

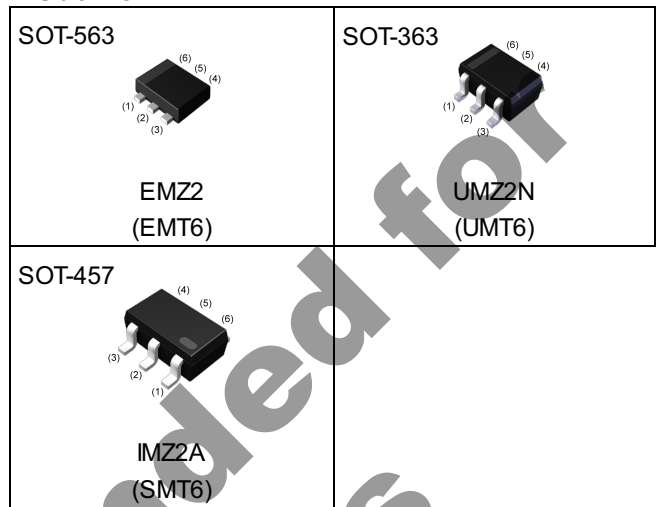
<For Tr1(PNP)>

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

<For Tr2(NPN)>

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

### ● Outline



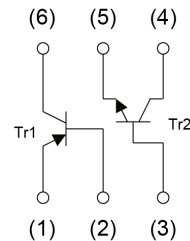
### ● Features

- 1) Included a 2SA1037AK and a 2SC2412K transistor in a EMT, UMT or SMT package.
- 2) Mounting possible with EMT3 or UMT3 or SMT3 automatic mounting machines.
- 3) Transistor elements are independent, eliminating interference.
- 4) Mounting cost and area can be cut in half.

### ● Inner circuit

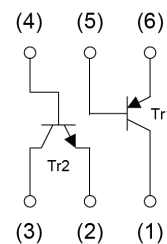
#### EMZ2 / UMZ2N

- (1) Tr1(PNP) Emitter
- (2) Tr1(PNP) Base
- (3) Tr2(NPN) Base
- (4) Tr2(NPN) Collector
- (5) Tr2(NPN) Emitter
- (6) Tr1(PNP) Collector



#### IMZ2A

- (1) Tr1(PNP) Collector
- (2) Tr2(NPN) Emitter
- (3) Tr2(NPN) Collector
- (4) Tr2(NPN) Base
- (5) Tr1(PNP) Base
- (6) Tr1(PNP) Emitter



### ● Application

GENERAL PURPOSE SMALL SIGNAL AMPLIFIER

### ● Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	Marking
EMZ2	SOT-563 (EMT6)	1616	T2R	180	8	8000	Z2
UMZ2N	SOT-363 (UMT6)	2021	TR	180	8	3000	Z2
IMZ2A	SOT-457 (SMT6)	2928	T108	180	8	3000	Z2

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

Parameter		Symbol	Tr1(PNP)	Tr2(NPN)	Unit
Collector-base voltage		$V_{\text{CBO}}$	-60	60	V
Collector-emitter voltage		$V_{\text{CEO}}$	-50	50	V
Emitter-base voltage		$V_{\text{EBO}}$	-6	7	V
Collector current		$I_{\text{C}}$	-150	150	mA
Power dissipation	EMZ2/ UMZ2N	$P_{\text{D}}^{*1*2}$	150		mW/Total
	IMZ2A	$P_{\text{D}}^{*1*3}$	300		mW/Total
Junction temperature		$T_{\text{j}}$	150		$^\circ\text{C}$
Range of storage temperature		$T_{\text{stg}}$	-55 to +150		$^\circ\text{C}$

● **Electrical characteristics** ( $T_a = 25^\circ\text{C}$ ) <For Tr1(PNP)>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector-base breakdown voltage	$BV_{\text{CBO}}$	$I_{\text{C}} = -50\mu\text{A}$	-60	-	-	V
Collector-emitter breakdown voltage	$BV_{\text{CEO}}$	$I_{\text{C}} = -1\text{mA}$	-50	-	-	V
Emitter-base breakdown voltage	$BV_{\text{EBO}}$	$I_{\text{E}} = -50\mu\text{A}$	-6	-	-	V
Collector cut-off current	$I_{\text{CBO}}$	$V_{\text{CB}} = -60\text{V}$	-	-	-100	nA
Emitter cut-off current	$I_{\text{EBO}}$	$V_{\text{EB}} = -6\text{V}$	-	-	-100	nA
Collector-emitter saturation voltage	$V_{\text{CE(sat)}}$	$I_{\text{C}} = -50\text{mA}, I_{\text{B}} = -5\text{mA}$	-	-	-500	mV
DC current gain	$h_{\text{FE}}$	$V_{\text{CE}} = -6\text{V}, I_{\text{C}} = -1\text{mA}$	120	-	560	-
Transition frequency	$f_{\text{T}}$	$V_{\text{CE}} = -12\text{V}, I_{\text{E}} = 2\text{mA}, f = 100\text{MHz}$	-	140	-	MHz
Output capacitance	$C_{\text{ob}}$	$V_{\text{CB}} = -12\text{V}, I_{\text{E}} = 2\text{mA}, f = 100\text{MHz}$	-	4.0	5.0	pF

● **Electrical characteristics** ( $T_a = 25^\circ\text{C}$ ) <For Tr2(NPN)>

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

\*1 Each terminal mounted on a reference land.

\*2 120mW per element must not be exceeded.

\*3 200mW per element must not be exceeded.

