

TOSHIBA

Power Devices

**Selection
Guide 2023**




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1. Diodes

■ SiC Schottky Barrier Diodes

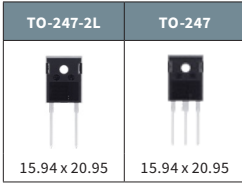
Package Dimensions (unit: mm)

| TO-220-2L | TO-220F-2L | DFN8x8 |
|---|---|---|
|  |  |  |
| 10.05 x 15.3 | 10.0 x 15.0 | 8.0 x 8.0 |

| Package | Part Number | V_{RRM} (V) | $I_{F(DC)}$ (A) | I_{FSM} (A) | V_f max (V) | | C_j / C_t typ. (pF) | $I_{R,max}$ (μ A) | T_j max ($^{\circ}$ C) |
|------------|-------------|------------------|--------------------|------------------|---------------|----|--------------------------|---------------------------|------------------------------|
| | | | | | @ I_f (A) | | | | |
| DFN8x8 | TRS4V65H ☆ | 650 | 4* | 28* | 1.35 | 4 | 15* | 55 | 175 |
| | TRS6V65H ☆ | 650 | 6* | 41* | 1.35 | 6 | 22* | 70 | |
| | TRS8V65H ☆ | 650 | 8* | 45* | 1.35 | 8 | 29* | 90 | |
| | TRS10V65H ☆ | 650 | 10* | 54* | 1.35 | 10 | 36* | 100 | |
| | TRS12V65H ☆ | 650 | 12* | 60* | 1.35 | 12 | 43* | 120 | |
| TO-220-2L | TRS2E65H ☆ | 650 | 2* | 19* | 1.35 | 2 | 9* | 40 | |
| | TRS2E65F | 650 | 2 | 21 | 1.6 | 2 | 8.7 | 20 | |
| | TRS3E65H ☆ | 650 | 3* | 28* | 1.35 | 3 | 12* | 45 | |
| | TRS3E65F | 650 | 3 | 27 | 1.6 | 3 | 12 | 20 | |
| | TRS4E65H ☆ | 650 | 4* | 36* | 1.35 | 4 | 15* | 55 | |
| | TRS4E65F | 650 | 4 | 39 | 1.6 | 4 | 16 | 20 | |
| | TRS6E65H ☆ | 650 | 6* | 41* | 1.35 | 6 | 22* | 70 | |
| | TRS6E65F | 650 | 6 | 55 | 1.6 | 6 | 22 | 30 | |
| | TRS8E65H ☆ | 650 | 8* | 56* | 1.35 | 8 | 29* | 90 | |
| | TRS8E65F | 650 | 8 | 69 | 1.6 | 8 | 28 | 40 | |
| | TRS10E65H ☆ | 650 | 10* | 62* | 1.35 | 10 | 36* | 100 | |
| | TRS10E65F | 650 | 10 | 83 | 1.6 | 10 | 36 | 50 | |
| | TRS12E65H ☆ | 650 | 12* | 74* | 1.35 | 12 | 43* | 120 | |
| TRS12E65F | 650 | 12 | 97 | 1.6 | 12 | 44 | 60 | | |
| TO-220F-2L | TRS4A65F | 650 | 4 | 37 | 1.6 | 4 | 16 | 20 | |
| | TRS6A65F | 650 | 6 | 52 | 1.6 | 6 | 22 | 30 | |
| | TRS8A65F | 650 | 8 | 65 | 1.6 | 8 | 28 | 40 | |
| | TRS10A65F | 650 | 10 | 79 | 1.6 | 10 | 36 | 50 | |
| | TRS12A65F | 650 | 12 | 92 | 1.6 | 12 | 44 | 60 | |

* This value is under the conditions specified in the datasheet.

☆ New Products



| Package | Part Number | V _{RRM} (V) | I _{F(DC)} (A) | I _{FSM} (A) | V _F max (V) | | C _j typ. (pF) | I _R max (μA) | T _j max (°C) |
|------------------------|---------------|-------------------------|---------------------------|-------------------------|------------------------|---------------------|-----------------------------|----------------------------|----------------------------|
| | | | | | | @I _F (A) | | | |
| TO-247-2L | TRS10H120H ★ | 1200 | 10 | (80) | (1.45) | 10 | (39) | (80) | 175 |
| | TRS15H120H ★ | 1200 | 15 | (110) | (1.45) | 15 | (56) | (100) | |
| | TRS20H120H ★ | 1200 | 20 | (140) | (1.45) | 20 | (71) | (130) | |
| | TRS30H120H ★ | 1200 | 30 | (210) | (1.45) | 30 | (104) | (180) | |
| | TRS40H120H ★ | 1200 | 40 | (270) | (1.45) | 40 | (138) | (230) | |
| TO-247 (Center Tap) | TRS12N65FB | 650 | 12** | 52* | 1.6* | 6 | 23* | 30* | |
| | TRS16N65FB | 650 | 16** | 65* | 1.6* | 8 | 30* | 40* | |
| | TRS20N65FB | 650 | 20** | 79* | 1.6* | 10 | 38* | 50* | |
| | TRS24N65FB | 650 | 24** | 92* | 1.6* | 12 | 46* | 60* | |
| | TRS10N120HB ★ | 1200 | 10** | (40*) | (1.45*) | 5 | (20*) | (50*) | |
| | TRS15N120HB ★ | 1200 | 15** | (55*) | (1.45*) | 7.5 | (28*) | (60*) | |
| | TRS20N120HB ★ | 1200 | 20** | (70*) | (1.45*) | 10 | (36*) | (80*) | |
| | TRS30N120HB ★ | 1200 | 30** | (105*) | (1.45*) | 15 | (53*) | (100*) | |
| TRS40N120HB ★ | 1200 | 40** | (135*) | (1.45*) | 20 | (69*) | (130*) | | |

* Per Leg, **Both Legs

★ Under Development (The specification is subject to change without notice.)

