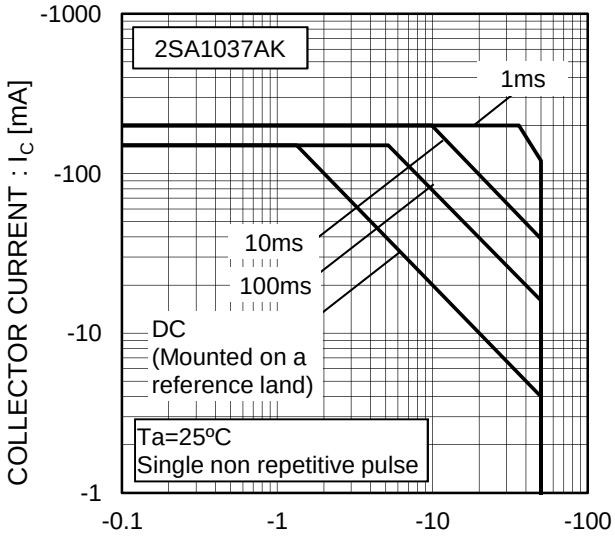
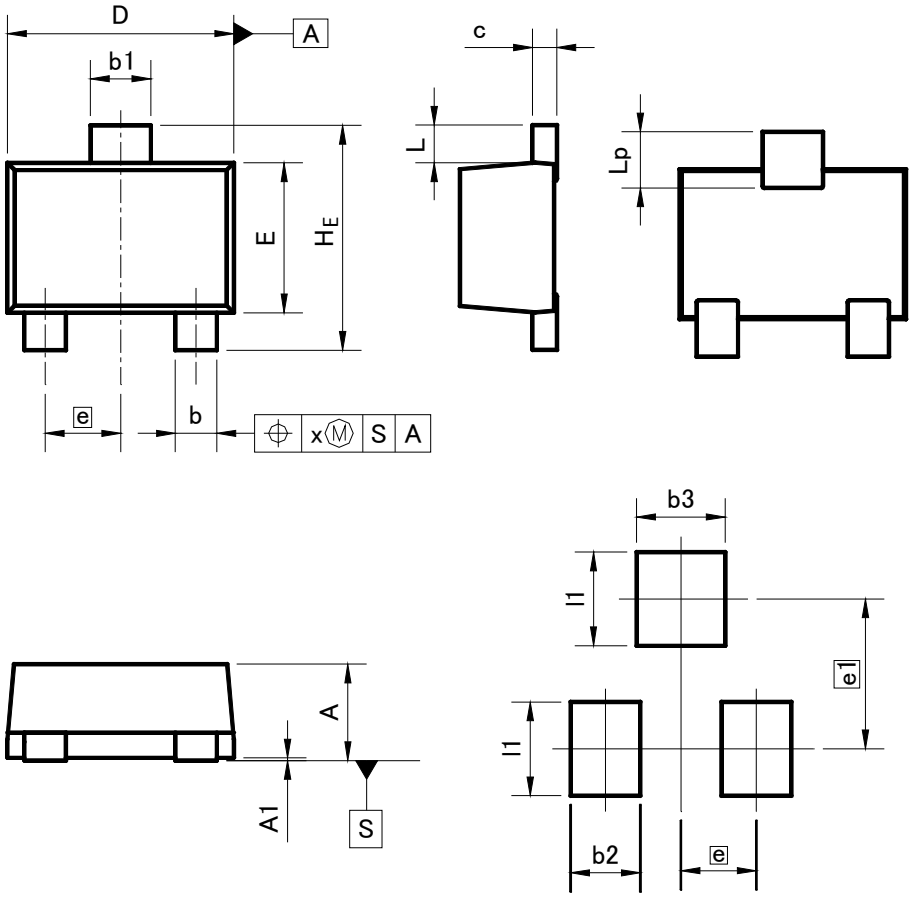


Fig.15 Safe Operating Area



●**Dimensions** (Unit : mm)

