

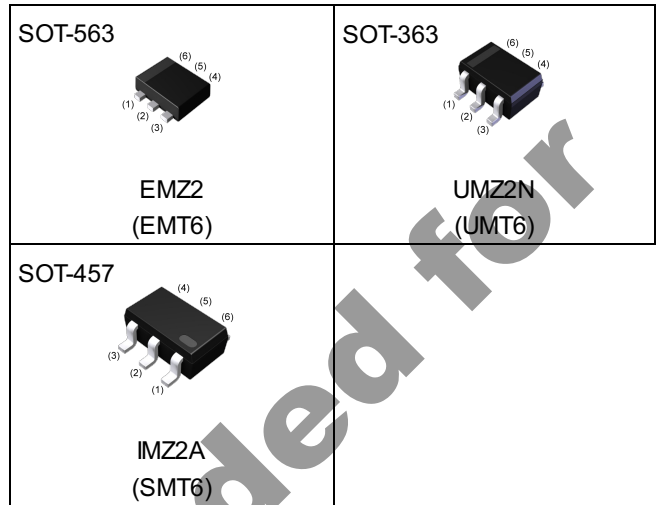
<For Tr1(PNP)>

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

<For Tr2(NPN)>

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

### ● Outline



### ● Features

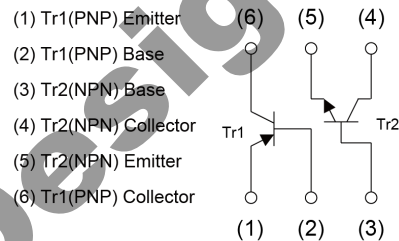
- 1) Included a 2SA1037AK and a 2SC2412K transistor in a EMT, UMT or SMT package.
- 2) Mounting possible with EMT3 or UMT3 or SMT3 automatic mounting machines.
- 3) Transistor elements are independent, eliminating interference.
- 4) Mounting cost and area can be cut in half.

### ● Application

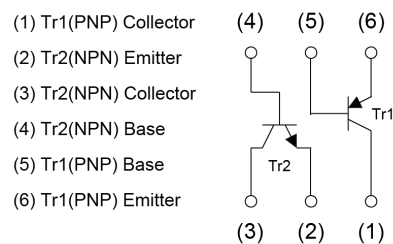
GENERAL PURPOSE SMALL SIGNAL AMPLIFIER

### ● Inner circuit

EMZ2 / UMZ2N



IMZ2A



### ● 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                 | $f_{\text{T}}$       | $V_{\text{CE}} = -12\text{V}$ , $I_{\text{E}} = 2\text{mA}$ ,<br>$f = 100\text{MHz}$ | -      | 140  | -    | MHz  |
| Output capacitance                   | $C_{\text{ob}}$      | $V_{\text{CB}} = -12\text{V}$ , $I_{\text{E}} = 2\text{mA}$ ,<br>$f = 100\text{MHz}$ | -      | 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                 | $f_{\text{T}}$       | $V_{\text{CE}} = 12\text{V}$ , $I_{\text{E}} = -2\text{mA}$ ,<br>$f = 100\text{MHz}$ | -      | 180  | -    | MHz  |
| Output capacitance                   | $C_{\text{ob}}$      | $V_{\text{CB}} = 12\text{V}$ , $I_{\text{E}} = 0\text{A}$ ,<br>$f = 1\text{MHz}$     | -      | 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

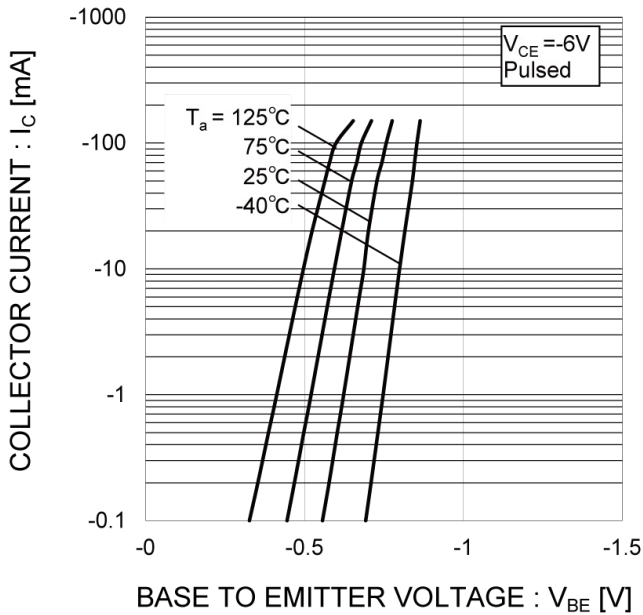


Fig.2 Grounded Emitter Output Characteristics

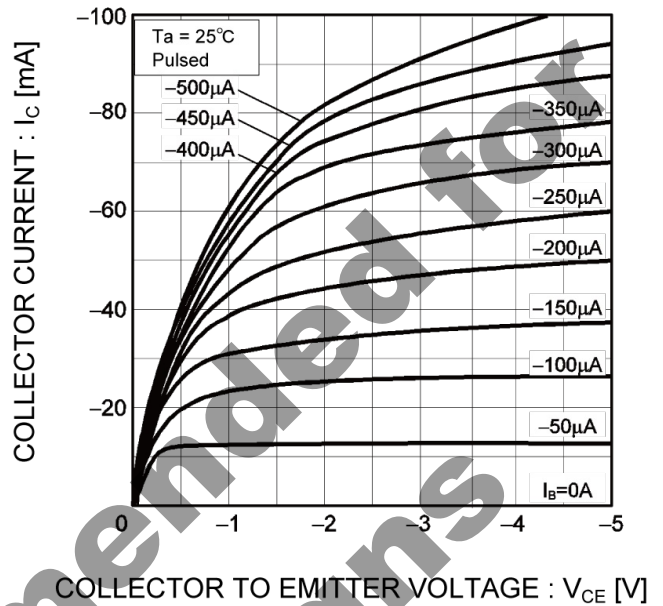


Fig.3 DC Current Gain vs. Collector Current (I)