●Electrical characteristic curves( $T_a=25^{\circ}\text{C}$ ) <For Tr1(PNP)>

Fig.1 Ground Emitter Propagation Characteristics

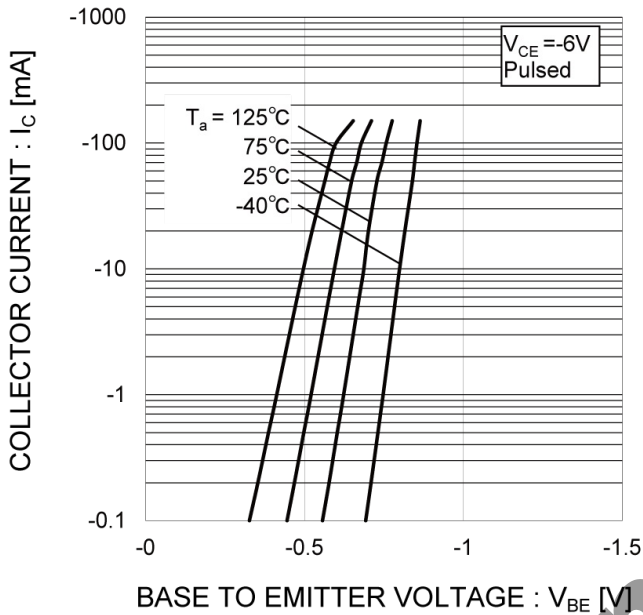


Fig.2 Grounded Emitter Output Characteristics

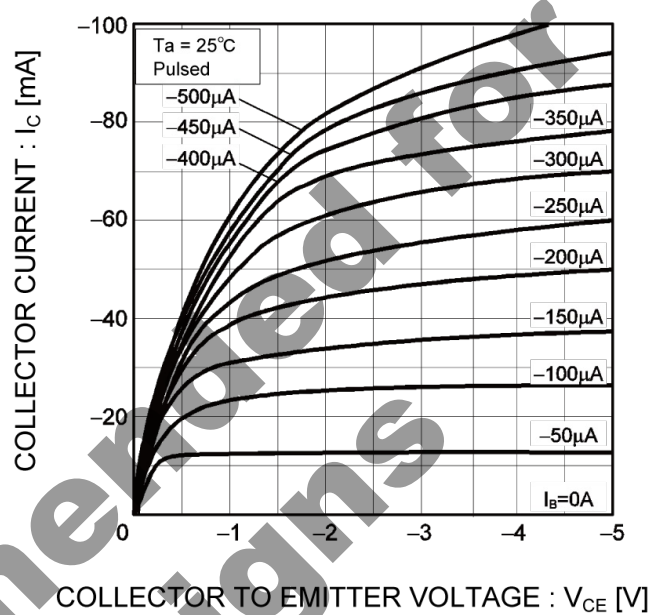


Fig.3 DC Current Gain vs. Collector Current (I)

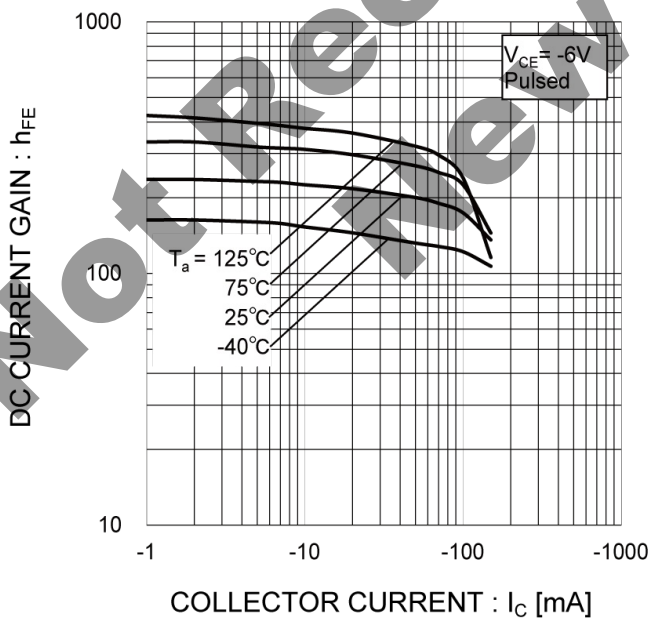
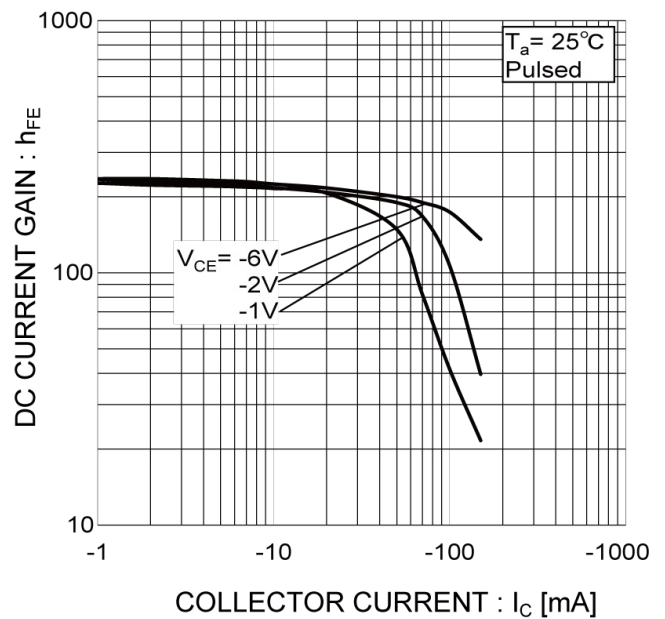


Fig.4 DC Current Gain vs. Collector Current (II)



●Electrical characteristic curves( $T_a=25^\circ\text{C}$ ) <For Tr1(PNP)>

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

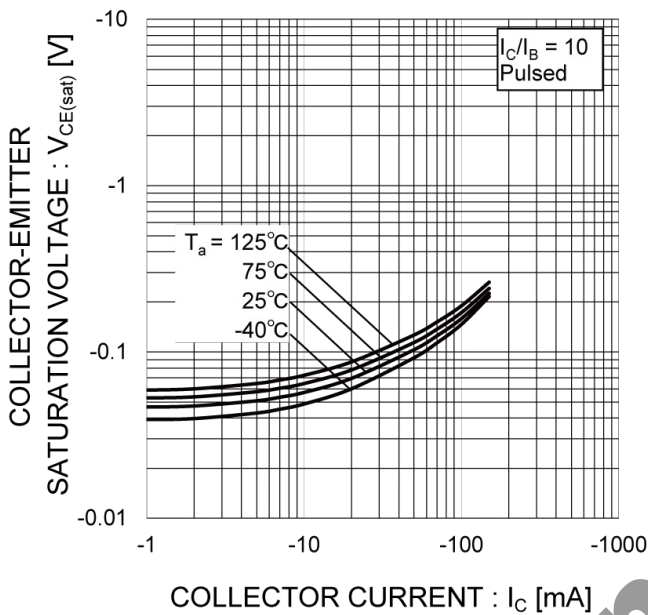


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (I)