VMT3



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

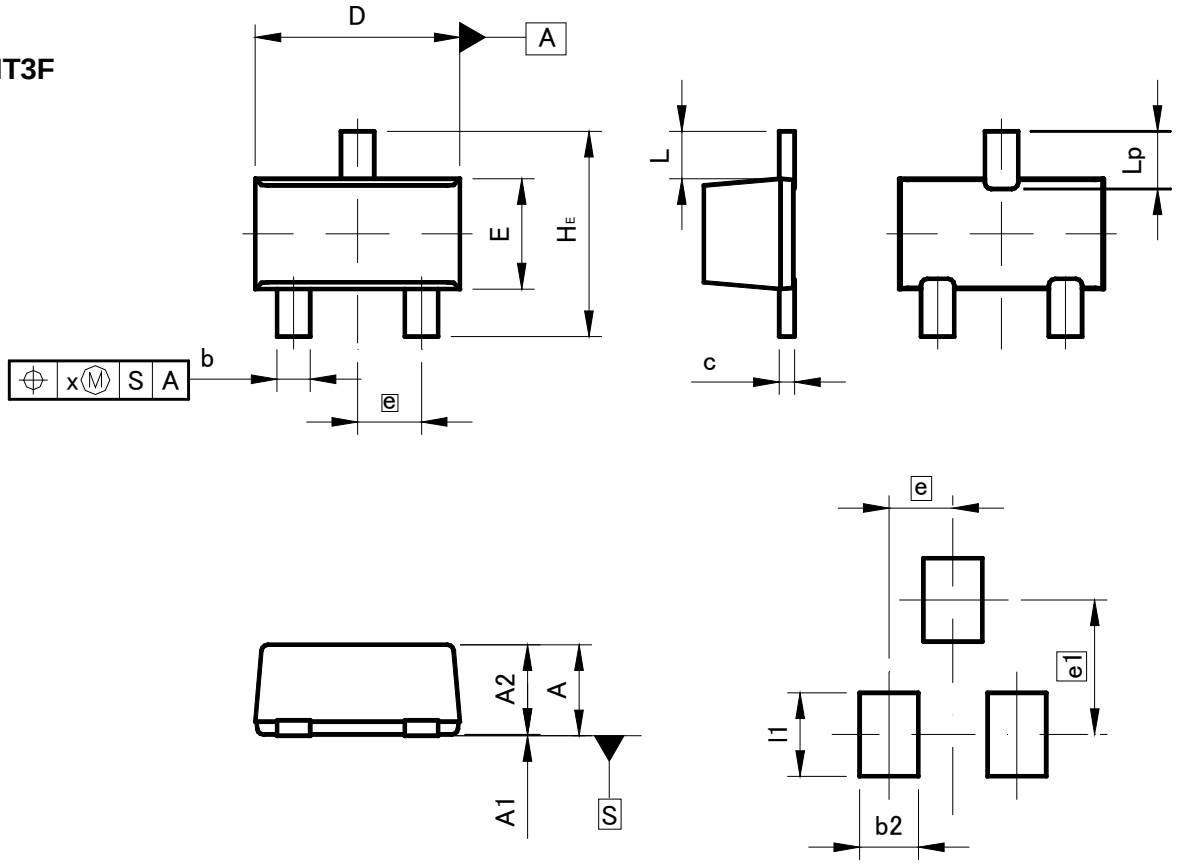
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.55	0.018	0.022
A1	0.00	0.10	0.000	0.004
b	0.17	0.27	0.007	0.011
b1	0.27	0.37	0.011	0.015
c	0.08	0.18	0.003	0.007
D	1.10	1.30	0.043	0.051
E	0.70	0.90	0.028	0.035
e	0.40		0.02	
HE	1.10	1.30	0.043	0.051
L	0.10	0.30	0.004	0.012
Lp	0.20	0.40	0.008	0.016
x	−	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	
l1	−	0.50	−	0.020

Dimension in mm / inches

●**Dimensions** (Unit : mm)