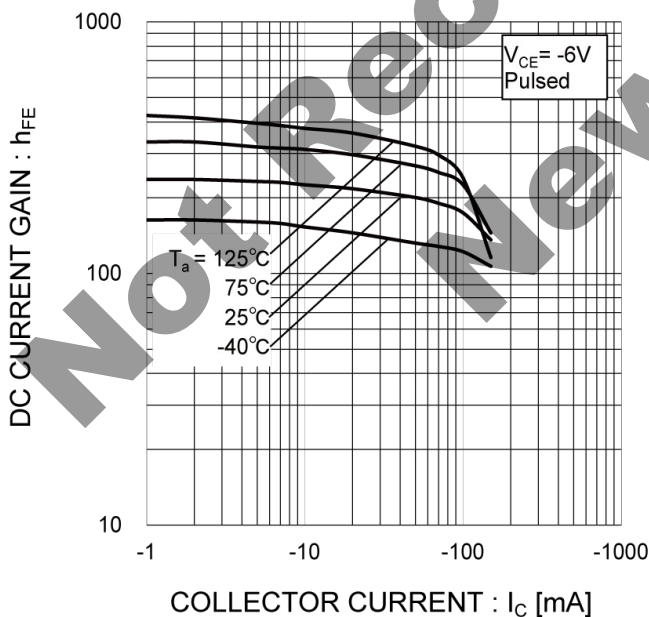
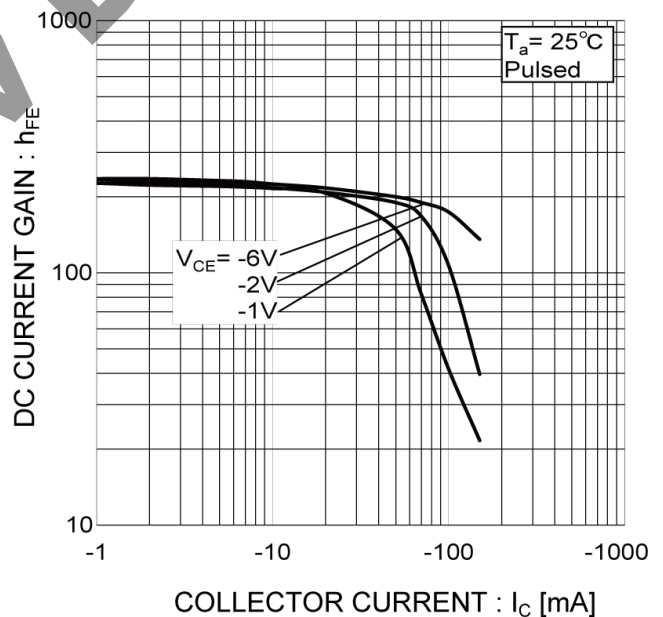


Fig.4 DC Current Gain vs. Collector Current (II)



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

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

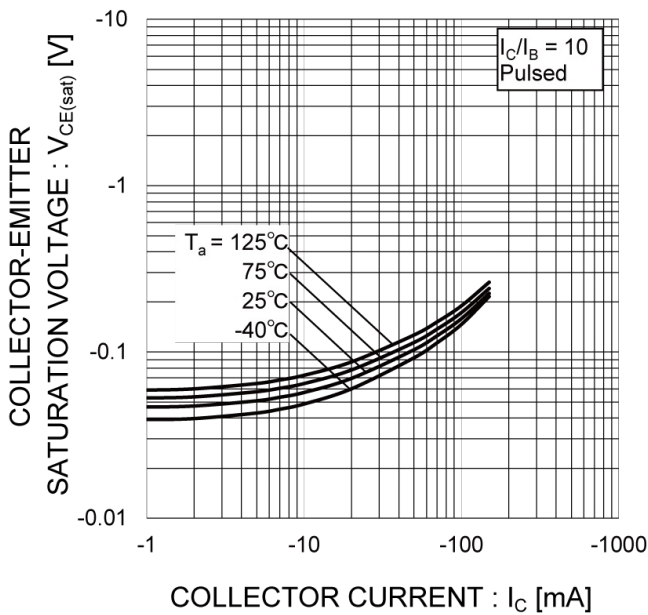


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (I)

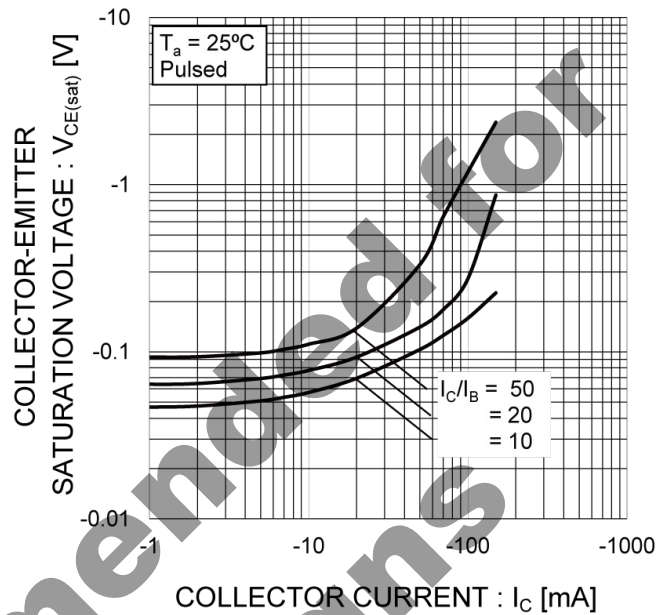


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current (I)

