

# Transistors

## TO-220 • TO-220FP • TO-220FN • HRT

TO-220FP is a TO-220 with mold coated fin for easier mounting and higher PC, 2W. TO-220FN is a low profile (by 2mm) version of TO-220FP without fin support pin, for higher mounting density. HRT is a taped power transistor package for use with an automatic placement machine.

| Application              | Part No. |          |          |          | V <sub>CEO</sub><br>(V)          | I <sub>C</sub><br>(A) | P <sub>C</sub> (W)    |          |                       |     | h <sub>FE</sub> | h <sub>FE</sub><br>Ranking code | V <sub>CE</sub> (V) | I <sub>C</sub> (A) | Internal circuit |
|--------------------------|----------|----------|----------|----------|----------------------------------|-----------------------|-----------------------|----------|-----------------------|-----|-----------------|---------------------------------|---------------------|--------------------|------------------|
|                          |          |          |          |          |                                  |                       | T <sub>C</sub> = 25°C |          | T <sub>a</sub> = 25°C |     |                 |                                 |                     |                    |                  |
|                          | TO-220   | TO-220FP | TO-220FN | HRT      |                                  |                       | TO-220                | TO-220FP | TO-220FN              | HRT |                 |                                 |                     |                    |                  |
| Driver                   | 2SA1634  | 2SA1635  | —        | —        | —60                              | —4                    | 40                    | 30       | —                     | —   | 60~320          | D E F                           | —4                  | —1                 | —                |
|                          | 2SB1369  | 2SB1370  | 2SB1565  | 2SB1496  | —60                              | —3                    | 40                    | 30       | 25                    | 1.8 | 60~320          | D E F                           | —5                  | —0.5               | —                |
|                          | 2SB1064  | 2SB1185  | 2SB1566  | 2SB1357  | —50                              | —3                    | 30                    | 25       | 25                    | 1.8 | 60~320          | D E F                           | —3                  | —0.5               | —                |
|                          | 2SB1085  | 2SB1186  | 2SB1569  | 2SB1353  | —120                             | —1.5                  | 20                    | 20       | 20                    | 1.8 | 60~320          | D E F                           | —5                  | —0.1               | —                |
|                          | 2SB1085A | 2SB1186A | 2SB1569A | 2SB1353A | —160                             | —1.5                  | 20                    | 20       | 20                    | 1.8 | 60~200          | D E                             | —5                  | —0.1               | —                |
|                          | 2SB1289  | 2SB1290  | —        | 2SB1356  | —80                              | —7                    | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | —5                  | —1                 | —                |
|                          | 2SB1291  | 2SB1292  | —        | 2SB1358  | —60                              | —5                    | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | —5                  | —1                 | —                |
|                          | 2SB1293  | 2SB1294  | —        | 2SB1360  | —100                             | —5                    | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | —5                  | —1                 | —                |
|                          | 2SB1334  | 2SB1335  | —        | 2SB1355  | —60                              | —4                    | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | —5                  | —1                 | —                |
|                          | 2SB1334A | 2SB1335A | —        | —        | —80                              | —4                    | 40                    | 30       | —                     | —   | 60~320          | D E F                           | —5                  | —1                 | —                |
|                          | 2SC4007  | 2SC4008  | —        | 2SC4355  | 80                               | 4                     | 40                    | 30       | —                     | 1.8 | 60~500          | D E F G                         | 4                   | 1                  | —                |
|                          | 2SD2023  | 2SD2061  | 2SD2394  | 2SD2096  | 60                               | 3                     | 40                    | 30       | 25                    | 1.8 | 60~320          | D E F                           | 5                   | 0.5                | —                |
|                          | 2SD1505  | 2SD1762  | 2SD2395  | 2SD2037  | 50                               | 3                     | 30                    | 25       | 25                    | 1.8 | 60~320          | D E F                           | 3                   | 0.5                | —                |