■ Schottky Barrier Diodes (SBDs)

Package Dimensions (unit: mm)



| Package | Part Number | V _{RRM} (V) | I _{F(AV)} max (A) | V _{FM} max (V) | | I _{RRM} max (mA) | | C _t typ. (pF) |
|---------|-------------|----------------------|----------------------------|-------------------------|----------------------|---------------------------|-----------------------|--------------------------|
| | | | | | @I _{FM} (A) | | @V _{RRM} (V) | |
| S-FLAT™ | CRS06 | 20 | 1 | 0.36 | 1 | 1 | 20 | 60 |
| | CRS01 | 30 | 1 | 0.37 | 0.7 | 1.5 | 30 | 40 |
| | CRS03 # | 30 | 1 | 0.45 | 0.7 | 0.1 | 30 | 40 |
| | CRS05 # | 30 | 1 | 0.45 | 1 | 0.2 | 30 | 60 |
| | CRS10I30A # | 30 | 1 | 0.39 | 0.7 | 0.06 | 30 | 50 |
| | CRS10I30B # | 30 | 1 | 0.42 | 1 | 0.06 | 30 | 50 |
| | CRS10I30C # | 30 | 1 | 0.36 | 1 | 0.1 | 30 | 82 |
| | CRS10I30E | 30 | 1 | 0.48 | 1 | 0.05 | 30 | 30 |
| | CRS11 | 30 | 1 | 0.36 | 1 | 1.5 | 30 | 60 |
| | CRS08 | 30 | 1.5 | 0.36 | 1.5 | 1 | 30 | 90 |
| | CRS09 # | 30 | 1.5 | 0.46 | 1.5 | 0.05 | 30 | 90 |
| | CRS15I30A # | 30 | 1.5 | 0.46 | 1.5 | 0.06 | 30 | 50 |
| | CRS15I30B # | 30 | 1.5 | 0.4 | 1.5 | 0.1 | 30 | 82 |
| | CRS14 # | 30 | 2 | 0.49 | 2 | 0.05 | 30 | 90 |
| | CRS20I30A # | 30 | 2 | 0.49 | 2 | 0.06 | 30 | 50 |
| | CRS20I30B # | 30 | 2 | 0.45 | 2 | 0.1 | 30 | 82 |
| | CRS15 # | 30 | 3 | 0.52 | 3 | 0.05 | 30 | 90 |
| | CRS30I30A # | 30 | 3 | 0.49 | 3 | 0.1 | 30 | 82 |
| | CRS04 # | 40 | 1 | 0.49 | 0.7 | 0.1 | 40 | 47 |
| | CRS04B | 40 | 1 | 0.49 | 0.7 | 0.05 | 40 | 22 |
| | CRS10I40A # | 40 | 1 | 0.49 | 0.7 | 0.06 | 40 | 35 |
| | CRS10I40B # | 40 | 1 | 0.45 | 1 | 0.1 | 40 | 62 |
| | CRS10I40E | 40 | 1 | 0.55 | 1 | 0.05 | 40 | 22 |
| | CRS15I40A # | 40 | 1.5 | 0.55 | 1.5 | 0.06 | 40 | 35 |
| | CRS20I40A # | 40 | 2 | 0.6 | 2 | 0.06 | 40 | 35 |
| | CRS20I40B # | 40 | 2 | 0.52 | 2 | 0.1 | 40 | 62 |
| | CRS30I40A # | 40 | 3 | 0.55 | 3 | 0.1 | 40 | 62 |
| | CRS12 # | 60 | 1 | 0.58 | 1 | 0.1 | 60 | 40 |
| | CRS13 # | 60 | 1 | 0.55 | 1 | 0.05 | 60 | 40 |
| | CRS10I60E | 60 | 1 | 0.62 | 1 | 0.05 | 60 | 17 |

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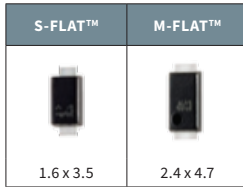


| Package | Part Number | V _{RRM} (V) | I _{F(AV)} max (A) | V _{FM} max (V) | | I _{RRM} max (mA) | | C _j typ. (pF) |
|---------|-------------|-------------------------|-------------------------------|-------------------------|----------------------|---------------------------|-----------------------|-----------------------------|
| | | | | | @I _{FM} (A) | | @V _{RRM} (V) | |
| M-FLAT™ | CMS08 | 30 | 1 | 0.37 | 1 | 1.5 | 30 | 70 |
| | CMS09 # | 30 | 1 | 0.45 | 1 | 0.5 | 30 | 70 |
| | CMS10I30A # | 30 | 1 | 0.36 | 1 | 0.1 | 30 | 82 |
| | CMS06 | 30 | 2 | 0.37 | 2 | 3 | 30 | 130 |
| | CMS07 # | 30 | 2 | 0.45 | 2 | 0.5 | 30 | 130 |
| | CMS17 # | 30 | 2 | 0.48 | 2 | 0.1 | 30 | 90 |
| | CMS20I30A # | 30 | 2 | 0.45 | 2 | 0.1 | 30 | 82 |
| | CMS01 | 30 | 3 | 0.37 | 3 | 5 | 30 | 190 |
| | CMS03 # | 30 | 3 | 0.45 | 3 | 0.5 | 30 | 190 |
| | CMS30I30A # | 30 | 3 | 0.49 | 3 | 0.1 | 30 | 82 |
| | CMS04 | 30 | 5 | 0.37 | 5 | 8 | 30 | 330 |
| | CMS05 | 30 | 5 | 0.45 | 5 | 0.8 | 30 | 330 |
| | CMS10 # | 40 | 1 | 0.55 | 1 | 0.5 | 40 | 50 |
| | CMS10I40A # | 40 | 1 | 0.45 | 1 | 0.1 | 40 | 62 |
| | CMS15I40A # | 40 | 1.5 | 0.49 | 1.5 | 0.1 | 40 | 62 |
| | CMS11 # | 40 | 2 | 0.55 | 2 | 0.5 | 40 | 95 |
| | CMS20I40A # | 40 | 2 | 0.52 | 2 | 0.1 | 40 | 62 |
| | CMS16 # | 40 | 3 | 0.55 | 3 | 0.2 | 40 | 95 |
| | CMS30I40A # | 40 | 3 | 0.55 | 3 | 0.1 | 40 | 62 |
| | CMS14 # | 60 | 2 | 0.58 | 2 | 0.2 | 60 | 77 |
| CMS15 # | 60 | 3 | 0.58 | 3 | 0.3 | 60 | 102 | |