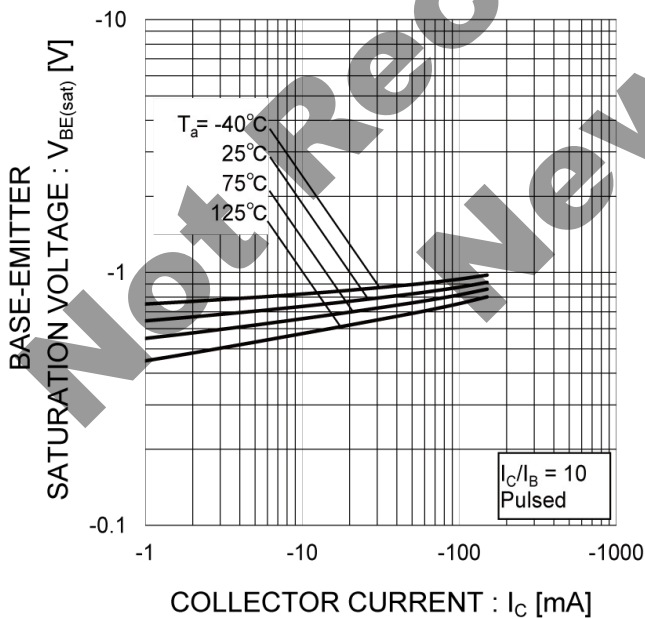
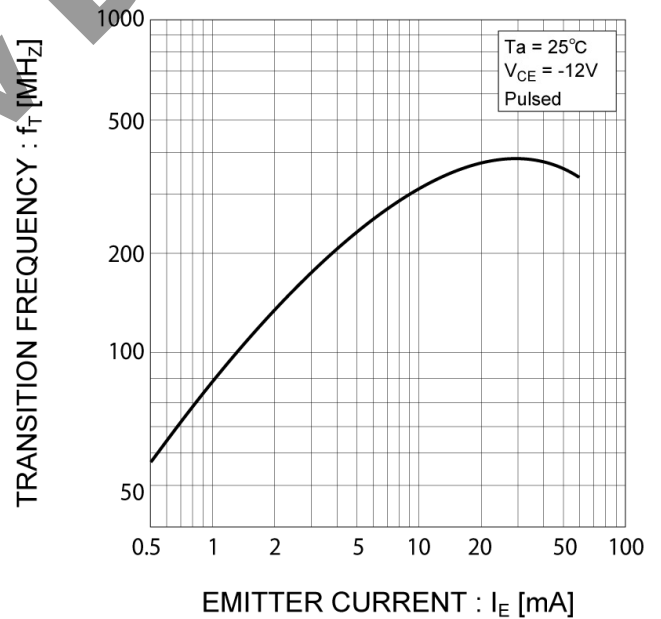