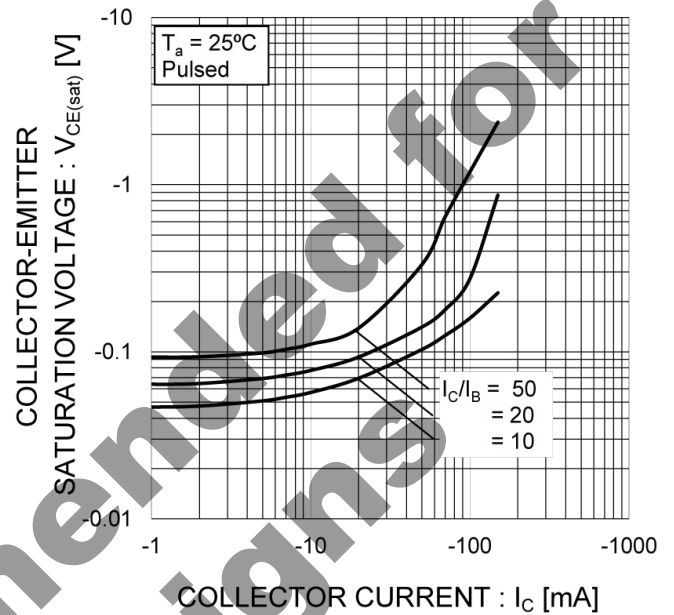


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current (I)

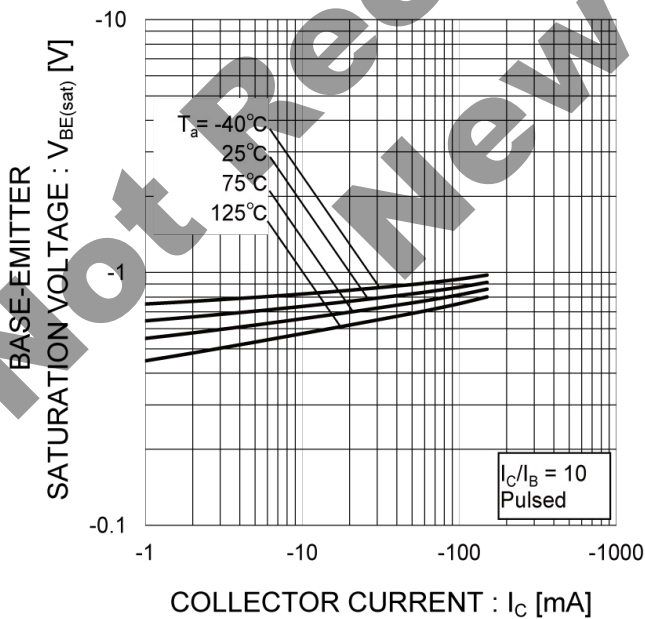
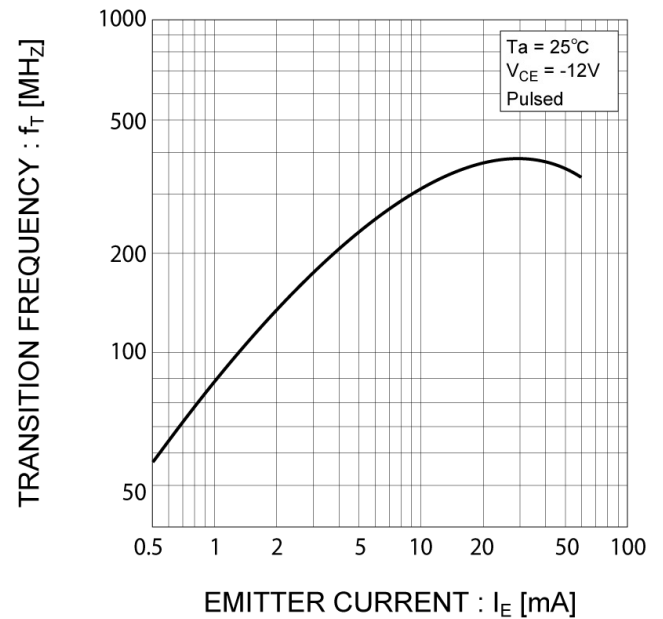


