

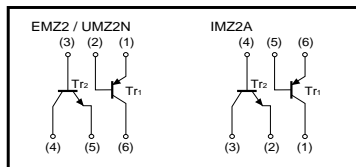
# Power management (dual transistors)

## EMZ2 / UMZ2N / IMZ2A

### ●Feature

- 1) Both a 2SA1037AK chip and 2SC2412K chip in a EMT or UMT or SMT package.

### ●Equivalent circuits



### ●Absolute maximum ratings (Ta = 25°C)

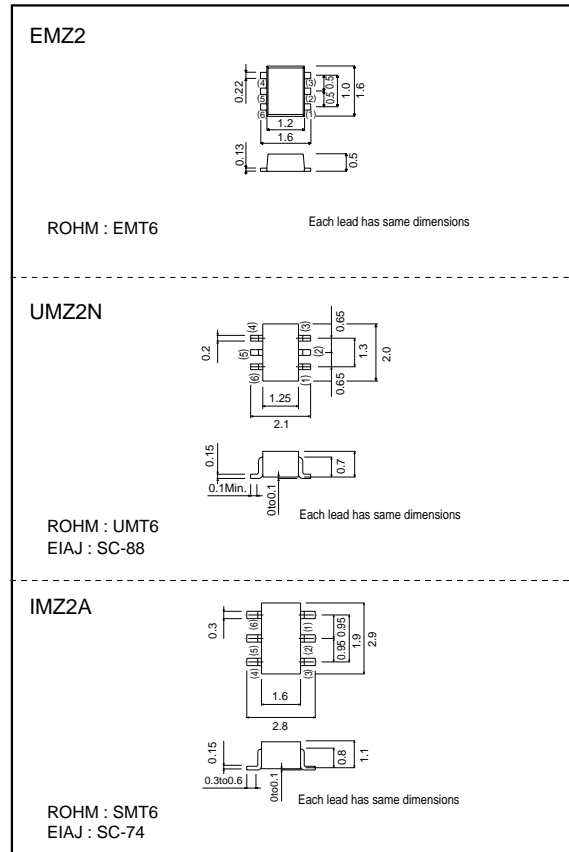
| Parameter                   | Symbol           | Limits      |     | Unit |
|-----------------------------|------------------|-------------|-----|------|
|                             |                  | Tr1         | Tr2 |      |
| Collector-base voltage      | V <sub>CB0</sub> | -60         | 60  | V    |
| Collector-emitter voltage   | V <sub>CE0</sub> | -50         | 50  | V    |
| Emitter-base voltage        | V <sub>EB0</sub> | -6          | 7   | V    |
| Collector current           | I <sub>c</sub>   | -150        | 150 | mA   |
| Collector power dissipation | P <sub>c</sub>   | 150 (TOTAL) |     | mW   |
|                             |                  | 300 (TOTAL) |     |      |
| Junction temperature        | T <sub>J</sub>   | 150         |     | °C   |
| Storage temperature         | T <sub>stg</sub> | -55 to +150 |     | °C   |

\*1 120mW per element must not be exceeded.  
\*2 200mW per element must not be exceeded.

### ●Package, marking, and packaging specifications

| Part No.                     | EMZ2 | UMZ2N | IMZ2A |
|------------------------------|------|-------|-------|
| Package                      | EMT6 | UMT6  | SMT6  |
| Marking                      | Z2   | Z2    | Z2    |
| Code                         | T2R  | TR    | T108  |
| Basic ordering unit (pieces) | 8000 | 3000  | 3000  |

### ●External dimensions (Unit : mm)



Transistors

●Electrical characteristics (Ta=25°C)

Tr1 (PNP)

| Parameter                            | Symbol               | Min. | Typ. | Max. | Unit | Conditions   |
|--------------------------------------|----------------------|------|------|------|------|--|
| Collector-base breakdown voltage     | BV <sub>CB0</sub>    | -60  | -    | -    | V    | I <sub>c</sub> = -50μA                                     |
| Collector-emitter breakdown voltage  | BV <sub>CE0</sub>    | -50  | -    | -    | V    | I <sub>c</sub> = -1mA                                      |
| Emitter-base breakdown voltage       | BV <sub>EB0</sub>    | -6   | -    | -    | V    | I <sub>E</sub> = -50μA                                     |
| Collector cutoff current             | I <sub>cBO</sub>     | -    | -    | -0.1 | μA   | V <sub>CB</sub> = -60V                                     |
| Emitter cutoff current               | I <sub>EBO</sub>     | -    | -    | -0.1 | μA   | V <sub>EB</sub> = -6V                                      |
| Collector-emitter saturation voltage | V <sub>CE(sat)</sub> | -    | -    | -0.5 | V    | I <sub>c</sub> /I <sub>B</sub> = -50mA/-5mA                |
| DC current transfer ratio            | h <sub>FE</sub>      | 120  | -    | 560  | -    | V <sub>CE</sub> = -6V, I <sub>c</sub> = -1mA               |
| Transition frequency                 | f <sub>t</sub>       | -    | 140  | -    | MHz  | V <sub>CE</sub> = -12V, I <sub>E</sub> = 2mA, f = 100MHz * |
| Output capacitance                   | C <sub>ob</sub>      | -    | 4    | 5    | pF   | V <sub>CB</sub> = -12V, I <sub>E</sub> = 0A, f = 1MHz      |