EMT3F



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

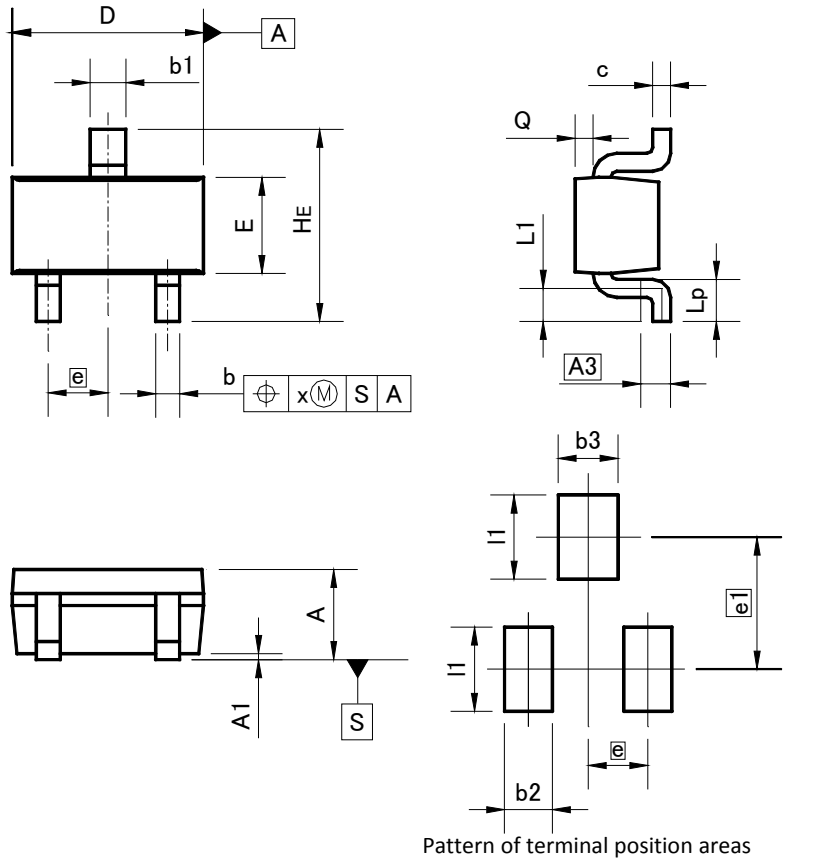
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.65	0.85	0.026	0.033
A1	0.00	0.10	0.000	0.004
A2	0.60	0.80	0.024	0.031
b	0.21	0.36	0.008	0.014
c	0.08	0.18	0.003	0.007
D	1.50	1.70	0.059	0.067
E	0.76	0.96	0.030	0.038
e	0.50		0.020	
HE	1.50	1.70	0.059	0.067
L	0.37		0.015	
Lp	0.35	0.55	0.014	0.022
x	−	0.10	−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

EMT3



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

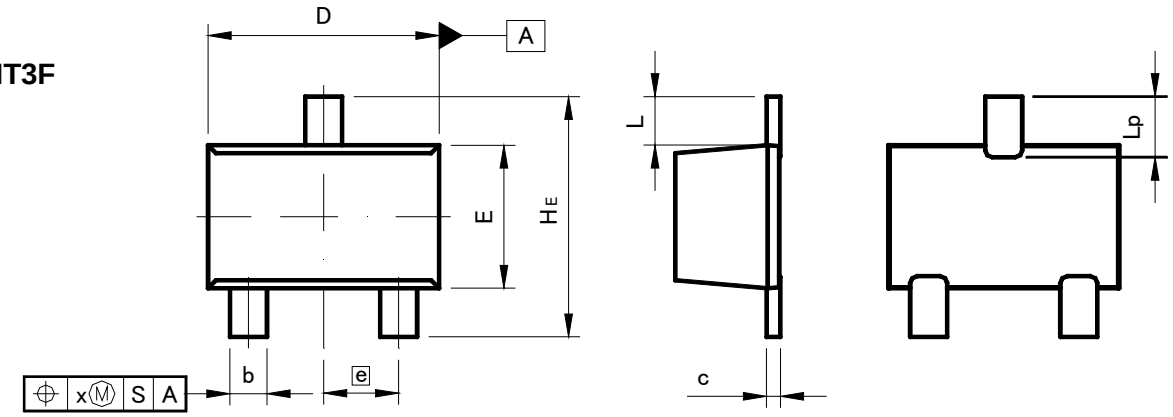
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.60	0.80	0.024	0.031
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.15	0.30	0.006	0.012
b1	0.25	0.40	0.010	0.016
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
e	0.50		0.020	
HE	1.40	1.80	0.055	0.071
L1	0.10	–	0.004	–
Lp	0.15	–	0.006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