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■ Rectifier Diodes

Package Dimensions (unit: mm)



General-Purpose Diodes

| Package | Part Number | V_{RRM} (V) | $I_{F(AV)}$ (A) | I_{FSM} (A) | V_{FM} (V) | | |
|---------|-------------|---------------|-----------------|---------------|--------------|-----|----------------|
| | | | | | typ. | max | @ I_{FM} (A) |
| S-FLAT™ | CRG11B ☆ | 400 | 0.4 | 8 | 0.98 | 1.1 | 0.4 |
| | CRG07 # | 400 | 0.7 | 15 | 1 | 1.1 | 0.7 |
| | CRG09A # | 400 | 1 | 15 | 0.95 | 1.1 | 0.7 |
| | CRG09B # | 400 | 1 | 10 | 0.95 | 1.1 | 0.7 |
| | CRG10A # | 600 | 0.7 | 15 | 0.95 | 1.1 | 0.7 |
| | CRG04A # | 600 | 1 | 20 | 0.98 | 1.1 | 1 |
| | CRG05 # ! | 800 | 1 | 15 | 1.05 | 1.2 | 1 |
| M-FLAT™ | CMG06A # | 600 | 1 | 20 | 0.98 | 1.1 | 1 |
| | CMG03A # | 600 | 2 | 80 | 0.87 | 1.1 | 2 |

Super Fast-Recovery Diodes

| Package | Part Number | V_{RRM} (V) | $I_{F(AV)}$ (A) | I_{FSM} (A) | V_{FM} (V) | | | t_{rr} max (ns) |
|---------|-------------|---------------|-----------------|---------------|--------------|-----|----------------|-------------------|
| | | | | | typ. | max | @ I_{FM} (A) | |
| S-FLAT™ | CRF03A # | 600 | 0.7 | 10 | 1.4 | 2 | 0.7 | 100 |
| | CRF02 # ! | 800 | 0.5 | 10 | 2.2 | 3 | 0.5 | 100 |
| M-FLAT™ | CMF02A # | 600 | 1 | 10 | 1.5 | 2 | 1 | 100 |
| | CMF01A # | 600 | 2 | 30 | 1.2 | 2 | 2 | 100 |
| | CMF04 # ! | 800 | 0.5 | 10 | - | 2.5 | 0.5 | 100 |
| | CMF03 # ! | 900 | 0.5 | 10 | - | 2.5 | 0.5 | 100 |
| | CMF05 # ! | 1000 | 0.5 | 10 | - | 2.7 | 0.5 | 100 |

High Efficiency Diodes (HEDs)

| Package | Part Number | V_{RRM} (V) | $I_{F(AV)}$ (A) | I_{FSM} (A) | V_{FM} (V) | | | t_{rr} max (ns) |
|---------|-------------|---------------|-----------------|---------------|--------------|------|----------------|-------------------|
| | | | | | typ. | max | @ I_{FM} (A) | |
| S-FLAT™ | CRH02B ☆ | 200 | 0.5 | 10 | 0.88 | 0.95 | 0.5 | 35 |
| | CRH02 # | 200 | 0.5 | 10 | 0.86 | 0.95 | 0.5 | 35 |
| | CRH01B ☆ | 200 | 1 | 10 | 0.9 | 0.98 | 1 | 35 |
| | CRH01 # | 200 | 1 | 15 | 0.9 | 0.98 | 1 | 35 |
| M-FLAT™ | CMH04 # | 200 | 1 | 20 | 0.87 | 0.98 | 1 | 35 |
| | CMH07 # | 200 | 2 | 40 | 0.91 | 0.98 | 2 | 35 |
| | CMH01 # | 200 | 3 | 40 | 0.9 | 0.98 | 3 | 35 |

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! Please contact our Sales department or Technical department when considering these products.

☆ New Products

Zener Diodes

Package Dimensions (unit: mm)



| Package | Part Number | P (W) | V _z (V) | | | | r _d (Ω) | | αT (mV / °C) | | |
|---------|-------------|-------|--------------------|------|------|----------------------|--------------------|----------------------|--------------|-----|----|
| | | | min | typ. | max | @I _z (mA) | max | @I _z (mA) | typ. | max | |
| M-FLAT™ | CMZ12 | ! | 10.8 | 12 | 13.2 | 10 | 30 | 10 | 8 | 13 | |
| | CMZ13 | ! | 11.7 | 13 | 14.3 | 10 | 30 | 10 | 9 | 14 | |
| | CMZ15 | ! | 13.5 | 15 | 16.5 | 10 | 30 | 10 | 11 | 17 | |
| | CMZ16 | ! | 14.4 | 16 | 17.6 | 10 | 30 | 10 | 12 | 19 | |
| | CMZ18 | ! | 16.2 | 18 | 19.8 | 10 | 30 | 10 | 14 | 23 | |
| | CMZ20 | ! | 18 | 20 | 22 | 10 | 30 | 10 | 16 | 26 | |
| | CMZ24 | ! | 21.6 | 24 | 26.4 | 10 | 30 | 10 | 20 | 32 | |
| | CMZ27 | ! | 24.3 | 27 | 29.7 | 10 | 30 | 10 | 23 | 36 | |
| | CMZ30 | ! | 27 | 30 | 33 | 10 | 30 | 10 | 25 | 40 | |
| | CMZ33 | ! | 29.7 | 33 | 36.3 | 10 | 30 | 10 | 26 | 41 | |
| | CMZ36 | ! | 32.4 | 36 | 39.6 | 9 | 30 | 9 | 28 | 45 | |
| | CMZ39 | ! | 35.1 | 39 | 42.9 | 8 | 35 | 8 | 30 | 48 | |
| | CMZ43 | ! | 38.7 | 43 | 47.3 | 7 | 40 | 7 | 33 | 53 | |
| | CMZ47 | ! | 42.3 | 47 | 51.7 | 6 | 65 | 6 | 38 | 60 | |
| | CMZ51 | ! | 45.9 | 51 | 56.1 | 6 | 65 | 6 | 43 | 68 | |
| | CMZB12 | # ! | ! | 10.8 | 12 | 13.2 | 10 | 30 | 10 | 8 | 13 |
| | CMZB13 | # ! | ! | 11.7 | 13 | 14.3 | 10 | 30 | 10 | 9 | 14 |
| | CMZB15 | # ! | ! | 13.5 | 15 | 16.5 | 10 | 30 | 10 | 11 | 17 |
| | CMZB18 | # ! | ! | 16.2 | 18 | 19.8 | 10 | 30 | 10 | 14 | 23 |
| | CMZB20 | # ! | ! | 18 | 20 | 22 | 10 | 30 | 10 | 16 | 26 |
| | CMZB24 | # ! | ! | 21.6 | 24 | 26.4 | 10 | 30 | 10 | 20 | 32 |
| | CMZB27 | # ! | ! | 24.3 | 27 | 29.7 | 10 | 30 | 10 | 23 | 36 |
| | CMZB30 | # ! | ! | 27 | 30 | 33 | 10 | 30 | 10 | 25 | 40 |
| | CMZB33 | # ! | ! | 29.7 | 33 | 36.3 | 10 | 30 | 10 | 26 | 41 |
| CMZB36 | # ! | ! | 32.4 | 36 | 39.6 | 9 | 30 | 9 | 28 | 45 | |
| CMZB39 | # ! | ! | 35.1 | 39 | 42.9 | 8 | 35 | 8 | 30 | 48 | |
| CMZB43 | # ! | ! | 38.7 | 43 | 47.3 | 7 | 40 | 7 | 33 | 53 | |
| CMZB47 | # ! | ! | 42.3 | 47 | 51.7 | 6 | 65 | 6 | 38 | 60 | |
| CMZB51 | # ! | ! | 45.9 | 51 | 56.1 | 6 | 65 | 6 | 43 | 68 | |