Fig.8 Gain Bandwidth Product vs. Emitter Current



●Electrical characteristic curves( $T_a=25^\circ\text{C}$ ) <For Tr1(PNP)>

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

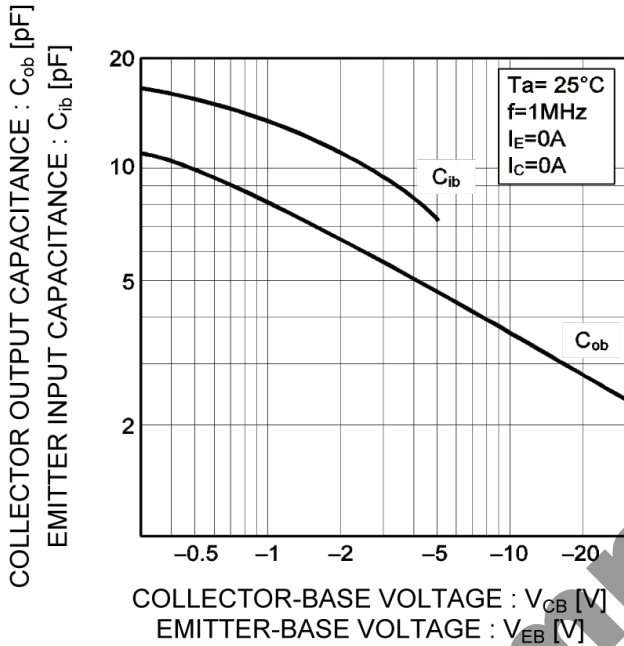


Fig.10 Safe Operating Area

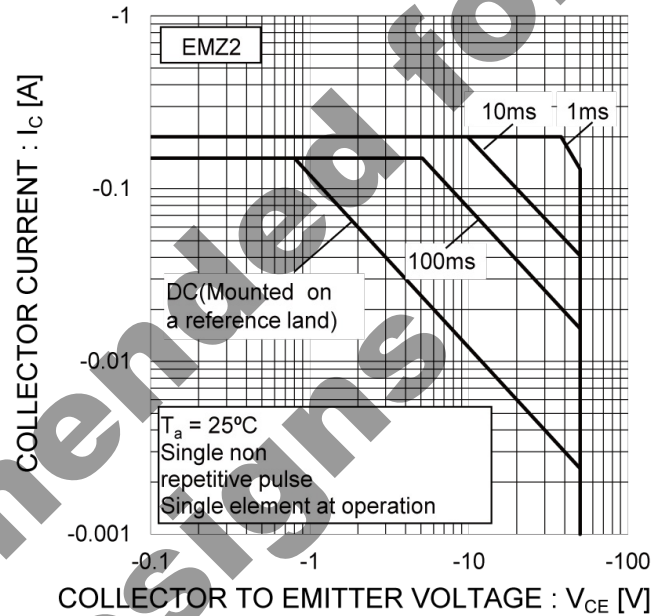


Fig.11 Safe Operating Area

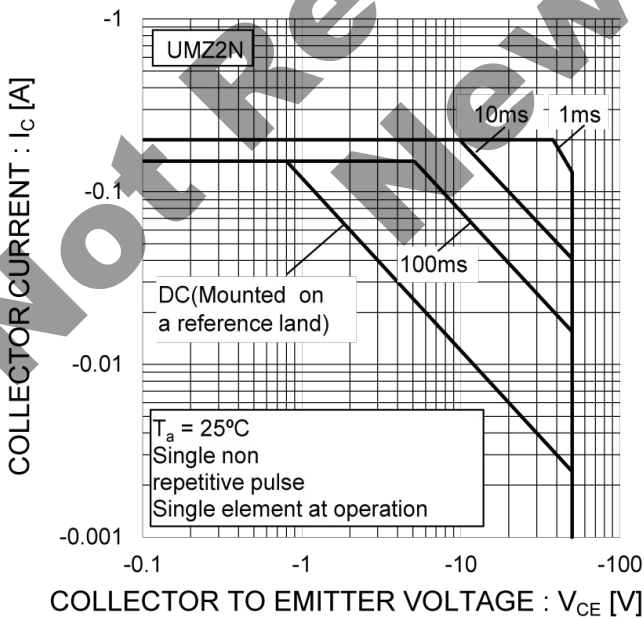
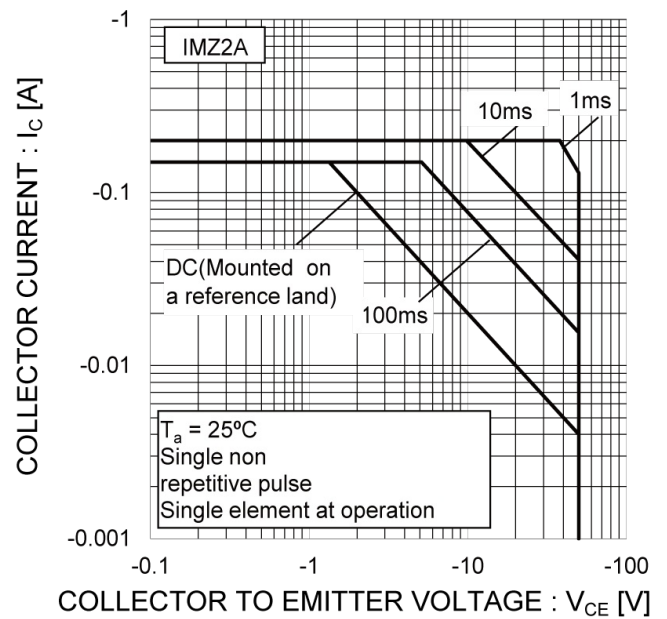


Fig.12 Safe Operating Area



● Electrical characteristic curves ( $T_a=25^\circ\text{C}$ ) <For Tr2(NPN)>

Fig.13 Ground Emitter Propagation Characteristics

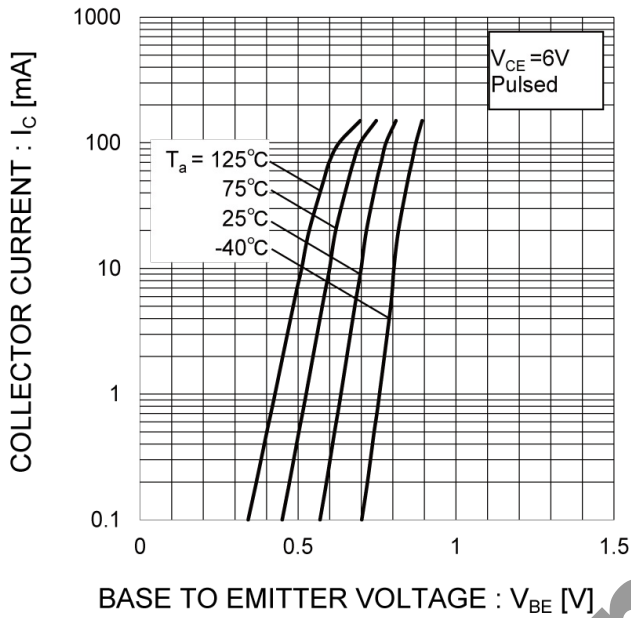


Fig.14 Grounded Emitter Output Characteristics

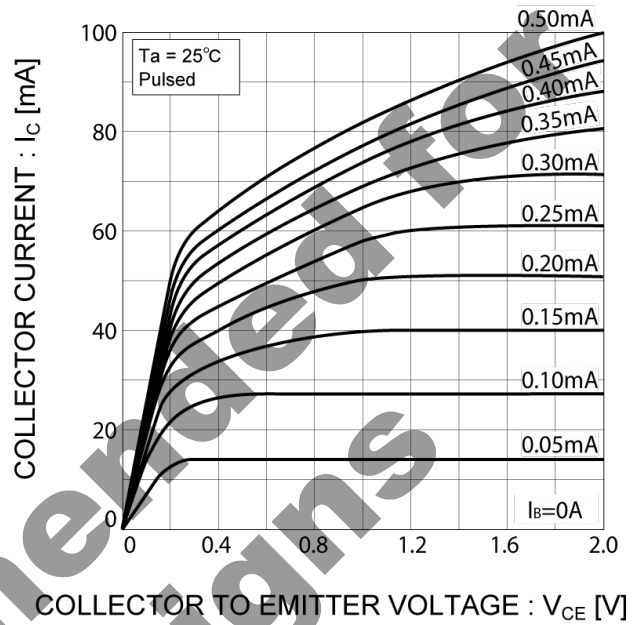


Fig.15 DC Current Gain vs. Collector Current (I)