\* Transition frequency of the device.

Tr2 (NPN)

| Parameter                            | Symbol               | Min. | Typ. | Max. | Unit | Conditions   |
|--------------------------------------|----------------------|------|------|------|------|--|
| Collector-base breakdown voltage     | BV <sub>CB0</sub>    | 60   | -    | -    | V    | I <sub>c</sub> = 50μA                                      |
| Collector-emitter breakdown voltage  | BV <sub>CE0</sub>    | 50   | -    | -    | V    | I <sub>c</sub> = 1mA                                       |
| Emitter-base breakdown voltage       | BV <sub>EB0</sub>    | 7    | -    | -    | V    | I <sub>E</sub> = 50μA                                      |
| Collector cutoff current             | I <sub>cBO</sub>     | -    | -    | 0.1  | μA   | V <sub>CB</sub> = 60V                                      |
| Emitter cutoff current               | I <sub>EBO</sub>     | -    | -    | 0.1  | μA   | V <sub>EB</sub> = 7V                                       |
| Collector-emitter saturation voltage | V <sub>CE(sat)</sub> | -    | -    | 0.4  | V    | I <sub>c</sub> /I <sub>B</sub> = 50mA/5mA                  |
| DC current transfer ratio            | h <sub>FE</sub>      | 120  | -    | 560  | -    | V <sub>CE</sub> = 6V, I <sub>c</sub> = 1mA                 |
| Transition frequency                 | f <sub>t</sub>       | -    | 180  | -    | MHz  | V <sub>CE</sub> = 12V, I <sub>E</sub> = -2mA, f = 100MHz * |
| Output capacitance                   | C <sub>ob</sub>      | -    | 2    | 3.5  | pF   | V <sub>CB</sub> = 12V, I <sub>E</sub> = 0A, f = 1MHz       |

\* Transition frequency of the device.

●Electrical characteristics curves

PNP Tr

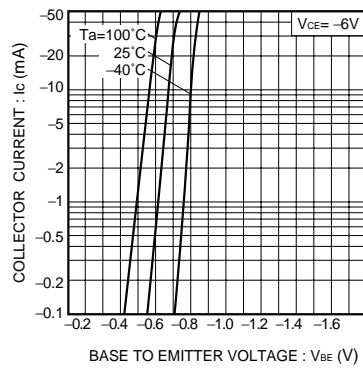


Fig.1 Grounded emitter propagation characteristics

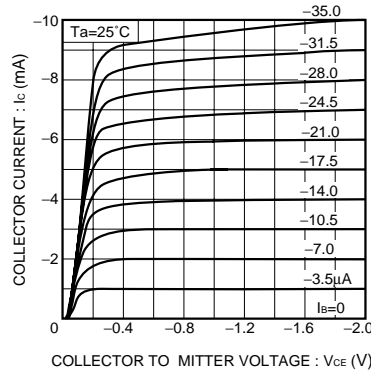


Fig.2 Grounded emitter output characteristics (I)

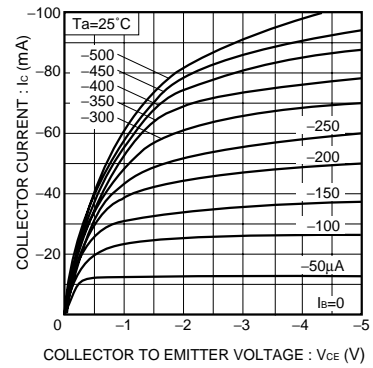


Fig.3 Grounded emitter output characteristics (II)