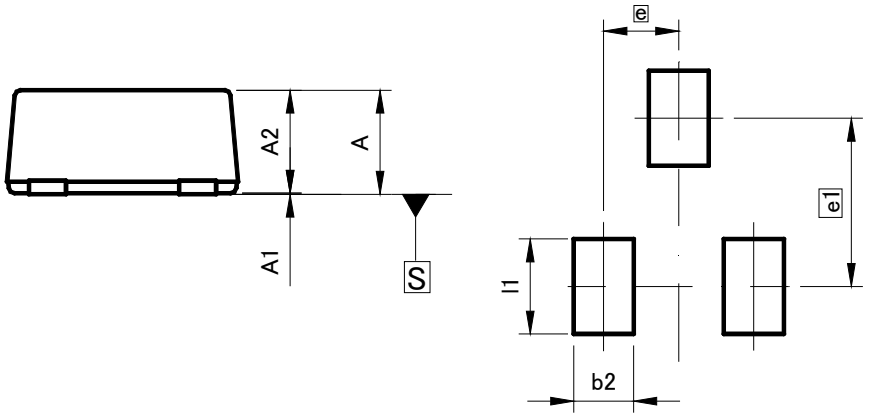
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	–	0.40	–	0.016
b3	–	0.50	–	0.020
e1	1.10		0.043	
l1	–	0.70	–	0.028

Dimension in mm / inches

●**Dimensions** (Unit : mm)

UMT3F





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

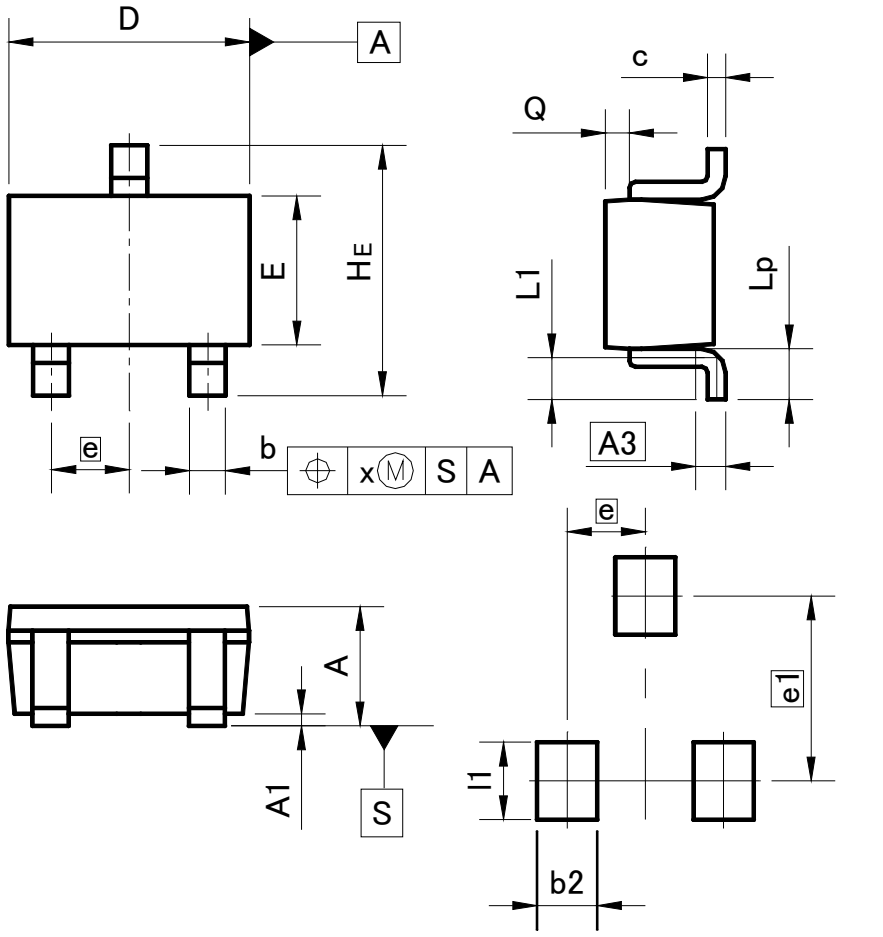
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.85	1.05	0.033	0.041
A1	0.00	0.10	0.000	0.004
A2	0.80	1.00	0.031	0.039
b	0.27	0.42	0.011	0.017
c	0.08	0.18	0.003	0.007
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L	0.43		0.017	
Lp	0.43	0.63	0.017	0.025
x	−	0.10	−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