Fig.8 Gain Bandwidth Product vs. Emitter Current



●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

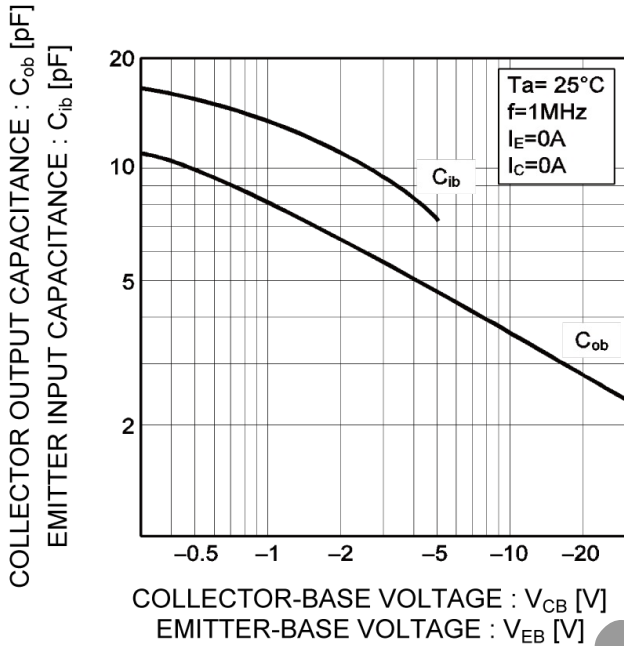


Fig.10 Safe Operating Area

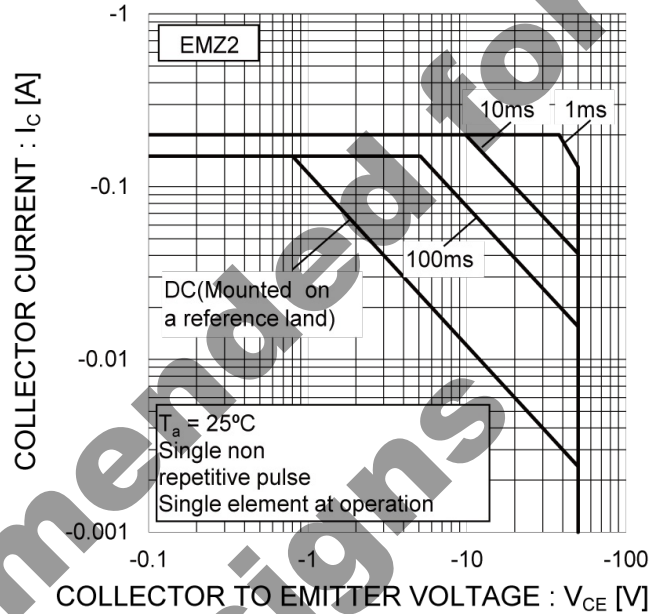


Fig.11 Safe Operating Area

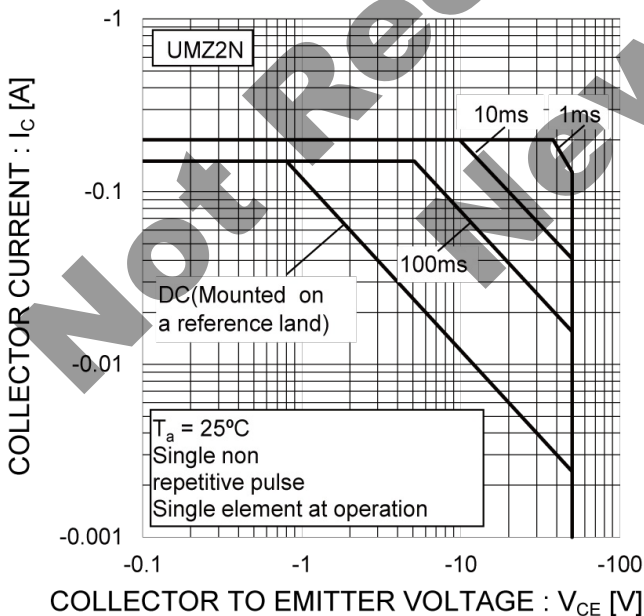
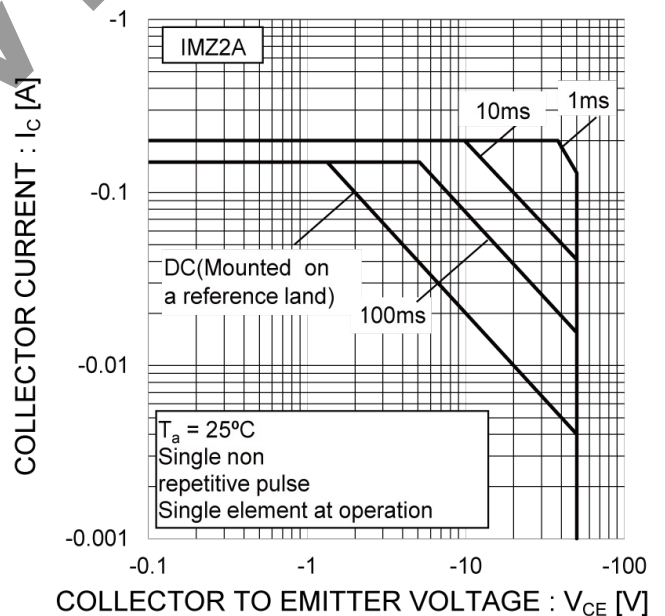


Fig.12 Safe Operating Area



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

Fig.13 Ground Emitter Propagation Characteristics

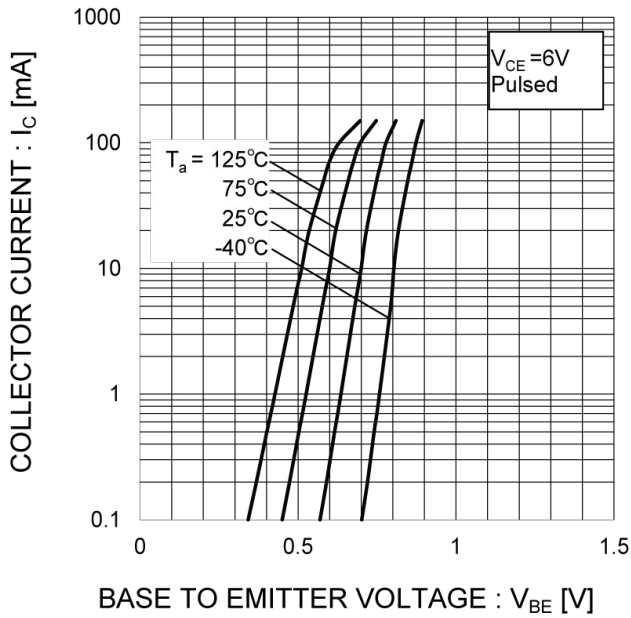


Fig.14 Grounded Emitter Output Characteristics

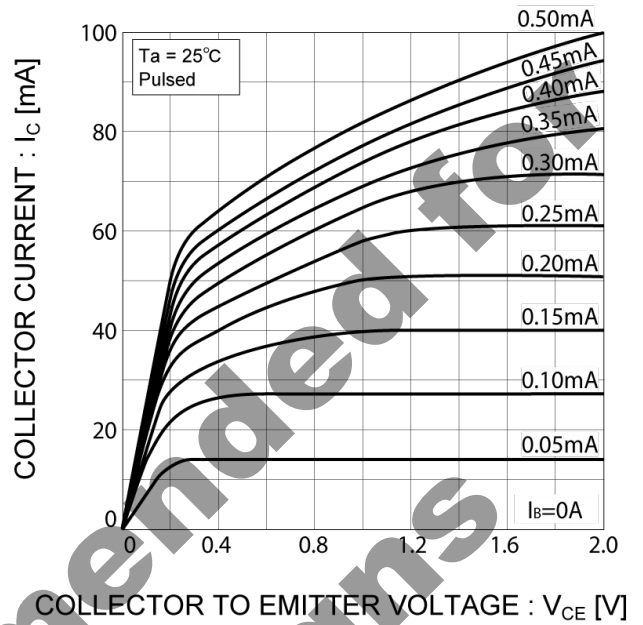


Fig.15 DC Current Gain vs. Collector Current (I)

