

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







**●Features**

- 1)Excellent  $h_{FE}$  linearity.
- 2)Complements the 2SC5658/2SC4617EB/  
2SC4617/2SC4081UB/2SC4081/2SC2412K

**●Application**

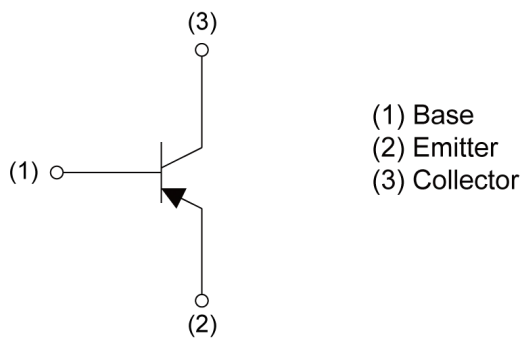
GENERAL PURPOSE SMALL SIGNAL  
AMPLIFIER

**●Outline**

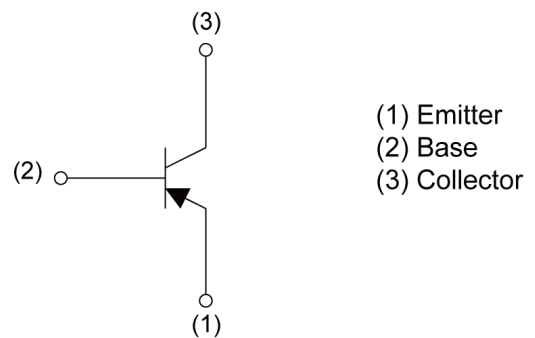
<p>VMT3</p>  <p>2SA2029 SC-105AA</p>	<p>EMT3F</p>  <p>2SA1774EB SOT-416FL</p>
<p>EMT3</p>  <p>2SA1774 SOT-416</p>	<p>UMT3F</p>  <p>2SA1576UB SOT-323FL</p>
<p>UMT3</p>  <p>2SA1576A SOT-323</p>	<p>SMT3</p>  <p>2SA1037AK SOT-346</p>

**●Inner circuit**

2SA2029/2SA1774EB/2SA1576UB



2SA1774/2SA1576A/2SA1037AK



**●Packaging specifications**

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	$h_{FE}$ rank	Marking
2SA2029	VMT3	1212	T2L	180	8	8000	QRS	F
2SA1774EB	EMT3F	1616	TL	180	8	3000	QRS	F
2SA1774	EMT3	1616	TL	180	8	3000	QRS	F
2SA1576UB	UMT3F	2021	TL	180	8	3000	QRS	F
2SA1576A	UMT3	2021	T106	180	8	3000	QRS	F
2SA1037AK	SMT3	2928	T146	180	8	3000	QRS	F

● 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		$V_{EBO}$	-6	V
Collector current		$I_C$	-150	mA
		$I_{CP}^{*1}$	-200	mA
Power dissipation	2SA2029	$P_D^{*2}$	150	mW
	2SA1774EB		150	
	2SA1774		150	
	2SA1576UB		200	
	2SA1576A		200	
	2SA1037AK		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	$BV_{EBO}$	$I_E = -50\mu\text{A}$	-6	-	-	V
Collector cut-off current	$I_{CBO}$	$V_{CB} = -60\text{V}$	-	-	-100	nA
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -6\text{V}$	-	-	-100	nA
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -50\text{mA}, I_B = -5\text{mA}$	-	-	-500	mV
DC current gain	$h_{FE}$	$V_{CE} = -6\text{V}, I_C = -1\text{mA}$	120	-	560	-
Transition frequency	$f_T$	$V_{CE} = -12\text{V}, I_E = 2\text{mA}, f = 100\text{MHz}$	-	140	-	MHz
Output capacitance	$C_{ob}$	$V_{CB} = -12\text{V}, I_E = 0\text{A}, f = 1\text{MHz}$	-	4.0	5.0	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