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| Package | Part Number | P (W) | V _Z (V) | | | | r _d (Ω) | | αT (mV/°C) | |
|---------|-------------|-------|--------------------|------|------|----------------------|--------------------|----------------------|------------|-----|
| | | | min | typ. | max | @I _Z (mA) | max | @I _Z (mA) | typ. | max |
| S-FLAT™ | CRY62 | # | 5.6 | 6.2 | 6.8 | 10 | 60 | 10 | 2 | 3 |
| | CRY68 | # | 6.2 | 6.8 | 7.4 | 10 | 60 | 10 | 3 | 4 |
| | CRY82 | # | 7.4 | 8.2 | 9 | 10 | 30 | 10 | 4 | 6 |
| | CRZ10 | # | 9 | 10 | 11 | 10 | 30 | 10 | 6 | 9 |
| | CRZ12 | # | 10.8 | 12 | 13.2 | 10 | 30 | 10 | 8 | 13 |
| | CRZ13 | # | 11.7 | 13 | 14.3 | 10 | 30 | 10 | 9 | 14 |
| | CRZ15 | # | 13.5 | 15 | 16.5 | 10 | 30 | 10 | 11 | 17 |
| | CRZ16 | # | 14.4 | 16 | 17.6 | 10 | 30 | 10 | 12 | 19 |
| | CRZ18 | # | 16.2 | 18 | 19.8 | 10 | 30 | 10 | 14 | 23 |
| | CRZ20 | # | 18 | 20 | 22 | 10 | 30 | 10 | 16 | 26 |
| | CRZ24 | # | 21.6 | 24 | 26.4 | 10 | 30 | 10 | 20 | 32 |
| | CRZ27 | # | 24.3 | 27 | 29.7 | 10 | 30 | 10 | 23 | 36 |
| | CRZ30 | # | 27 | 30 | 33 | 10 | 30 | 10 | 25 | 40 |
| | CRZ33 | # | 29.7 | 33 | 36.3 | 10 | 30 | 10 | 26 | 41 |
| CRZ36 | # | 32.4 | 36 | 39.6 | 9 | 30 | 9 | 28 | 45 | |
| CRZ39 | # | 35.1 | 39 | 42.9 | 8 | 35 | 8 | 30 | 48 | |

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Part Naming Conventions

SiC Schottky Barrier Diodes

Ex.) TR S 10 A 65 F —
① ② ③ ④ ⑤ ⑥

- ① SiC Schottky Barrier Diodes
- ② Current rating $I_{F(DC)}$
Ex.) 10: $I_{F(DC)} = 10\text{ A}$
- ③ Package
A : TO-220F-2L
E : TO-220-2L
H : TO-247-2L
J : TO-3P(N)
P : DPAK
N : TO-247
V : DFN8x8

- ④ Voltage Rating V_{RRM}
Display value x 10 = V_{RRM}
Ex.) 65: $V_{RRM} = "65" \times 10 = 650\text{ V}$
- ⑤ Generation
C, D : 1st Generation
F, G : 2nd Generation
H : 3rd Generation
- ⑥ Connection
None: 1 chip
B : 2 chips & Center tap type

Schottky Barrier Diodes

New Naming Conventions

Ex.) CR S 10 I 30 A
① ② ③ ④ ⑤ ⑥

- ① Schottky Barrier Diode / package type
CM : M-FLAT™ Package
CR : S-FLAT™ Package
- ② Number of pins / Internal Connection
S : 2pins / Single
- ③ Average forward current, $I_{F(AV)}$
Ex.) 08 : 0.8 A, 10 : 1.0 A
- ④ Product feature
I : Low forward voltage & low leakage current
(New SBD series)
- ⑤ Reverse voltage, V_{RRM}
Ex.) 30 : 30 V
- ⑥ Suffix that indicates an additional feature

Old Naming Conventions

Ex.) CR S 01 A
① ② ③ ④

- ① Package type
CM : M-FLAT™ Package
CR : S-FLAT™ Package
- ② Diode type
S : Schottky Barrier Diode
- ③ Serial number
- ④ Suffix that indicates an additional feature

Rectifier Diodes

Ex.) CR G 01 A
① ② ③ ④

- ① Package type
CM : M-FLAT™ Package
CR : S-FLAT™ Package
- ② Diode type
G : General-Purpose Diode
F : Super Fast-Recovery Diode (S-FRDs)
H : High Efficiency Diode (HEDs)
- ③ Serial number
- ④ Suffix that indicates an additional feature





