## 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. | | | | $V_{CEO}$ (V) | Ic (A) | Pc (W) Tc=25°C | | | Pc (W) Ta=25°C | $h_{FE}$ | $h_{FE}$ Ranking code | $V_{CE}$ (V) | Ic (A) | Internal circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 $V_{CE(sat)}$ | – | 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 | – |
| | 2SC4848 | 2SC4849 | – | – | 120 | 7 | 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 $h_{FE}$ | 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 | $90^{+20}_{-10}$ | 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**

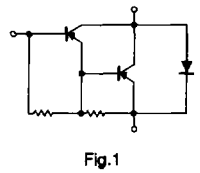
Fig.1

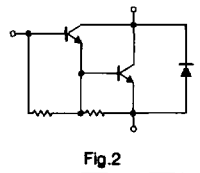
Fig.2

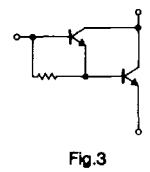
Fig.3

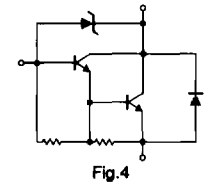
Fig.4

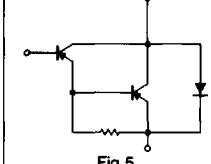
Fig.5

## ●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 (50pcs×20) |
| TO-220FP* | None | Bulk | 500 |
| | C7 | Tube | 1,000 (50pcs×20) |
| TO-220FN | None | Bulk | 500 |
| | C7 | Tube | 1,000 (50pcs×20)) |
| HRT | T114 | Ammo box | 1,000 |

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

**$h_{FE}$ Ranking code**

Input $h_{FE}$ rank signal display
One rank prefered ☐ D ☐
Multiple rank prefered ☐ D F
(Min., Max. is displayed)

| Code | $h_{FE}$ 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 |

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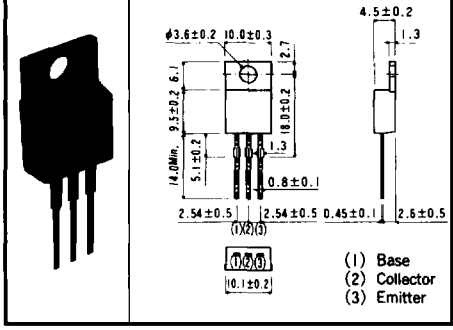
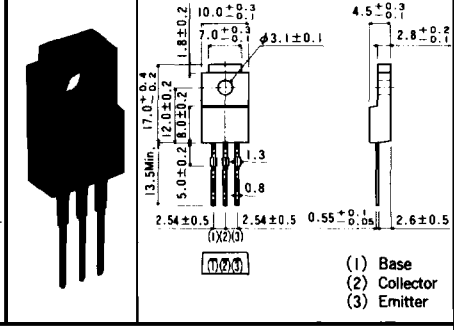
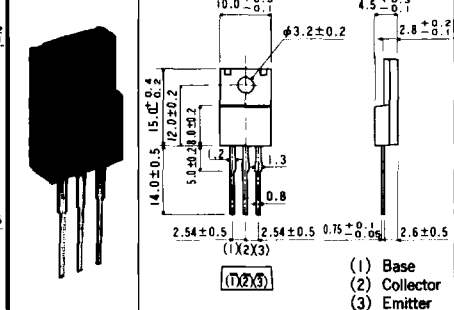
### TO-220



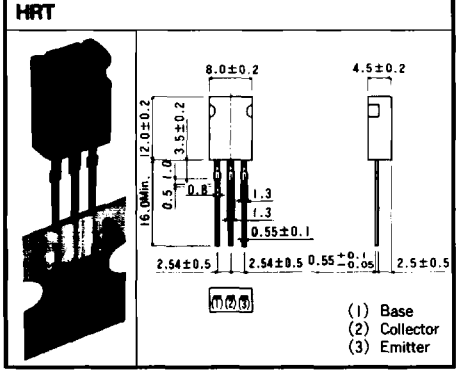

### TO-220FP



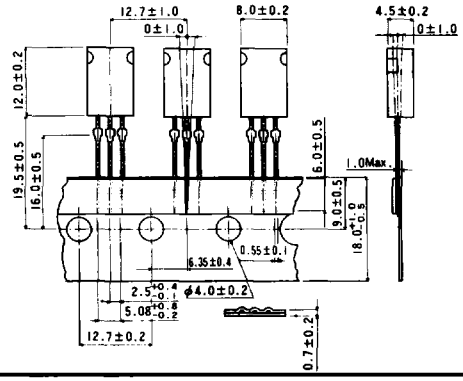

### TO-220FN




### HRT

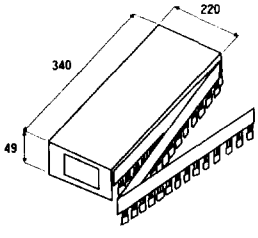



### HRT Taping

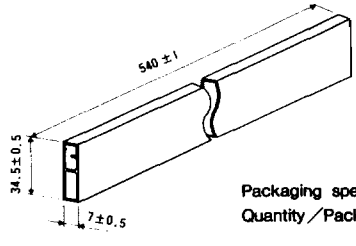


(Unit : mm)

### HRT Ammo box




### TO-220 Container tube




Packaging specification code : C7
Quantity / Packaging : 50 pcs