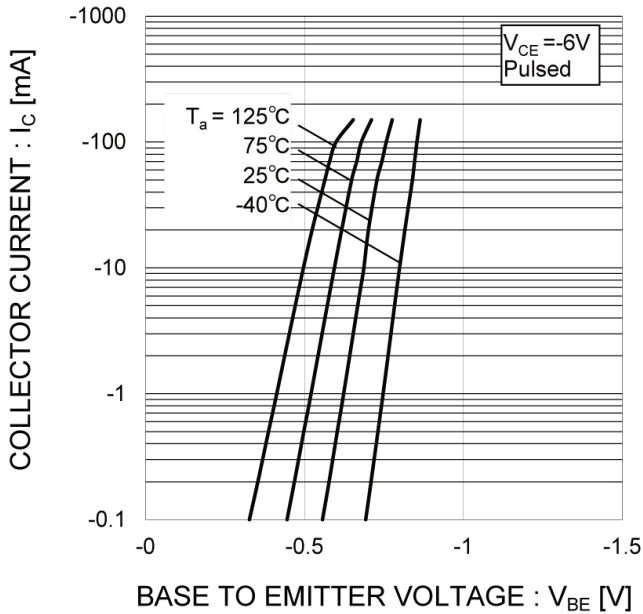


Fig.2 Typical Output Characteristics

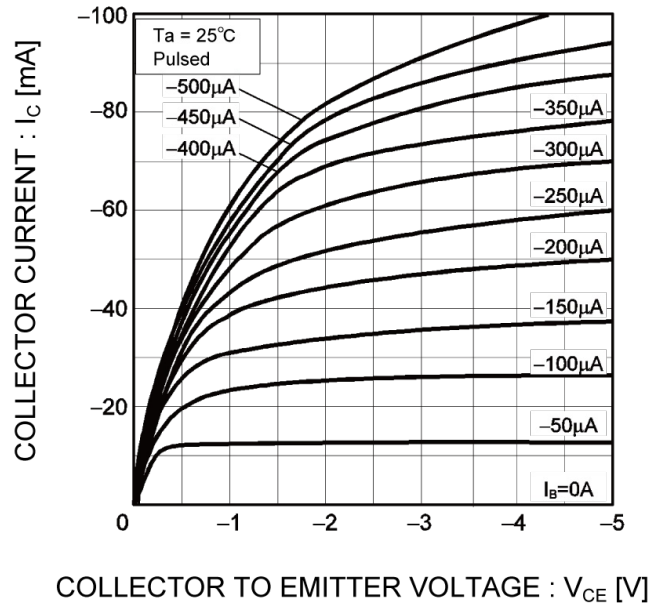
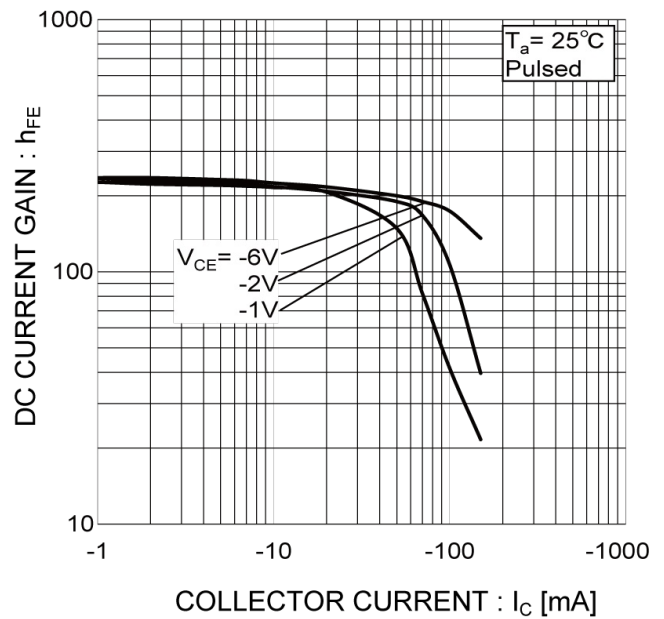


Fig.3 DC Current Gain vs. Collector Current (I)