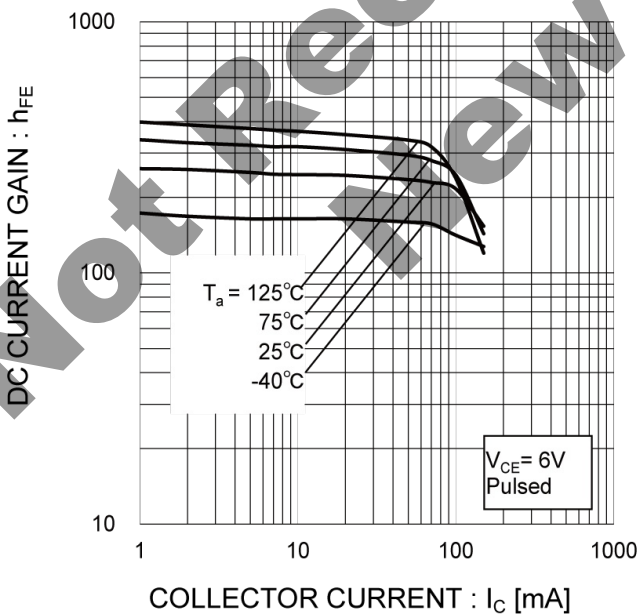
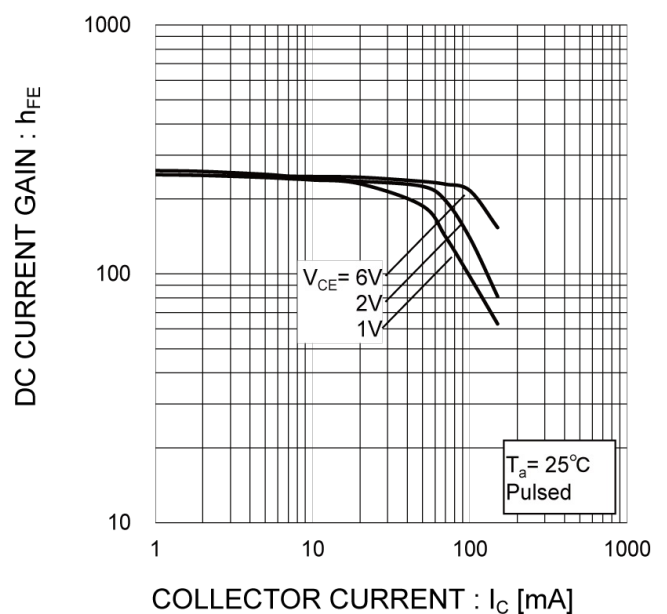


Fig.16 DC Current Gain vs. Collector Current (II)



● Electrical characteristic curves ( $T_a = 25^\circ\text{C}$ ) <For Tr2(NPN)>

Fig.17 Collector-Emitter Saturation Voltage vs. Collector Current(I)

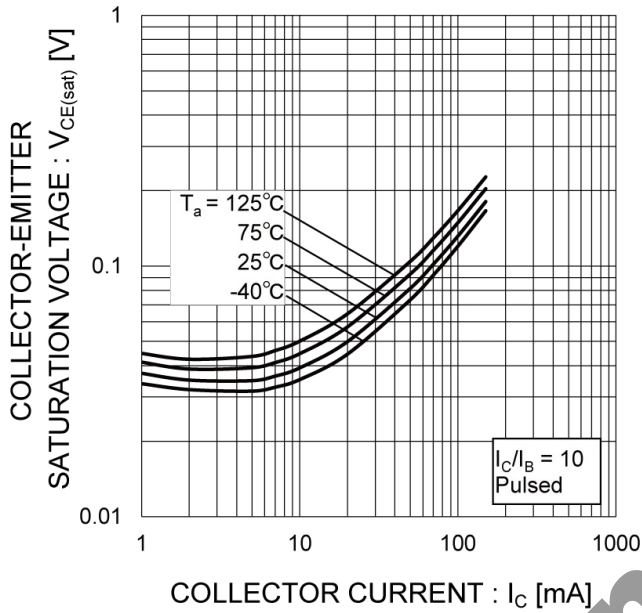


Fig.18 Collector-Emitter Saturation Voltage vs. Collector Current (I)

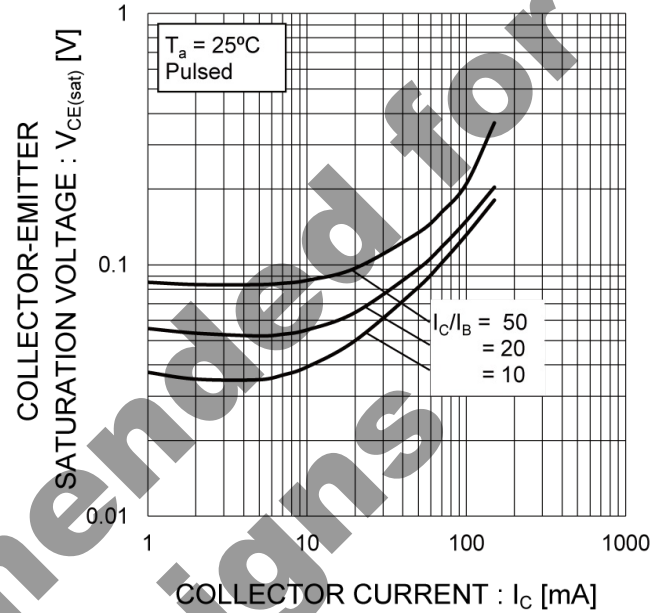


Fig.19 Base-Emitter Saturation Voltage vs. Collector Current (I)