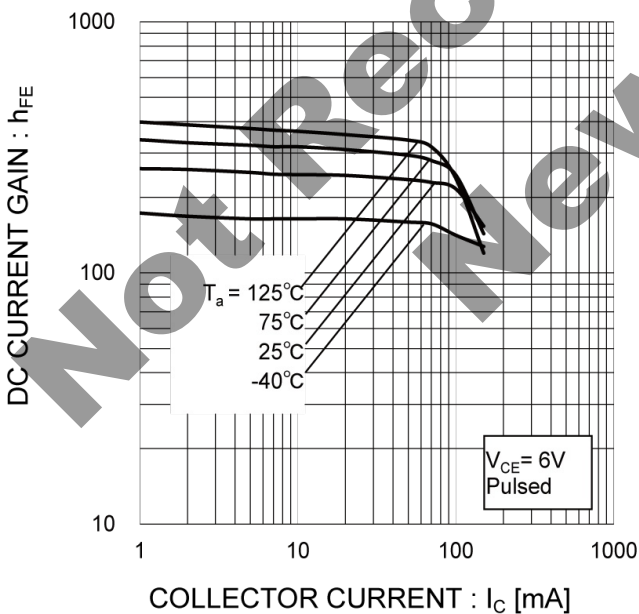
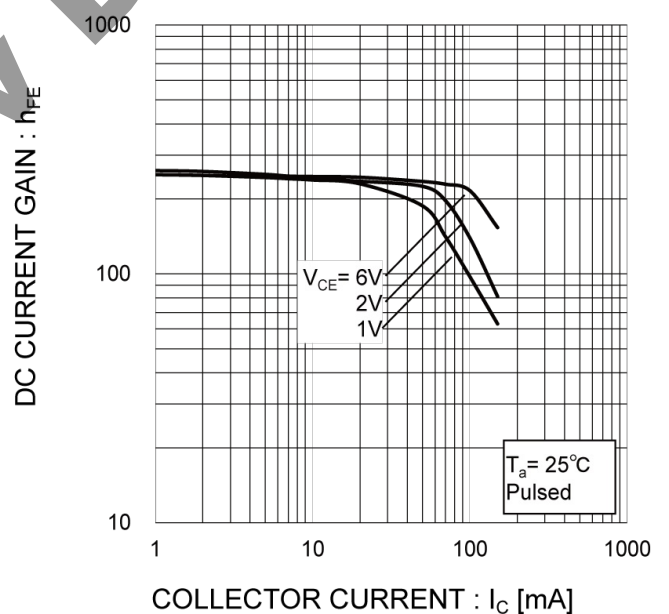


Fig.16 DC Current Gain vs. Collector Current (II)



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

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

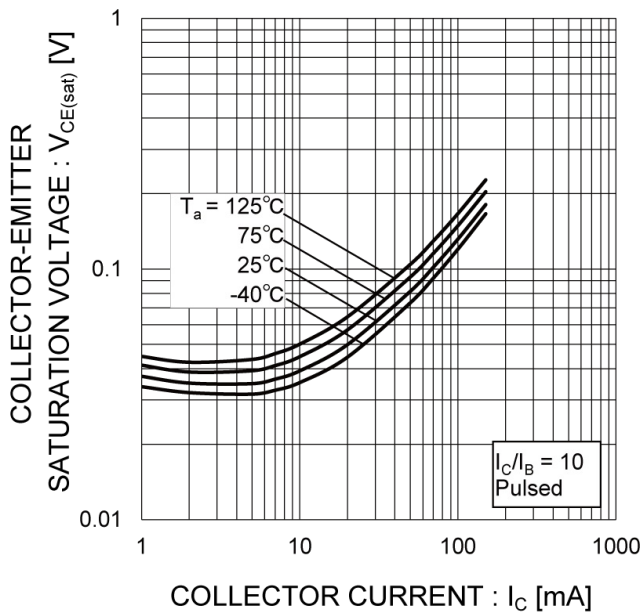


Fig.18 Collector-Emitter Saturation Voltage vs. Collector Current (I)

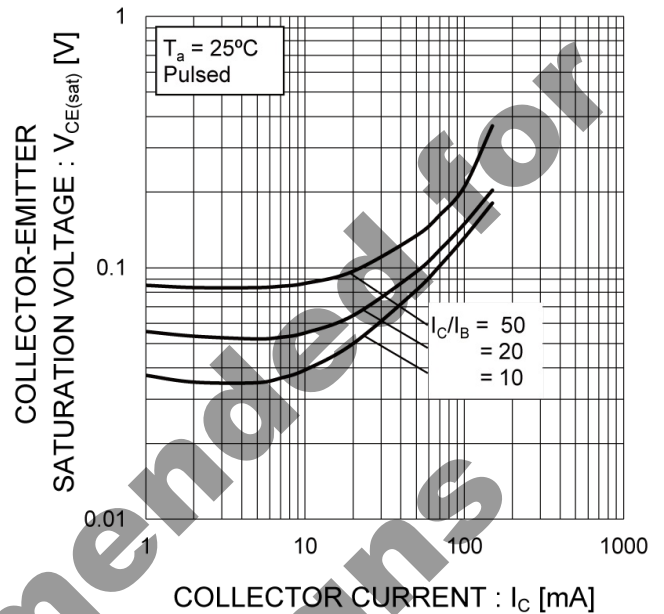


Fig.19 Base-Emitter Saturation Voltage vs. Collector Current (I)