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



Fig.8 Gain Bandwidth Product vs. Emitter Current



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

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

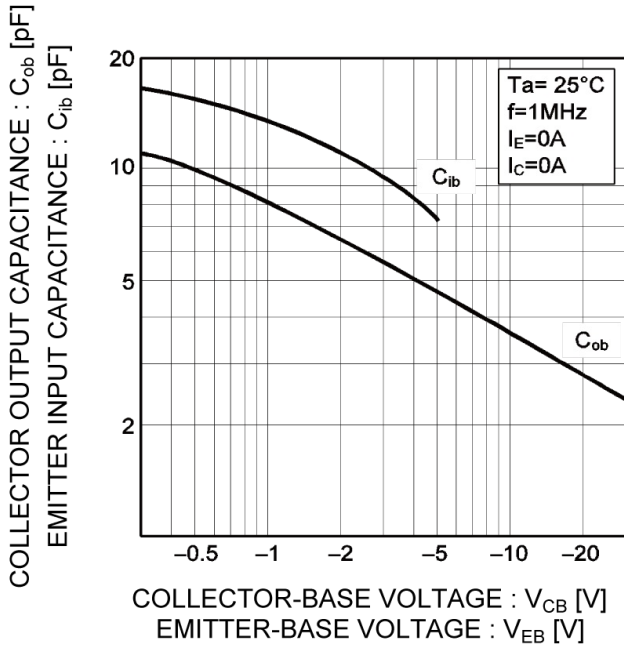


Fig.10 Safe Operating Area

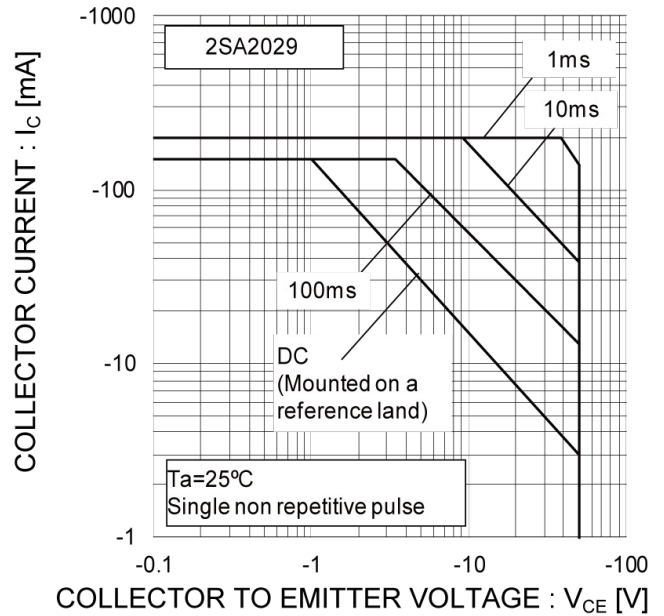
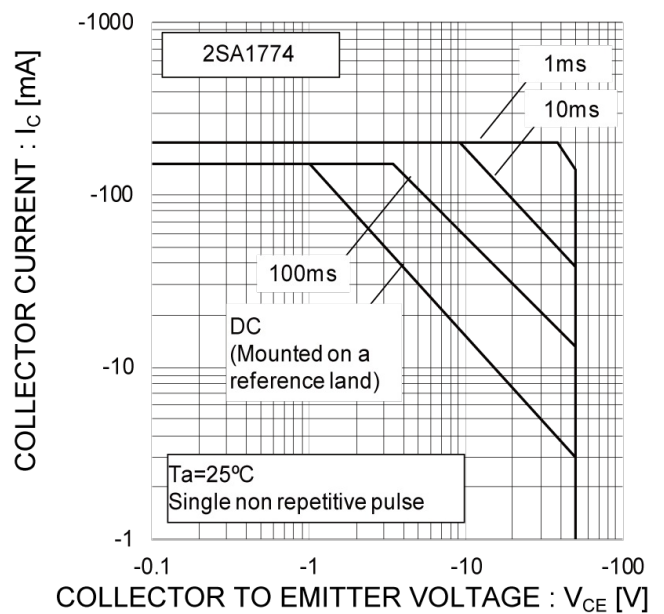


Fig.11 Safe Operating Area



Fig.12 Safe Operating Area



●Electrical characteristic curves(Ta=25°C)