|                          | 2SD1562  | 2SD1763  | 2SD2400  | 2SD2033  | 120                              | 1.5                   | 20                    | 20       | 20                    | 1.8 | 60~320          | D E F                           | 5                   | 0.1                | —                |
|                          | 2SD1562A | 2SD1763A | 2SD2400A | 2SD2033A | 160                              | 1.5                   | 20                    | 20       | 20                    | 1.8 | 60~200          | D E                             | 5                   | 0.1                | —                |
|                          | 2SD1580  | 2SD1833  | —        | 2SD2036  | 80                               | 7                     | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | 5                   | 1                  | —                |
|                          | 2SD1720  | 2SD1832  | —        | 2SD2038  | 60                               | 5                     | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | 5                   | 1                  | —                |
|                          | 2SD1778  | 2SD1855  | —        | 2SD2035  | 60                               | 4                     | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | 5                   | 1                  | —                |
|                          | 2SD1778A | 2SD1855A | —        | —        | 80                               | 4                     | 40                    | 30       | —                     | —   | 60~320          | D E F                           | 5                   | 1                  | —                |
|                          | 2SD1896  | 2SD1897  | —        | 2SD2040  | 100                              | 5                     | 40                    | 30       | —                     | 1.8 | 60~320          | D E F                           | 5                   | 1                  | —                |
|                          | 2SD1956  | 2SD1957  | —        | —        | 120                              | 7                     | 40                    | 30       | —                     | —   | 100~500         | E F G                           | 5                   | 1                  | —                |
| Low V <sub>CE(sat)</sub> | —        | 2SA1757  | —        | —        | —60                              | —5                    | —                     | 25       | —                     | —   | 60~320          | D E F                           | —2                  | —1                 | —                |
|                          | —        | 2SA1758  | —        | —        | —60                              | —12                   | —                     | 30       | —                     | —   | 60~320          | D E F                           | —2                  | —2                 | —                |
|                          | —        | 2SC4595  | —        | —        | 60                               | 12                    | —                     | 30       | —                     | —   | 60~320          | D E F                           | 2                   | 2                  | —                |
|                          | —        | 2SC4596  | —        | —        | 60                               | 5                     | —                     | 25       | —                     | —   | 60~320          | D E F                           | 2                   | 1                  | —                |
|                          | 2SC4845  | 2SC4846  | —        | —        | 120                              | 5                     | 40                    | 30       | —                     | —   | 60~200          | D E                             | 5                   | 3                  | —                |
| Chroma                   | —        | —        | 2SC5147  | 2SC4506  | 300                              | 0.1                   | —                     | —        | 10                    | 1.5 | 40~200          | C D E                           | 10                  | 0.01               | —                |
| High h <sub>FE</sub>     | 2SD1943  | 2SD1944  | 2SD2396  | 2SD2044  | 60                               | 3                     | 40                    | 30       | 30                    | 1.8 | 400~2k          | H J K                           | 4                   | 0.5                | —                |
| High Voltage SW          | 2SC3968  | 2SC3969  | —        | 2SC4354  | 400                              | 2                     | 20                    | 20       | —                     | 1.8 | 16~50           | A B                             | 5                   | 0.1                | —                |
|                          | 2SC4205  | 2SC4129  | —        | —        | 400                              | 5                     | 40                    | 30       | —                     | —   | 16~32           | A                               | 5                   | 3                  | —                |
|                          | ☆2SC5112 | ☆2SC5113 | —        | —        | 500                              | 5                     | 40                    | 35       | —                     | —   | 10~50           | —                               | 5                   | 2.5                | —                |