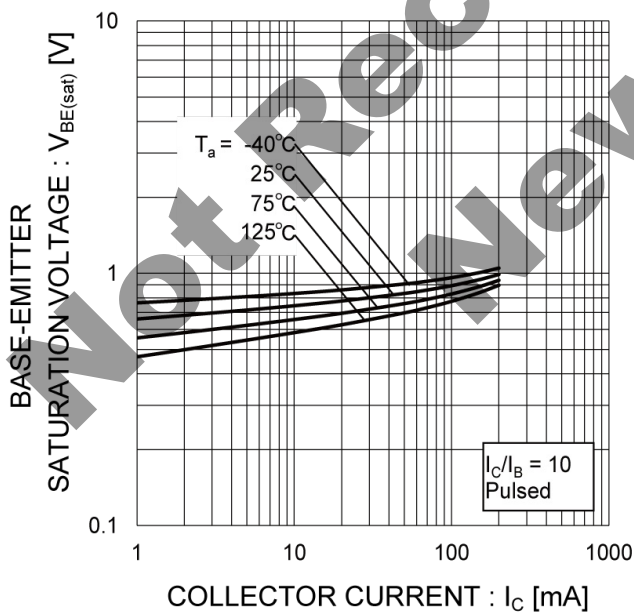
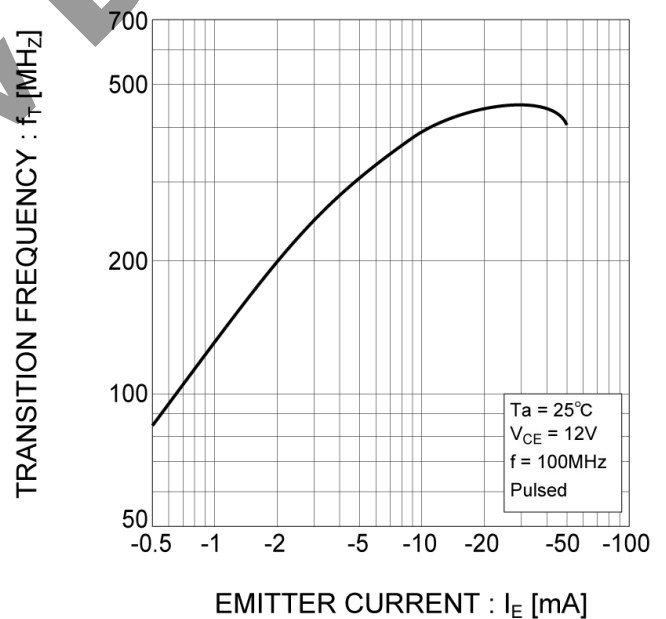