Zener Diodes

Ex.) CR Z 12 A
① ② ③ ④

- ① Package type
CM : M-FLAT™ Package
CR : S-FLAT™ Package
- ② Diode type
Y : Zener Diode ($V_Z < 10\text{ V}$)
Z, ZB : Zener Diode ($V_Z \geq 10\text{ V}$)
- ③ Zener Voltage
12 : $V_Z = 12\text{ V}$
62 : $V_Z = 6.2\text{ V}$
- ④ Suffix that indicates an additional feature

2. Bipolar Transistors





Package Dimensions (unit: mm)

| TSM | PS-8 | PW-Mini | New PW-Mold |
|---|---|---|---|
|  |  |  |  |
| 2.9 x 2.8 | 2.9 x 2.8 | 4.6 x 4.2 | 6.5 x 9.5 |

PNP

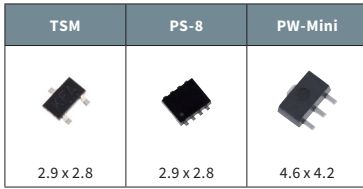
| Package | Part Number | V _{CEO} (V) | I _C (A) | h _{FE} | | | | V _{CE(sat)} max (V) | | | f _T typ. (MHz) | Complementary Product | Note |
|-------------|-------------|----------------------|--------------------|-----------------|-----|----------------------|---------------------|------------------------------|---------------------|--------|---------------------------|-----------------------|-------------------|
| | | | | min | max | @V _{CE} (V) | @I _C (A) | @I _C (A) | @I _B (A) | | | | |
| TSM | 2SA2065 | -20 | -1.5 | 200 | 500 | -2 | -0.15 | -0.14 | -0.5 | -0.017 | - | - | Low Saturation |
| | 2SA2061 | -20 | -2.5 | 200 | 500 | -2 | -0.5 | -0.19 | -1.6 | -0.053 | - | - | Low Saturation |
| | TTA007 | -50 | -1 | 200 | 500 | -2 | -0.1 | -0.2 | -0.3 | -0.01 | - | - | Low Saturation |
| PS-8 | 2SA2056 | -50 | -2 | 200 | 500 | -2 | -0.3 | -0.2 | -1 | -0.033 | - | - | Low Saturation |
| | TPCP8601 | -20 | -4 | 200 | 500 | -2 | -0.6 | -0.19 | -2 | -0.067 | - | - | Low Saturation |
| | TPCP8602 | -50 | -2.5 | 200 | 500 | -2 | -0.3 | -0.2 | -1 | -0.033 | - | - | Low Saturation |
| | TPCP8605 ☆ | -50 | -5 | 200 | 500 | -2 | -0.5 | -0.27 | -1.6 | -0.053 | - | - | Low Saturation |
| | TPCP8606 ☆ | -80 | -4 | 100 | 200 | -2 | -0.4 | -0.22 | -1.2 | -0.12 | - | - | Low Saturation |
| | TPCP8607 ☆ | -120 | -2.5 | 120 | 240 | -2 | -0.25 | -0.32 | -0.75 | -0.075 | - | - | Low Saturation |
| PW-Mini | TPCP8604 | -400 | -0.3 | 140 | 450 | -5 | -0.02 | -1 | -0.1 | -0.01 | 35 | - | |
| | 2SA2069 # | -20 | -1.5 | 200 | 500 | -2 | -0.15 | -0.14 | -0.5 | -0.017 | - | - | Low Saturation |
| | 2SA2059 # | -20 | -3 | 200 | 500 | -2 | -0.5 | -0.19 | -1.6 | -0.053 | - | - | Low Saturation |
| | 2SA2070 # | -50 | -1 | 200 | 500 | -2 | -0.1 | -0.2 | -0.3 | -0.01 | - | - | Low Saturation |
| | 2SA1213 # | -50 | -2 | 70 | 240 | -2 | -0.5 | -0.5 | -1 | -0.05 | 120 | 2SC2873 | Low Saturation |
| | 2SA1681 # | -50 | -2 | 120 | 400 | -2 | -0.1 | -0.5 | -1 | -0.05 | 100 | 2SC4409 | Low Saturation |
| | 2SA2060 # | -50 | -2 | 200 | 500 | -2 | -0.3 | -0.2 | -1 | -0.033 | - | - | Low Saturation |
| | TTA2060 ☆ | -50 | -2 | 200 | 500 | -2 | -0.3 | -0.18 | -1 | -0.033 | - | - | Low Saturation |
| | 2SA1736 # | -50 | -3 | 120 | 400 | -2 | -0.1 | -0.5 | -1.5 | -0.075 | 100 | 2SC4541 | Low Saturation |
| | TTA011 ☆ | -50 | -5 | 200 | 500 | -2 | -0.5 | -0.27 | -1.6 | -0.053 | - | - | Low Saturation |
| | 2SA2206 # | -80 | -2 | 100 | 200 | -2 | -0.5 | -0.3 | -0.5 | -0.05 | 100 | 2SC6124 | Low Saturation |
| | TTA012 ☆ | -80 | -4 | 100 | 200 | -2 | -0.4 | -0.22 | -1.2 | -0.12 | - | - | Low Saturation |
| | 2SA1201 # | -120 | -0.8 | 80 | 240 | -5 | -0.1 | -1 | -0.5 | -0.05 | 120 | 2SC2881 | Power Amps Driver |
| | TTA013 ☆ | -120 | -2.5 | 120 | 240 | -2 | -0.25 | -0.32 | -0.75 | -0.075 | - | - | Low Saturation |
| New PW-Mold | 2SA1971 # | -400 | -0.5 | 140 | 450 | -5 | -0.02 | -1 | -0.1 | -0.01 | 35 | - | |
| | TTA010 # | -500 | -0.1 | 100 | 300 | -10 | -0.02 | -0.3 | -0.02 | -0.002 | - | TTC018 | Low Saturation |
| | 2SA1241 # | -50 | -2 | 70 | 240 | -2 | -0.5 | -0.5 | -1 | -0.05 | 100 | 2SC3076 | Low Saturation |
| | 2SA1244 # | -50 | -5 | 70 | 240 | -1 | -1 | -0.4 | -3 | -0.15 | 60 | - | Low Saturation |
| | 2SA2097 # | -50 | -5 | 200 | 500 | -2 | -0.5 | -0.27 | -1.6 | -0.053 | - | - | Low Saturation |
| | TTA2097 ☆ | -50 | -5 | 200 | 500 | -2 | -0.5 | -0.27 | -1.6 | -0.053 | - | - | Low Saturation |
| | TTA005 # | -50 | -5 | 200 | 500 | -2 | -0.5 | -0.27 | -1.6 | -0.053 | - | - | Low Saturation |
| | 2SB906 # | -60 | -3 | 60 | 200 | -5 | -0.5 | -1.7 | -3 | -0.3 | 9 | - | |
| | TTB002 # | -60 | -3 | 100 | 250 | -5 | -0.5 | -0.5 | -0.6 | -0.06 | 9 | - | Low Saturation |
| | TTA003 # | -80 | -3 | 100 | 200 | -2 | -0.5 | -0.3 | -0.5 | -0.05 | 100 | - | Low Saturation |
| New PW-Mold | TTA009 # | -80 | -3 | 100 | 200 | -2 | -0.5 | -0.5 | -1 | -0.1 | 100 | - | Low Saturation |
| | TTA014 ☆ | -120 | -2.5 | 120 | 240 | -2 | -0.25 | -0.35 | -0.75 | -0.075 | - | - | Low Saturation |
| | 2SA1225 # | -160 | -1.5 | 70 | 240 | -5 | -0.1 | -1.5 | -0.5 | -0.05 | 100 | - | |
| | 2SA2034 # | -400 | -2 | 80 | 240 | -5 | -0.1 | -1 | -0.5 | -0.1 | - | - | |
| | 2SA2184 # | -550 | -1 | 80 | 300 | -5 | -0.1 | -0.7 | -0.3 | -0.06 | 27 | - | |
| | 2SA2142 # | -600 | -0.5 | 70 | 500 | -5 | -0.001 | -1 | -0.1 | -0.01 | 35 | - | |