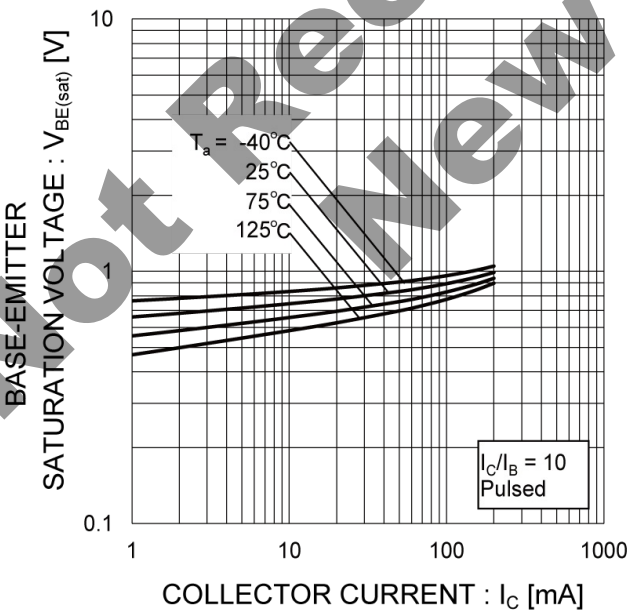
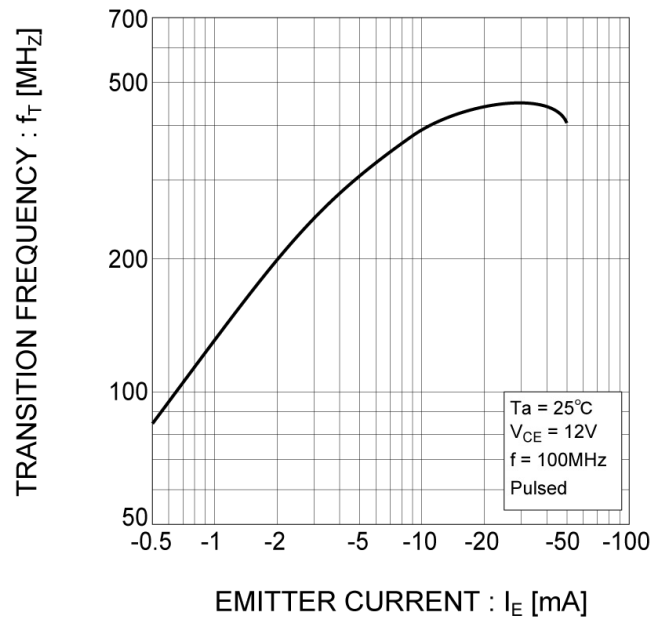


Fig.20 Gain Bandwidth Product vs. Emitter Current



●Electrical characteristic curves( $T_a = 25^\circ\text{C}$ ) <For TR2(NPN)>

Fig.21 Collector Output Capacitance vs. Collector-Base Voltage  
Emitter Input Capacitance vs. Emitter-Base Voltage