Fig.20 Gain Bandwidth Product vs. Emitter Current



●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

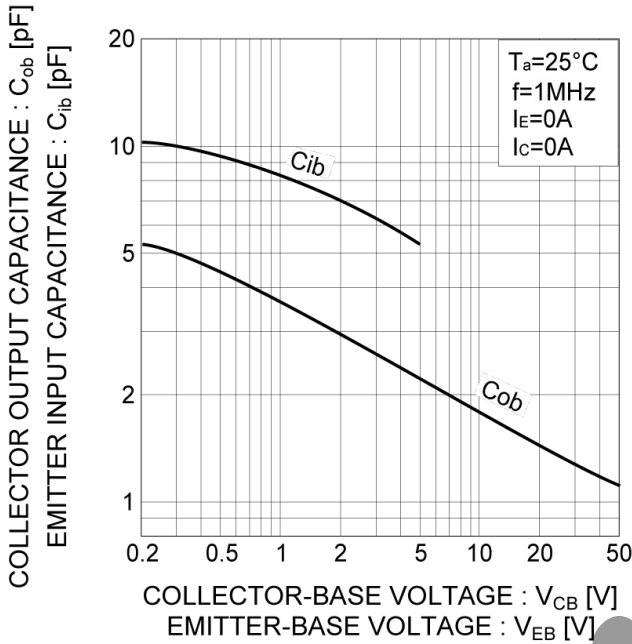


Fig.22 Safe Operating Area

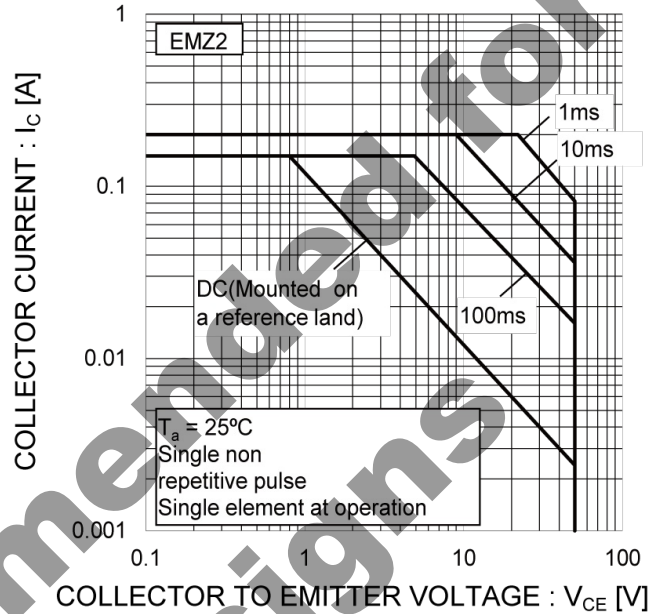


Fig.23 Safe Operating Area

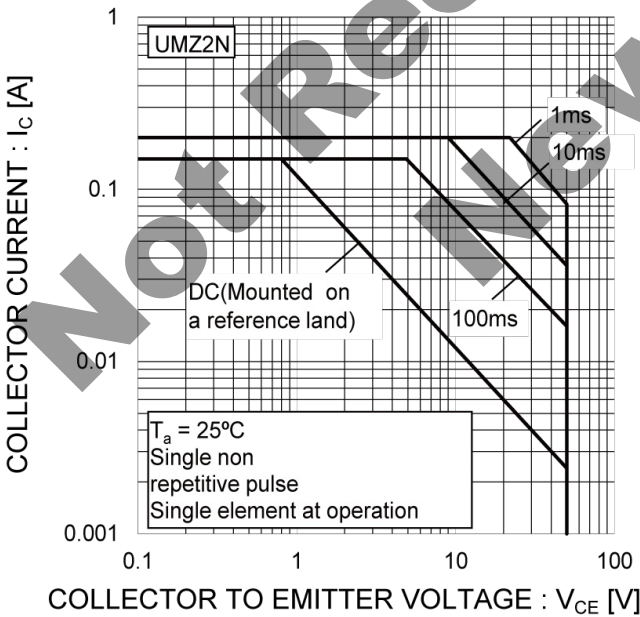
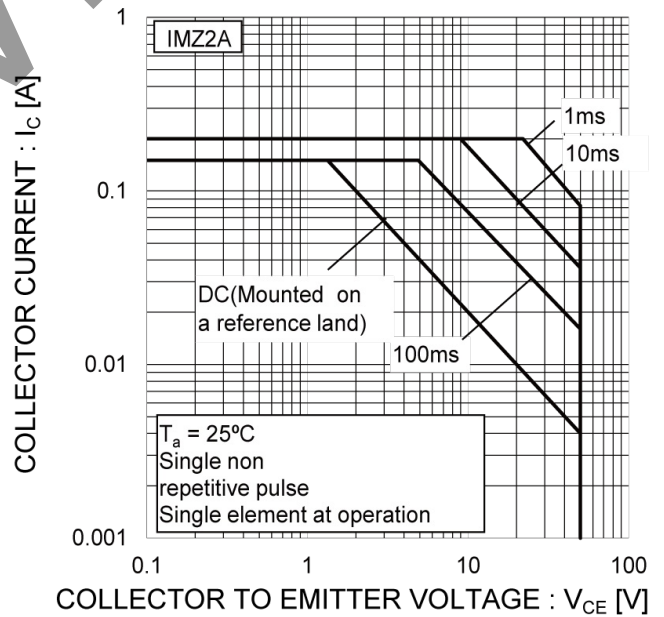
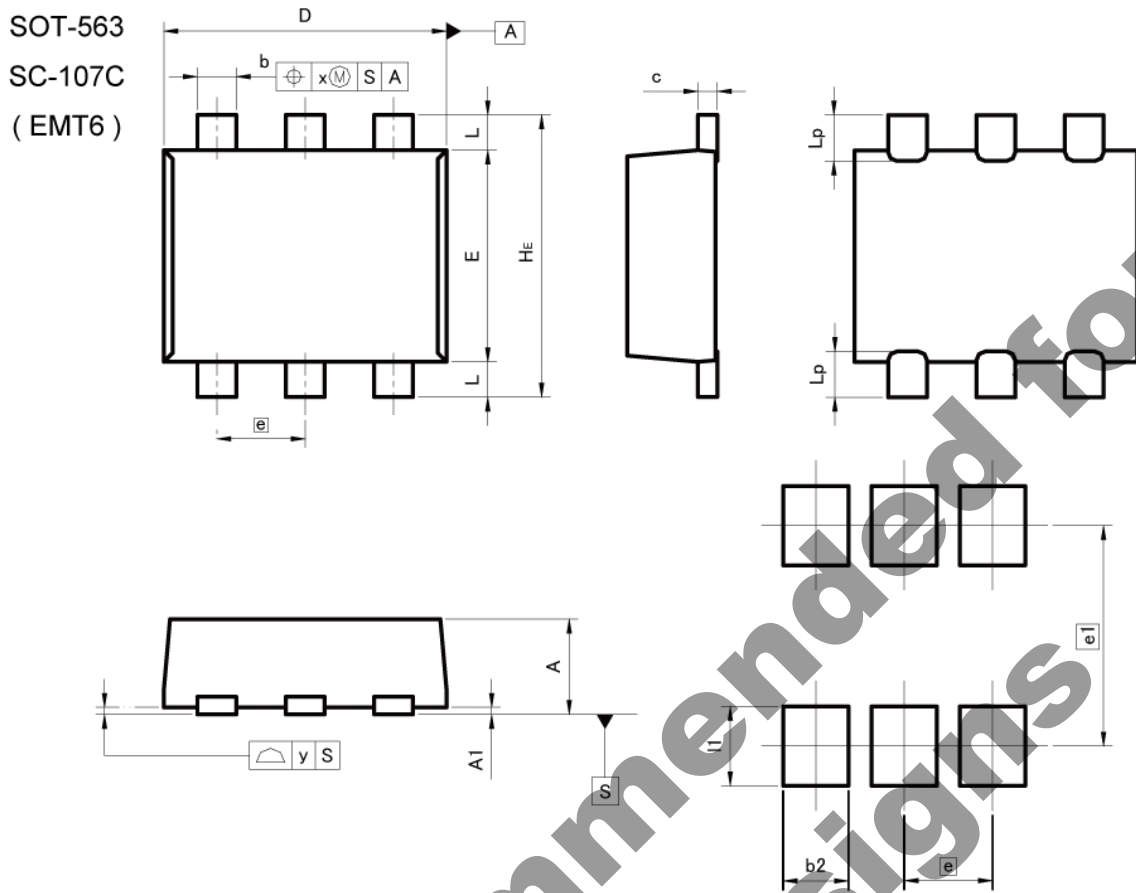