☆ New Products, # AEC-Q101 qualified

| TO-126N | TO-220SIS | TO-3P(N) | TO-3P(L) |
|--|---|---|---|
|  |  |  |  |
| 8.0 x 11.0 | 10.0 x 15.0 | 15.5 x 20.0 | 20.0 x 26.0 |

| Package | Part Number | V _{CE0} (V) | I _C (A) | h _{FE} | | | | V _{CE(sat)} max (V) | | | f _T typ. (MHz) | Complementary Product | Note |
|-----------|-------------|----------------------|--------------------|-----------------|-------|----------------------|---------------------|------------------------------|---------------------|--------|---------------------------|-----------------------|-------------------|
| | | | | min | max | @V _{CE} (V) | @I _C (A) | @I _C (A) | @I _B (A) | | | | |
| TO-126N | TTA008B | -80 | -2 | 100 | 200 | -2 | -0.5 | -0.5 | -1 | -0.1 | 100 | TTC015B | Low Saturation |
| | TTB1067B % | -80 | -2 | 2000 | - | -2 | -1 | -1.5 | -1 | -0.001 | 50 | TTD1509B | |
| | TTA004B | -160 | -1.5 | 140 | 280 | -5 | -0.1 | -0.5 | -0.5 | -0.05 | 100 | TTC004B | Power Amps Driver |
| | TTA006B | -230 | -1 | 100 | 320 | -5 | -0.1 | -1.5 | -0.5 | -0.05 | 70 | TTC011B | Power Amps Driver |
| TO-220SIS | TTA1452B | -80 | -12 | 120 | 240 | -1 | -1 | -0.4 | -6 | -0.3 | 50 | TTC3710B | Low Saturation |
| | TTB1020B % | -100 | -7 | 2000 | 15000 | -3 | -3 | -1.5 | -3 | -0.006 | - | TTD1415B | |
| TO-3P(N) | 2SA1941 | -140 | -10 | 55 | 160 | -5 | -1 | -2 | -7 | -0.7 | 30 | 2SC5198 | Power Amps Output |
| | TTA0001 | -160 | -18 | 80 | 160 | -5 | -1 | -2 | -9 | -0.9 | 30 | TTC0001 | Power Amps Output |
| | 2SA2120 | -200 | -12 | 55 | 160 | -5 | -1 | -3 | -8 | -0.8 | 25 | 2SC5948 | Power Amps Output |
| | 2SA1943N | -230 | -15 | 80 | 160 | -5 | -1 | -3 | -8 | -0.8 | 30 | 2SC5200N | Power Amps Output |
| | 2SA1962 | -230 | -15 | 55 | 160 | -5 | -1 | -3 | -8 | -0.8 | 30 | 2SC5242 | |
| | 2SA1986 | -230 | -15 | 55 | 160 | -5 | -1 | -3 | -8 | -0.8 | 30 | 2SC5358 | |
| TO-3P(L) | 2SA1942 | -160 | -12 | 55 | 160 | -5 | -1 | -2.5 | -8 | -0.8 | 30 | 2SC5199 | Power Amps Output |
| | TTA0002 | -160 | -18 | 80 | 160 | -5 | -1 | -2 | -9 | -0.9 | 30 | TTC0002 | Power Amps Output |
| | 2SA2121 | -200 | -15 | 55 | 160 | -5 | -1 | -3 | -10 | -1 | 25 | 2SC5949 | Power Amps Output |
| | 2SA1943 | -230 | -15 | 55 | 160 | -5 | -1 | -3 | -8 | -0.8 | 30 | 2SC5200 | |
| | 2SA1987 | -230 | -15 | 55 | 160 | -5 | -1 | -3 | -8 | -0.8 | 30 | 2SC5359 | Power Amps Output |
| | TTA1943 | -230 | -15 | 80 | 160 | -5 | -1 | -3 | -8 | -0.8 | 30 | TTC5200 | Power Amps Output |