Transistors

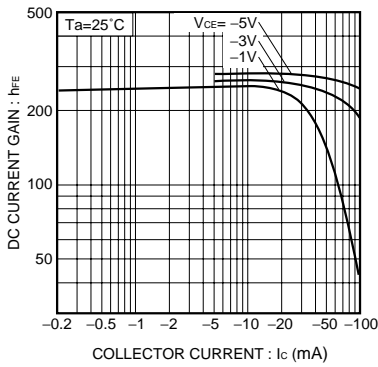


Fig.4 DC current gain vs. collector current (I)

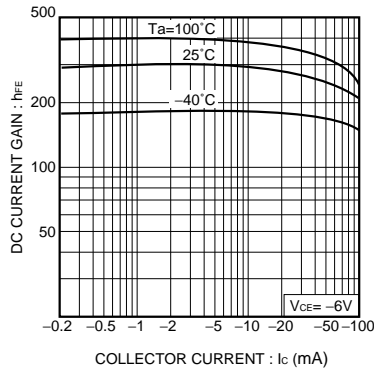


Fig.5 DC current gain vs. collector current (II)

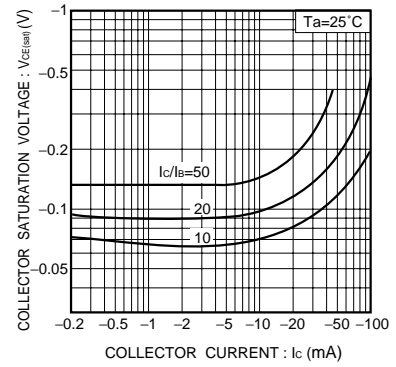


Fig.6 Collector-emitter saturation voltage vs. collector current (I)

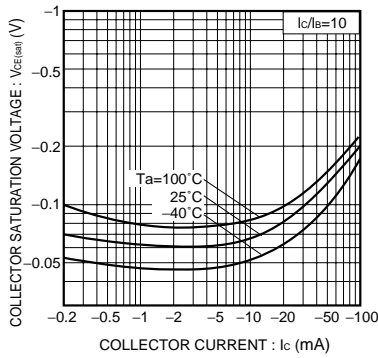


Fig.7 Collector-emitter saturation voltage vs. collector current (II)

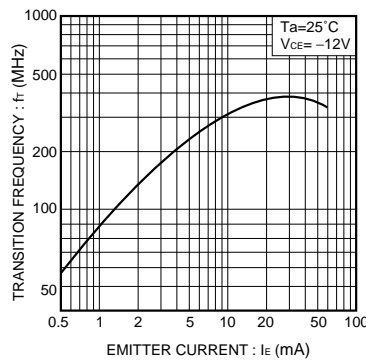


Fig.8 Gain bandwidth product vs. emitter current

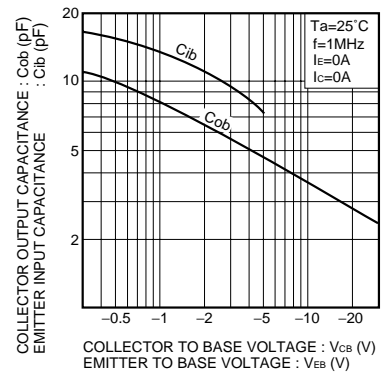


Fig.9 Collector output capacitance vs. collector-base voltage and emitter input capacitance vs. emitter-base voltage

NPN Tr

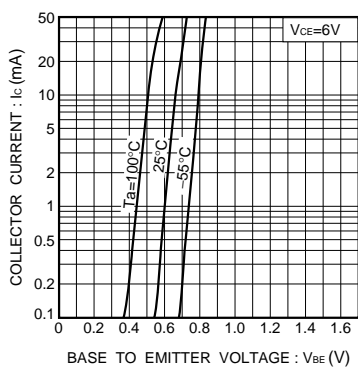


Fig.10 Grounded emitter propagation characteristics

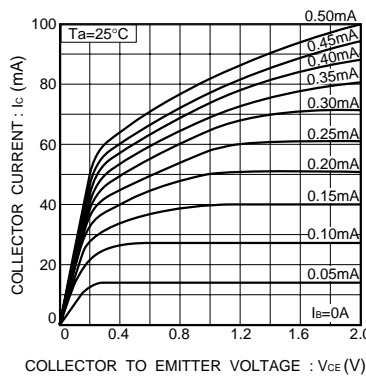


Fig.11 Grounded emitter output characteristics ( I )