Fig.24 Safe Operating Area





●Dimensions



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

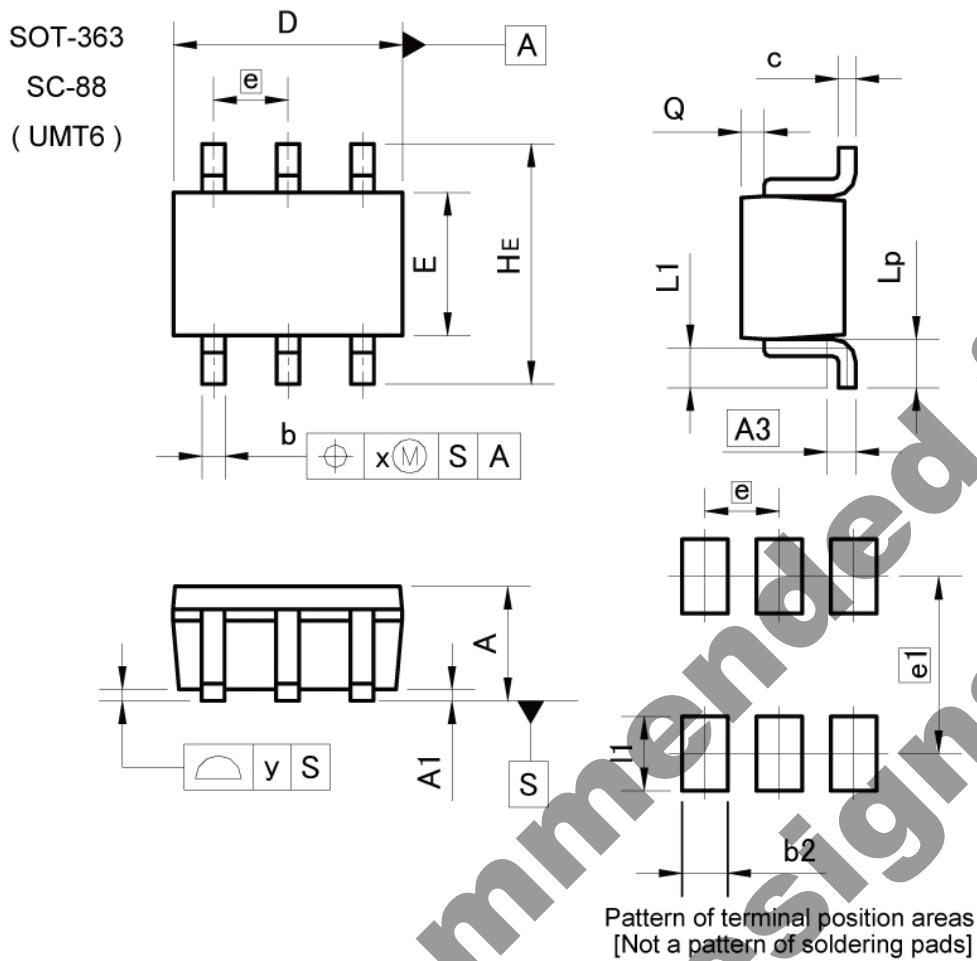
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.45       | 0.55 | 0.018  | 0.022 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| b   | 0.17       | 0.27 | 0.007  | 0.011 |
| c   | 0.08       | 0.18 | 0.003  | 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



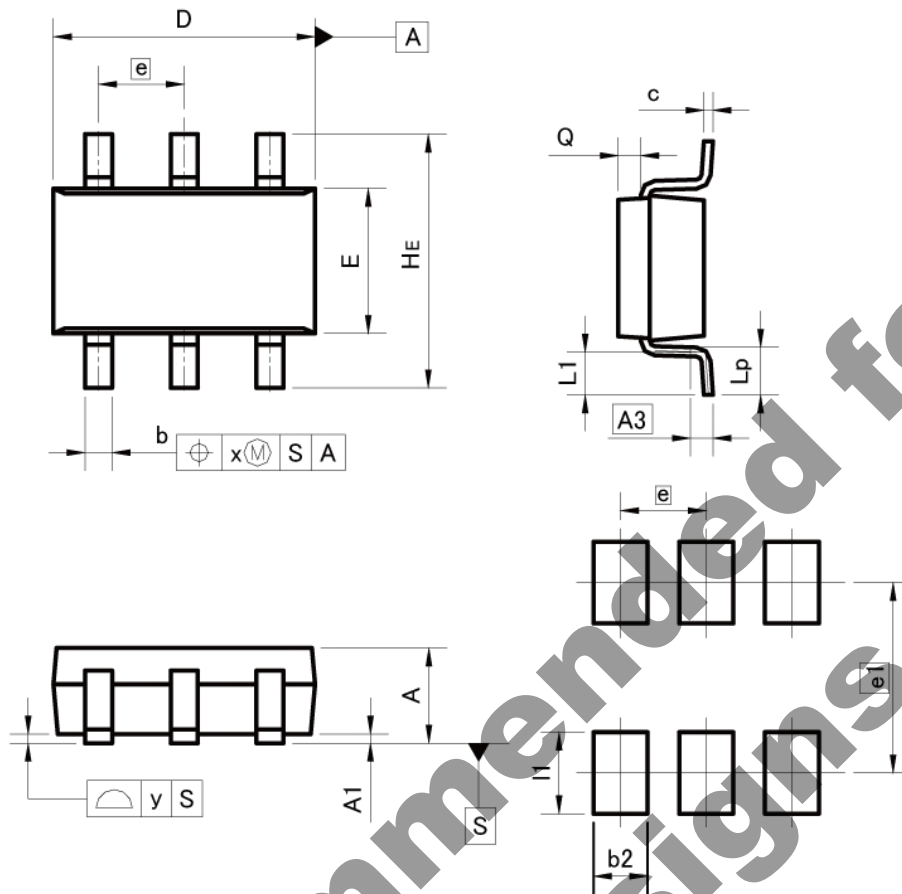
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.80       | 1.00 | 0.031  | 0.039 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A3  | 0.25       |      | 0.010  |       |
| b   | 0.15       | 0.30 | 0.006  | 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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