|                          | ☆2SC5116 | ☆2SC5117 | —        | —        | 550                              | 4                     | 40                    | 35       | —                     | —   | 10~50           | —                               | 5                   | 2                  | —                |
| Darlington               | 2SB1286  | 2SB1287  | 2SB1567  | 2SB1359  | —100                             | —2                    | 25                    | 20       | 20                    | 1.8 | 1k~10k          | —                               | —2                  | —1                 | Fig.1            |
|                          | 2SB1339  | 2SB1340  | —        | 2SB1513  | —120                             | —6                    | 40                    | 30       | —                     | 1.8 | 2k~20k          | —                               | —3                  | —2                 | Fig.1            |
|                          | 2SB1341  | 2SB1342  | 2SB1568  | 2SB1512  | —80                              | —4                    | 35                    | 30       | 30                    | 1.8 | 1k~10k          | —                               | —3                  | —2                 | Fig.1            |
|                          | 2SB1343  | 2SB1344  | —        | 2SB1514  | —100                             | —8                    | 40                    | 30       | —                     | 1.8 | 1k~20k          | —                               | —3                  | —2                 | Fig.1            |
|                          | 2SB1550  | 2SB1551  | —        | 2SB1549  | —80                              | —10                   | 40                    | 30       | —                     | 1.8 | 1k~20k          | —                               | —3                  | —5                 | Fig.1            |
|                          | —        | 2SB1616  | —        | —        | —80                              | —4                    | —                     | 30       | —                     | —   | 1K~10K          | —                               | —3                  | —2                 | Fig.5            |
|                          | 2SC4573  | 2SC4574  | —        | 2SC4575  | 60±10                            | 4                     | 35                    | 30       | —                     | 1.8 | 2k~10k          | —                               | 5                   | 1.5                | Fig.4            |
|                          | —        | 2SC4895  | —        | —        | 100                              | 3                     | —                     | 30       | —                     | —   | 2k~10k          | —                               | 2                   | 1.5                | Fig.2            |
|                          | 2SD1646  | 2SD1765  | 2SD2398  | 2SD2039  | 100                              | 2                     | 25                    | 20       | 20                    | 1.8 | 1k~10k          | —                               | 2                   | 1                  | Fig.2            |
|                          | 2SD1647  | 2SD1764  | 2SD2397  | 2SD2041  | 60±10                            | 2                     | 25                    | 20       | 20                    | 1.8 | 1k~10k          | —                               | 2                   | 1                  | Fig.4            |
|                          | —        | 2SD2091  | —        | 2SD2283  | 90 <sup>+20</sup> <sub>-10</sub> | 2                     | —                     | 20       | —                     | 1.8 | 1k~10k          | —                               | 2                   | 1                  | Fig.4            |
|                          | 2SD1783  | 2SD1856  | —        | 2SD2042  | 60±10                            | 5                     | 30                    | 25       | —                     | 1.8 | 2k~30k          | —                               | 3                   | 2                  | Fig.4            |
|                          | 2SD1888  | 2SD1889  | —        | 2SD2043  | 120                              | 6                     | 40                    | 30       | —                     | 1.8 | 2k~20k          | —                               | 3                   | 2                  | Fig.2            |
|                          | 2SD1932  | 2SD1933  | 2SD2399  | 2SD2032  | 80                               | 4                     | 35                    | 30       | 30                    | 1.8 | 1k~10k          | —                               | 3                   | 2                  | Fig.2            |
|                          | 2SD1986  | 2SD1987  | —        | 2SD2306  | 60                               | 4                     | 35                    | 30       | —                     | 1.8 | 1k~10k          | —                               | 3                   | 2                  | Fig.3            |
|                          | 2SD2024  | 2SD2025  | —        | 2SD2307  | 100                              | 8                     | 40                    | 30       | —                     | 1.8 | 1k~20k          | —                               | 3                   | 2                  | Fig.2            |