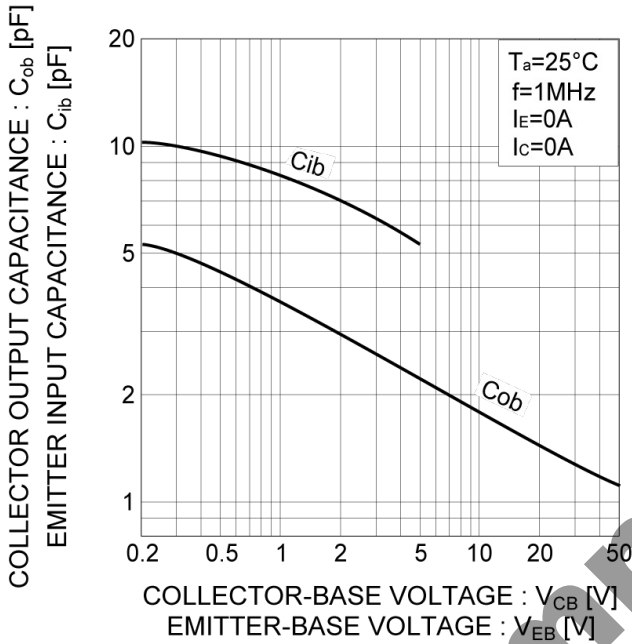


Fig.22 Safe Operating Area

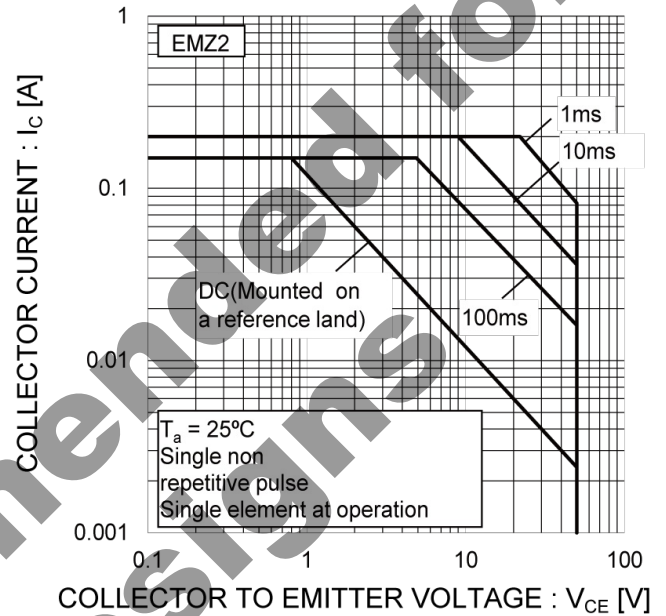


Fig.23 Safe Operating Area

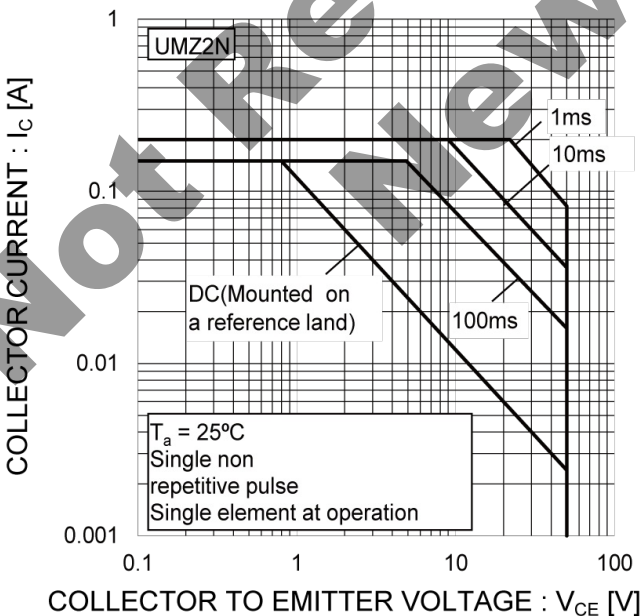
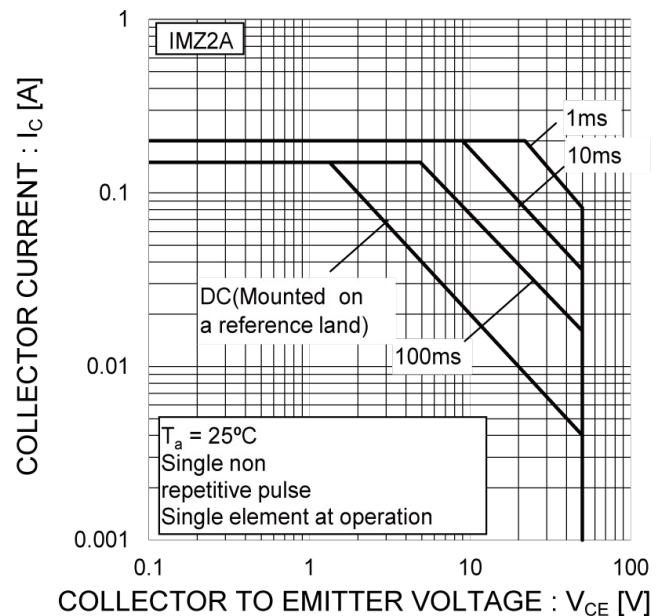


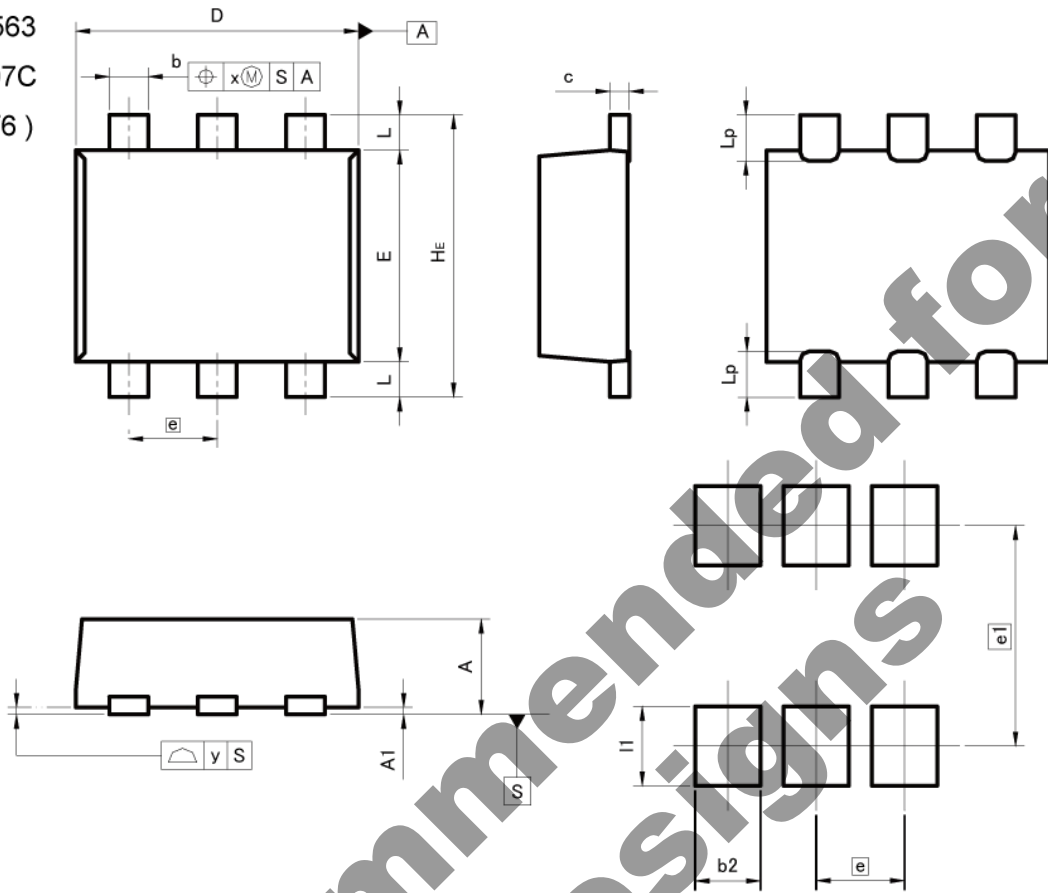
Fig.24 Safe Operating Area





●Dimensions

SOT-563  
SC-107C  
(EMT6)