Fig.13 Safe Operating Area



Fig.14 Safe Operating Area

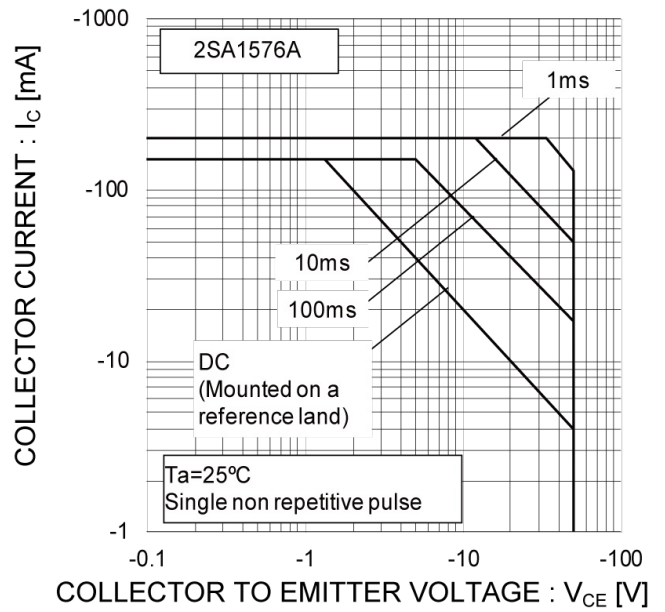
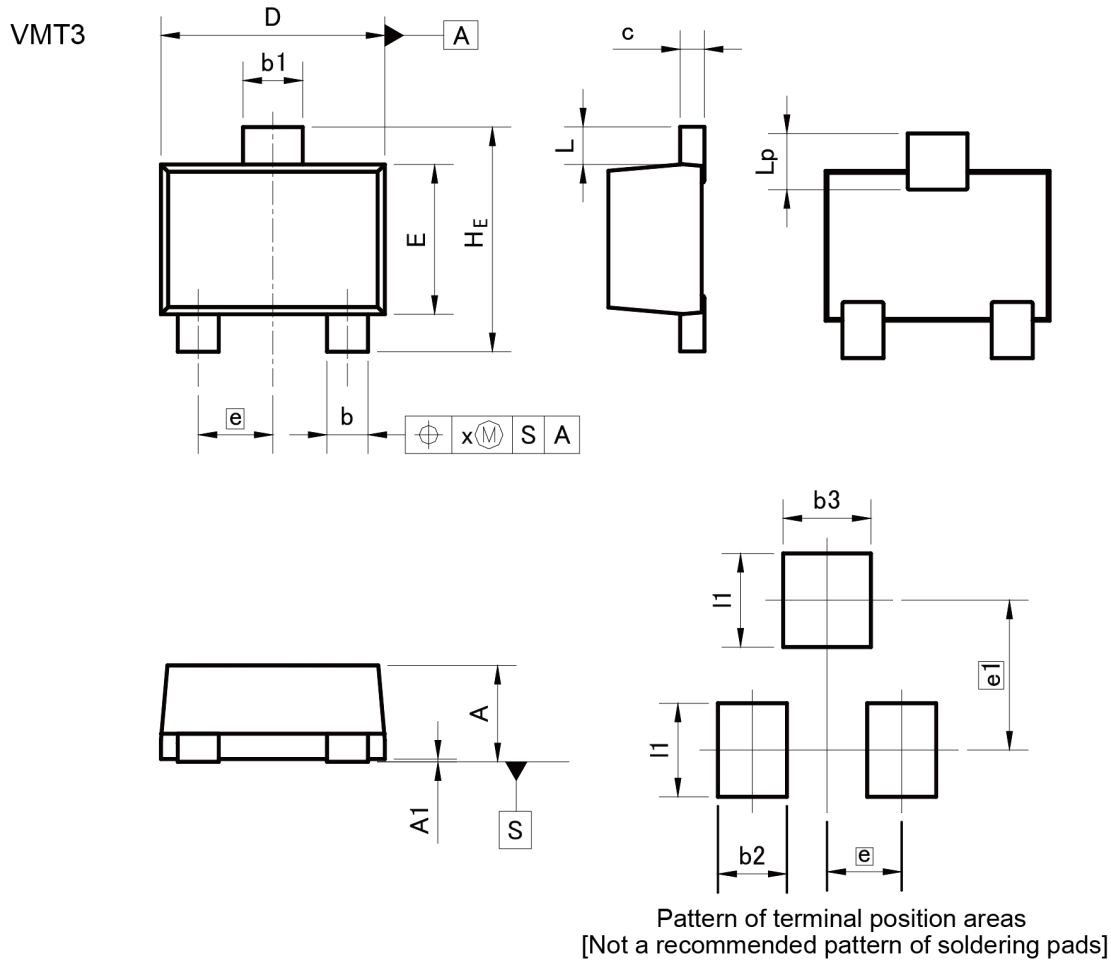