% Darlington



NPN

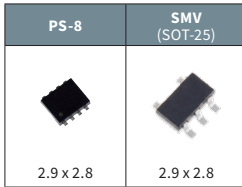
| Package | Part Number | V _{CEO} (V) | I _C (A) | h _{FE} | | | | V _{CE(sat)} max (V) | | | f _T typ. (MHz) | Complementary Product | Note |
|---------|---------------|----------------------|--------------------|-----------------|------|----------------------|---------------------|------------------------------|---------------------|-------|---------------------------|-----------------------|-------------------|
| | | | | min | max | @V _{CE} (V) | @I _C (A) | @I _C (A) | @I _B (A) | | | | |
| TSM | 2SC5784 | 20 | 1.5 | 400 | 1000 | 2 | 0.15 | 0.12 | 0.5 | 0.01 | - | - | Low Saturation |
| | 2SC5738 | 20 | 3.5 | 400 | 1000 | 2 | 0.5 | 0.15 | 1.6 | 0.032 | - | - | Low Saturation |
| | 2SC5976 | 30 | 3 | 250 | 400 | 2 | 0.3 | 0.14 | 1 | 0.033 | - | - | Low Saturation |
| | TTC007 | 50 | 1 | 400 | 1000 | 2 | 0.1 | 0.12 | 0.3 | 0.006 | - | - | Low Saturation |
| | 2SC5692 | 50 | 2.5 | 400 | 1000 | 2 | 0.3 | 0.14 | 1 | 0.02 | - | - | Low Saturation |
| | 2SC6033 | 50 | 2.5 | 250 | 400 | 2 | 0.3 | 0.18 | 1 | 0.033 | - | - | Low Saturation |
| | 2SC5703 | 50 | 4 | 400 | 1000 | 2 | 0.5 | 0.12 | 1.6 | 0.032 | - | - | Low Saturation |
| | 2SD2719 % § | 60±10 | 0.8 | 2000 | - | 2 | 1 | 1.2 | 0.5 | 0.001 | - | - | |
| | 2SC6061 | 120 | 1 | 120 | 300 | 2 | 0.1 | 0.14 | 0.3 | 0.01 | - | - | Low Saturation |
| PS-8 | TPCP8701 & | 50 | 3 | 400 | 1000 | 2 | 0.3 | 0.14 | 1 | 0.02 | - | - | Low Saturation |
| | TPCP8505 | 50 | 3 | 400 | 1000 | 2 | 0.3 | 0.14 | 1 | 0.02 | - | - | Low Saturation |
| | TPCP8511 | 50 | 3 | 250 | 400 | 2 | 0.3 | 0.18 | 1 | 0.033 | - | - | Low Saturation |
| | TPCP8512 ☆ | 50 | 5 | 400 | 1000 | 2 | 0.5 | 0.21 | 1.6 | 0.032 | - | - | Low Saturation |
| | TPCP8513 ☆ | 80 | 4 | 100 | 200 | 2 | 0.4 | 0.17 | 1.2 | 0.12 | - | - | Low Saturation |
| | TPCP8507 | 120 | 1 | 120 | 300 | 2 | 0.1 | 0.14 | 0.3 | 0.01 | - | - | Low Saturation |
| | TPCP8510 | 120 | 1 | 120 | 300 | 2 | 0.1 | 0.14 | 0.3 | 0.01 | - | - | Low Saturation |
| | TPCP8514 ☆ | 120 | 3 | 120 | 240 | 2 | 0.3 | 0.15 | 1 | 0.1 | - | - | Low Saturation |
| PW-Mini | 2SC5819 # | 20 | 1.5 | 400 | 1000 | 2 | 0.15 | 0.12 | 0.5 | 0.01 | - | - | Low Saturation |
| | 2SC5714 # | 20 | 4 | 400 | 1000 | 2 | 0.5 | 0.15 | 1.6 | 0.032 | - | - | Low Saturation |
| | 2SC5810 # | 50 | 1 | 400 | 1000 | 2 | 0.1 | 0.17 | 0.3 | 0.006 | - | - | Low Saturation |
| | 2SC2873 # | 50 | 2 | 70 | 240 | 2 | 0.5 | 0.5 | 1 | 0.05 | 120 | 2SA1213 | Low Saturation |
| | 2SC4409 # | 50 | 2 | 120 | 400 | 2 | 0.1 | 0.5 | 1 | 0.05 | 100 | 2SA1681 | Low Saturation |
| | 2SC4541 # | 50 | 3 | 120 | 400 | 2 | 0.1 | 0.5 | 1.5 | 0.075 | 100 | 2SA1736 | Low Saturation |
| | 2SC5712 # | 50 | 3 | 400 | 1000 | 2 | 0.3 | 0.14 | 1 | 0.02 | - | - | Low Saturation |
| | TTC5712 ☆ | 50 | 3 | 400 | 1000 | 2 | 0.3 | 0.14 | 1 | 0.02 | - | - | Low Saturation |
| | 2SC6126 # | 50 | 3 | 250 | 400 | 2 | 0.3 | 0.18 | 1 | 0.033 | - | - | Low Saturation |
| | TTC019 ☆ | 50 | 5 | 400 | 1000 | 2 | 0.5 | 0.21 | 1.6 | 0.032 | - | - | Low Saturation |
| | 2SD2686 % § # | 60±10 | 1 | 2000 | - | 2 | 1 | 1.2 | 0.5 | 0.001 | - | - | |
| | 2SC6124 # | 80 | 2 | 100 | 200 | 2 | 0.5 | 0.3 | 0.5 | 0.05 | 150 | 2SA2206 | Low Saturation |
| | TTC020 ☆ | 80 | 4 | 100 | 200 | 2 | 0.4 | 0.17 | 1.2 | 0.12 | - | - | Low Saturation |
| | 2SC2881 # | 120 | 0.8 | 80 | 240 | 5 | 0.1 | 1 | 0.5 | 0.05 | 120 | 2SA1201 | Power Amps Driver |
| | TTC021 ☆ | 120 | 3 | 120 | 240 | 2 | 0.3 | 0.15 | 1 | 0.1 | - | - | Low Saturation |
| | TTC005 # | 285 | 1 | 80 | 200 | 5 | 0.001 | 1 | 0.6 | 0.075 | - | - | |
| | TTC013 # | 350 | 0.5 | 100 | 200 | 5 | 0.05 | 0.3 | 0.16 | 0.02 | - | - | Low Saturation |
| | TTC018 # | 500 | 0.1 | 100 | 300 | 10 | 0.02 | 0.3 | 0.02 | 0.002 | - | TTA010 | Low Saturation |