UMT3



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

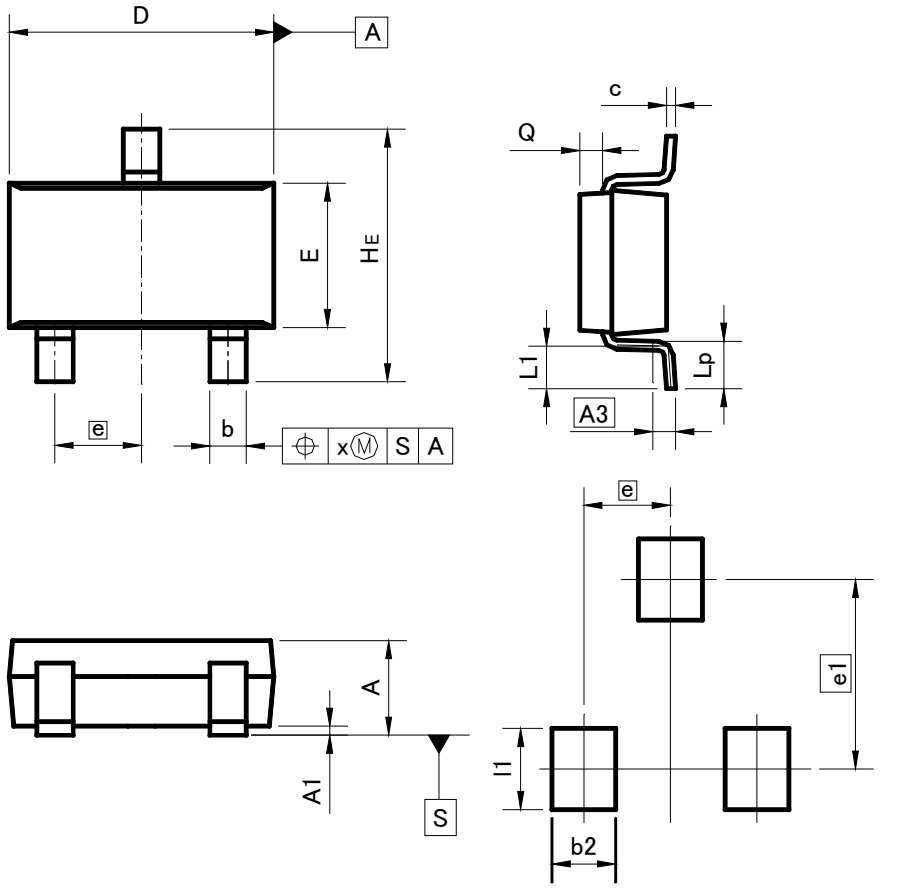
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.15	0.30	0.006	0.012
c	0.10	0.20	0.004	0.008
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.020
Lp	0.25	0.55	0.010	0.022
Q	0.10	0.30	0.004	0.012
x	−	0.10	−	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	−	0.50	−	0.020
e1	1.55		0.061	
l1	−	0.65	−	0.026

Dimension in mm / inches

●**Dimensions** (Unit : mm)

SMT3



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

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	
l1	−	0.90	−	0.035

Dimension in mm / inches

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Poducts beyond the rating specified by ROHM.

4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

6) The Products are intended for use in general electronic equipment (i.e. AV/OA devices, communication, consumer systems, gaming/entertainment sets) as well as the applications indicated in this document.

7) The Products specified in this document are not designed to be radiation tolerant.

8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

10) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.

11) ROHM has used reasonable care to ensur the accuracy of the information contained in this document. However, ROHM does not warrants that such information is error-free, and ROHM shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.

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