Fig.15 Safe Operating Area



●Dimensions



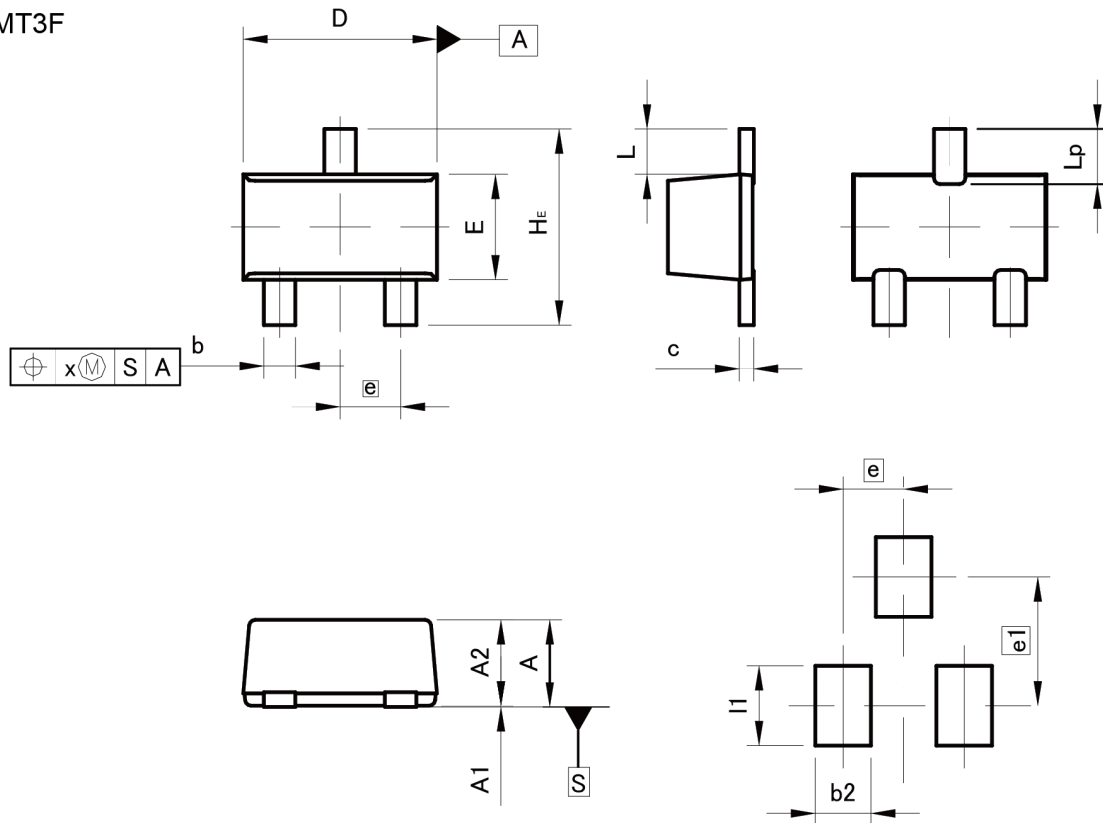
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.55	0.018	0.022
A1	0.00	0.10	0.000	0.004
b	0.17	0.27	0.007	0.011
b1	0.27	0.37	0.011	0.015
c	0.08	0.18	0.003	0.007
D	1.10	1.30	0.043	0.051
E	0.70	0.90	0.028	0.035
e	0.40		0.02	
HE	1.10	1.30	0.043	0.051
L	0.10	0.30	0.004	0.012
Lp	0.20	0.40	0.008	0.016
x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