Note : ☆Under development

Darlington transistor Internal circuit

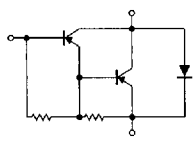


Fig.1

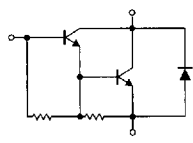


Fig.2

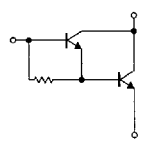


Fig.3

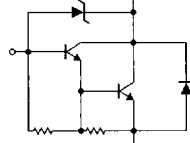


Fig.4

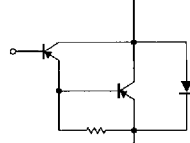


Fig.5

查询"2SB1334AD"供应商

●Product Designation

- When ordering, specify the type.
- Check each code against the tables shown below.
- Fill a space with the next character.

2 S D 2 3 9 5

Part No.

Special code

- Omit for standard product.
- Factory assigned for custom product.

Packaging

| Package   | Code | Package specifications | Quantity / Package (pcs) |
|-----------|------|------------------------|--------------------------|
| TO-220*   | None | Bulk                   | 500                      |
|           | C7   | Tube                   | 1,000<br>(50pcs × 20)    |
| TO-220FP* | None | Bulk                   | 500                      |
|           | C7   | Tube                   | 1,000<br>(50pcs × 20)    |
| TO-220FN  | None | Bulk                   | 500                      |
|           | C7   | Tube                   | 1,000<br>(50pcs × 20)    |
| HRT       | T114 | Ammo box               | 1,000                    |

Note : Available in various lead configurations (forming, cut leads).  
For further information, contact our sales representatives.

h<sub>FE</sub> Ranking code

Input h<sub>FE</sub> rank signal display

One rank preferred ☒ D ☐ F

Multiple rank preferred ☒ D ☐ F

(Min., Max. is displayed)

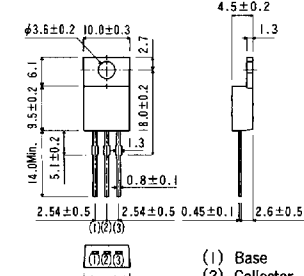
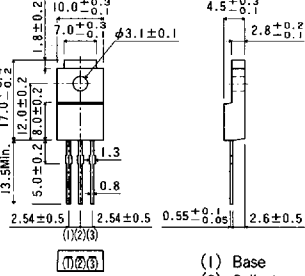
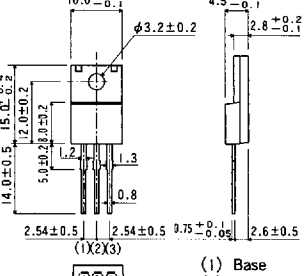
| Code | h <sub>FE</sub> Range |
|------|-----------------------|
| A    | 16~32                 |
| B    | 25~50                 |
| C    | 40~80                 |
| D    | 60~120                |
| E    | 100~200               |
| F    | 160~320               |
| G    | 250~500               |
| H    | 400~800               |
| J    | 600~1200              |
| K    | 1000~2000             |

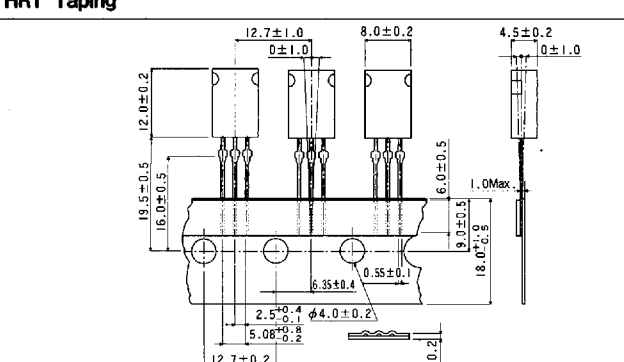
Transistors

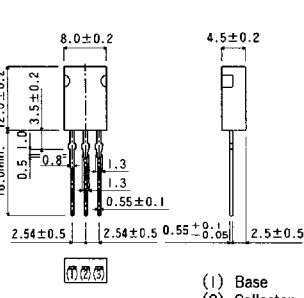
Transistors

The Basic and Basic ordering  
units for Standard and Semi-  
standard Products Units

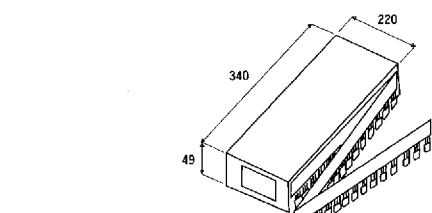
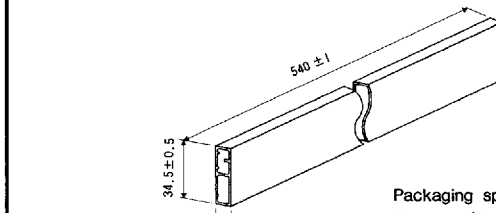
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>TO-220</p>   <p>(1) Base<br/>(2) Collector<br/>(3) Emitter</p> | <p>TO-220FP</p>   <p>(1) Base<br/>(2) Collector<br/>(3) Emitter</p> | <p>TO-220FN</p>   <p>(1) Base<br/>(2) Collector<br/>(3) Emitter</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                       |
|-------------------------------------------------------------------------------------------------------|
| <p>HRT Taping</p>  |
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|                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>HRT</p>   <p>(1) Base<br/>(2) Collector<br/>(3) Emitter</p> |
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(Unit : mm)

|                                                                                                         |                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>HRT Ammo box</p>  | <p>TO-220 Container tube</p>  <p>Packaging specification code : C7<br/>Quantity / Packaging : 50 pcs</p> |
|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|