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

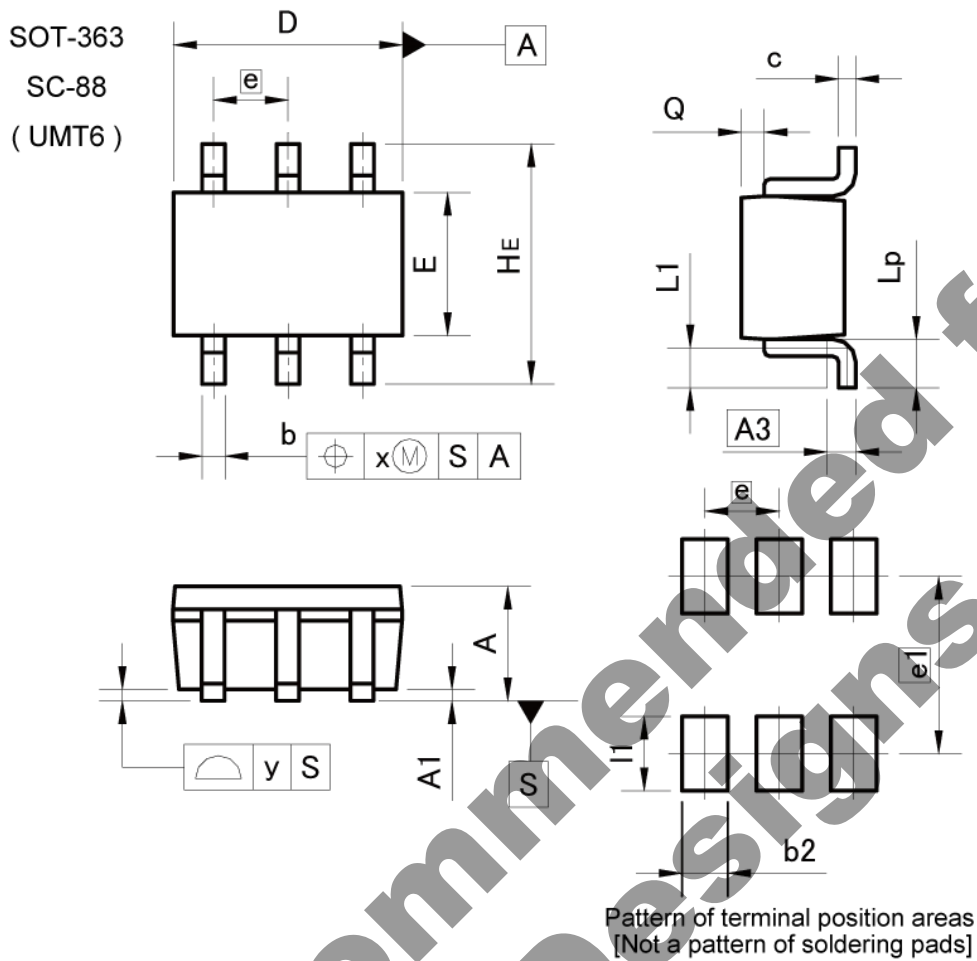
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.55	0.018	0.022
A1	0.00	0.10	0.000	0.004
b	0.17	0.27	0.007	0.011
c	0.08	0.18	0.003	0.007
D	1.50	1.70	0.059	0.067
E	1.10	1.30	0.043	0.051
e	0.50		0.020	
HE	1.50	1.70	0.059	0.067
L	0.10	0.30	0.004	0.012
Lp	-	0.35	-	0.014
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.37	-	0.015
e1	1.25		0.049	
l1	-	0.45	-	0.018

Dimension in mm/inches

●Dimensions



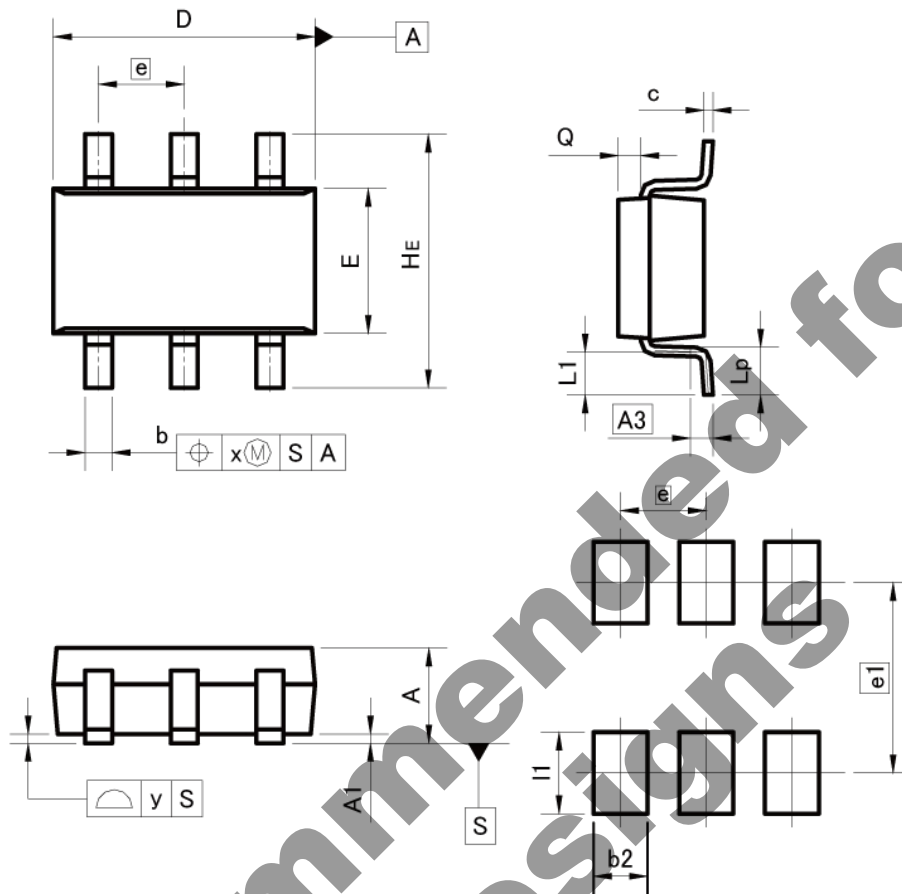
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.15	0.30	0.006	0.012
c	0.10	0.20	0.004	0.008
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.020
Lp	0.25	0.55	0.010	0.022
Q	0.10	0.30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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.40	-	0.016
e1	1.55		0.061	
l1	-	0.65	-	0.026

Dimension in mm/inches

●Dimensions

SOT-457  
 SC-74  
 (SMT6)



Pattern of terminal position areas  
 [Not a 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	0.25	0.40	0.010	0.016
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	-	0.20	-	0.008
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

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