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

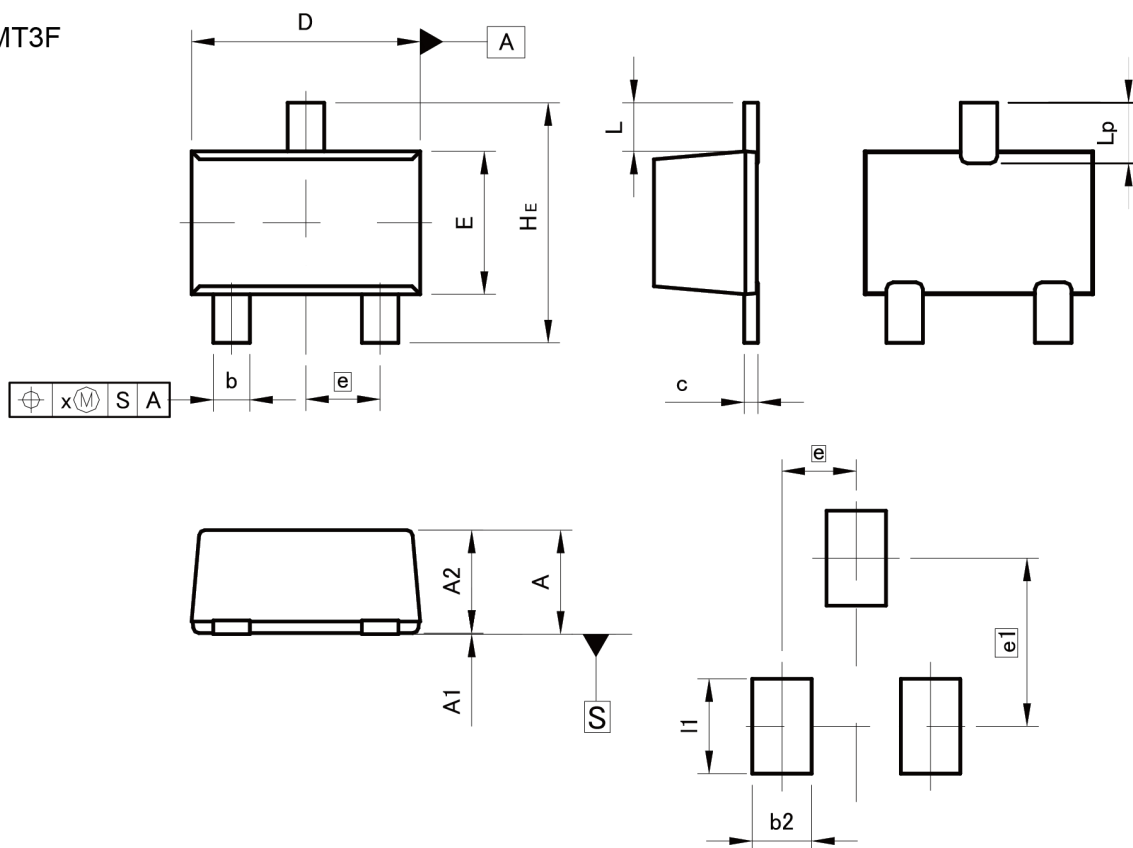
Dimension in mm/inches





●Dimensions

UMT3F



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

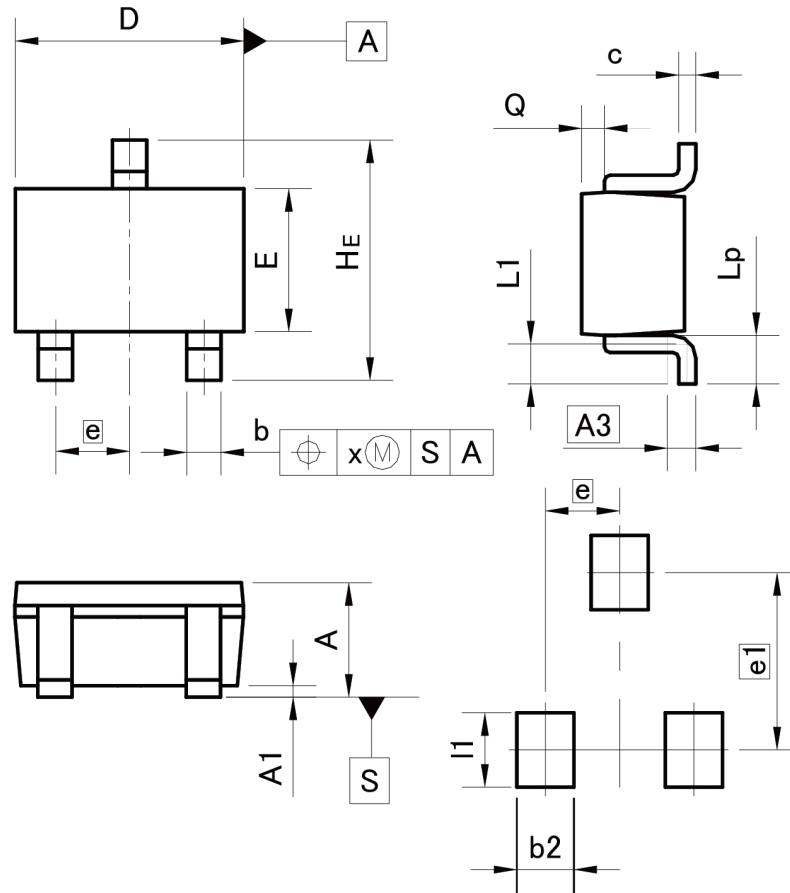
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.85	1.05	0.033	0.041
A1	0.00	0.10	0.000	0.004
A2	0.80	1.00	0.031	0.039
b	0.27	0.42	0.011	0.017
c	0.08	0.18	0.003	0.007
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L	0.43		0.017	
Lp	0.43	0.63	0.017	0.025