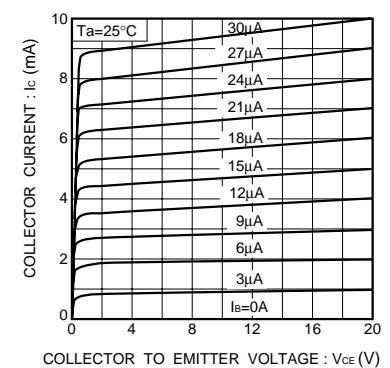


Fig.12 Grounded emitter output characteristics ( II )

Transistors

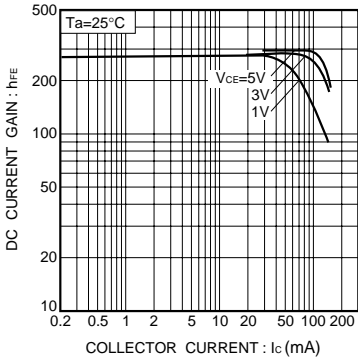


Fig.13 DC current gain vs. collector current ( I )

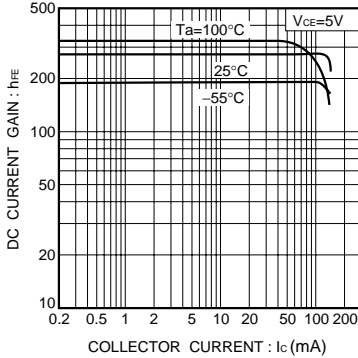


Fig.14 DC current gain vs. collector current ( II )

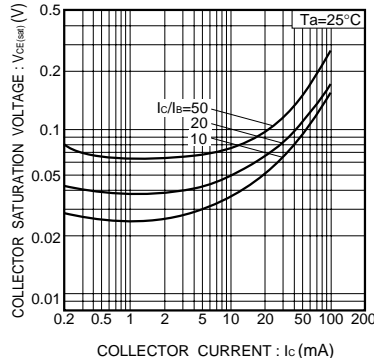


Fig.15 Collector-emitter saturation voltage vs. collector current

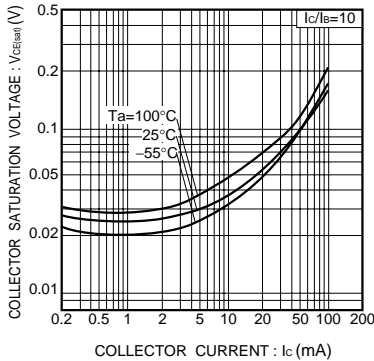


Fig.16 Collector-emitter saturation voltage vs. collector current ( I )

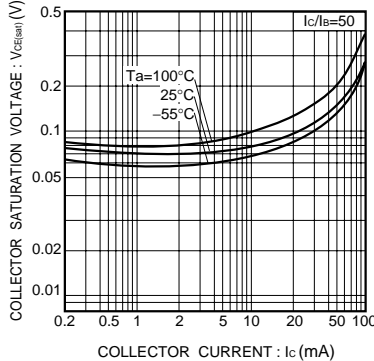


Fig.17 Collector-emitter saturation voltage vs. collector current (II)

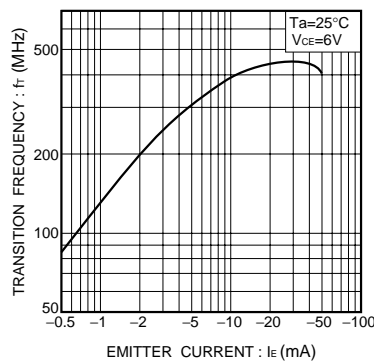


Fig.18 Gain bandwidth product vs. emitter current

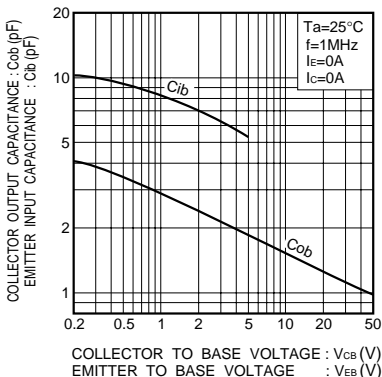


Fig.19 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage

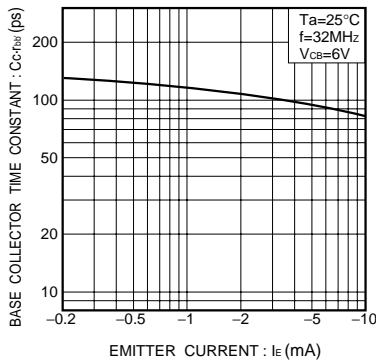


Fig.20 Base-collector time constant vs. emitter current

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