x	-	0.10	-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

UMT3



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

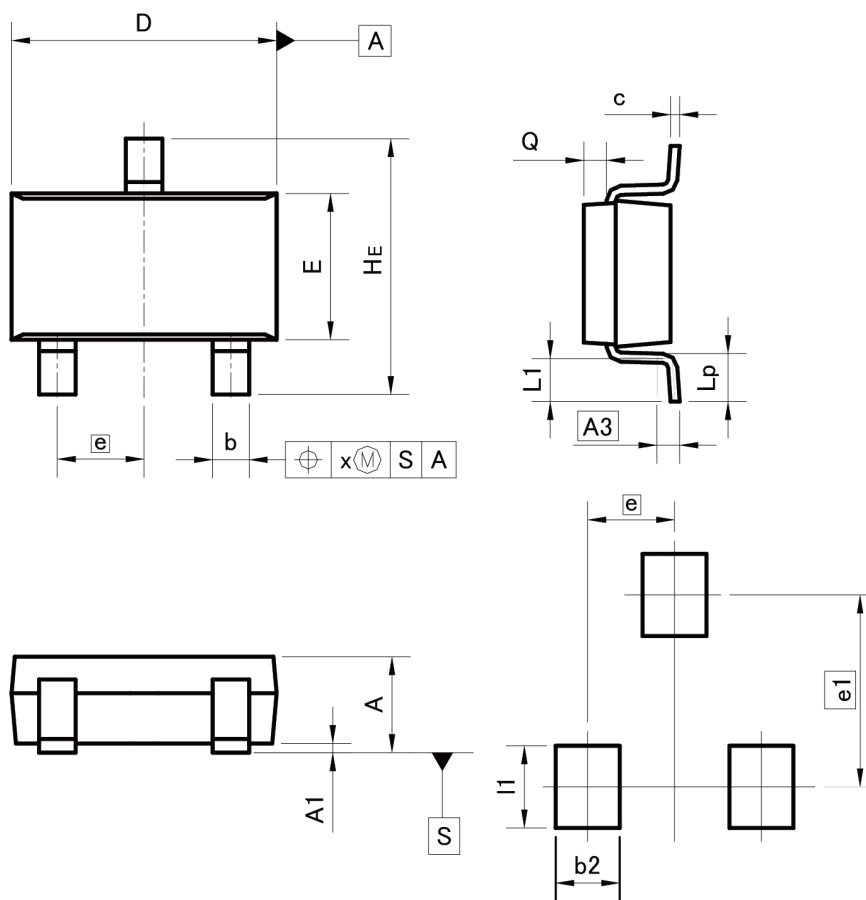
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.15	0.30	0.006	0.012
c	0.10	0.20	0.004	0.008
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.020
Lp	0.25	0.55	0.010	0.022
Q	0.10	0.30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

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

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