% Darlington, § Built-in Active Clamp Zener, & NPN + NPN, ☆ New Products, # AEC-Q101 qualified

| New PW-Mold | TO-126N | New PW-Mold2 | TO-220SIS | TO-3P(N) | TO-3P(L) |
|--|---|---|---|---|---|
|  |  |  |  |  |  |
| 6.5 x 9.5 | 8.0 x 11.0 | 6.5 x 5.5 | 10.0 x 15.0 | 15.5 x 20.0 | 20.0 x 26.0 |

| Package | Part Number | V _{CE0} (V) | I _c (A) | h _{FE} | | | | V _{CE(sat)} max (V) | | | f _t typ. (MHz) | Complementary Product | Note | |
|--------------|-------------|----------------------|--------------------|-----------------|------|----------------------|---------------------|------------------------------|---------------------|-------|---------------------------|-----------------------|-------------------|-------------------|
| | | | | min | max | @V _{CE} (V) | @I _c (A) | @I _c (A) | @I _B (A) | | | | | |
| New PW-Mold | 2SC3076 | # | 50 | 2 | 70 | 240 | 2 | 0.5 | 0.5 | 1 | 0.05 | 80 | 2SA1241 | Low Saturation |
| | 2SC5886A | # | 50 | 5 | 400 | 1000 | 2 | 0.5 | 0.22 | 1.6 | 0.032 | - | - | Low Saturation |
| | TTC5886A | ☆ | 50 | 5 | 400 | 1000 | 2 | 0.5 | 0.22 | 1.6 | 0.032 | - | - | Low Saturation |
| | TTC016 | # | 50 | 5 | 400 | 1000 | 2 | 0.5 | 0.22 | 1.6 | 0.032 | - | - | Low Saturation |
| | 2SC6076 | # | 80 | 3 | 180 | 450 | 2 | 0.5 | 0.3 | 0.5 | 0.05 | 150 | - | Low Saturation |
| | TTC017 | # | 80 | 3 | 180 | 450 | 2 | 0.5 | 0.5 | 1 | 0.1 | 150 | - | Low Saturation |
| | 2SD1223 | % # | 80 | 4 | 2000 | - | 2 | 1 | 1.5 | 3 | 0.006 | - | - | |
| | 2SC3303 | # | 80 | 5 | 70 | 240 | 1 | 1 | 0.4 | 3 | 0.15 | 120 | - | Low Saturation |
| | TTC023 | ☆ | 120 | 3 | 120 | 240 | 2 | 0.3 | 0.19 | 1 | 0.1 | - | - | Low Saturation |
| | 2SC5548A | # | 400 | 2 | 40 | 100 | 5 | 0.2 | 1 | 0.8 | 0.1 | - | - | |
| 2SC6127 | # | 800 | 0.05 | 15 | - | 5 | 0.007 | 1 | 0.02 | 0.004 | 15 | - | | |
| TTC014 | # | 800 | 1 | 100 | 200 | 5 | 0.1 | 1 | 0.5 | 0.05 | - | - | | |
| TO-126N | TTC015B | # | 80 | 2 | 100 | 200 | 2 | 0.5 | 0.5 | 1 | 0.1 | 150 | TTA008B | Low Saturation |
| | TTD1509B | % | 80 | 2 | 2000 | - | 2 | 1 | 1.5 | 1 | 0.001 | 100 | TTB1067B | |
| | TTC004B | | 160 | 1.5 | 140 | 280 | 5 | 0.1 | 0.5 | 0.05 | 100 | TTA004B | Power Amps Driver | |
| | TTC011B | | 230 | 1 | 100 | 320 | 5 | 0.1 | 1.5 | 0.5 | 0.05 | 100 | TTA006B | Power Amps Driver |
| | TTC5460B | | 800 | 0.05 | 15 | - | 5 | 0.007 | 1 | 0.02 | 0.004 | 5.5 | - | |
| New PW-Mold2 | TTC008 | # | 285 | 1.5 | 100 | 200 | 5 | 0.3 | 1 | 0.5 | 0.0625 | - | - | |
| | 2SC6142 | # | 375 | 1.5 | 100 | 200 | 5 | 0.1 | 0.9 | 0.8 | 0.1 | - | - | |
| TO-220SIS | TTC3710B | | 80 | 12 | 120 | 240 | 1 | 1 | 0.4 | 6 | 0.3 | 80 | TTA1452B | Low Saturation |
| | TTD1415B | % | 100 | 7 | 2000 | 15000 | 3 | 3 | 1.5 | 3 | 0.006 | - | TTB1020B | |
| | TTD1410B | % | 250 | 6 | 2000 | - | 2 | 2 | 2 | 4 | 0.04 | - | - | |
| | TTD1409B | % | 400 | 6 | 600 | - | 2 | 2 | 2 | 4 | 0.04 | - | - | |
| TO-3P(N) | 2SC5198 | | 140 | 10 | 55 | 160 | 5 | 1 | 2 | 7 | 0.7 | 30 | 2SA1941 | Power Amps Output |
| | TTC0001 | | 160 | 18 | 80 | 160 | 5 | 1 | 2 | 9 | 0.9 | 30 | TTA0001 | Power Amps Output |
| | 2SC5948 | | 200 | 12 | 55 | 160 | 5 | 1 | 2 | 8 | 0.8 | 30 | 2SA2120 | Power Amps Output |
| | 2SC5200N | | 230 | 15 | 80 | 160 | 5 | 1 | 3 | 8 | 0.8 | 30 | 2SA1943N | Power Amps Output |
| | 2SC5242 | | 230 | 15 | 55 | 160 | 5 | 1 | 3 | 8 | 0.8 | 30 | 2SA1962 | Power Amps Output |
| | 2SC5358 | | 230 | 15 | 55 | 160 | 5 | 1 | 3 | 8 | 0.8 | 30 | 2SA1986 | Power Amps Output |
| | 2SC5354 | | 800 | 5 | 15 | 60 | 5 | 0.5 | 1 | 2 | 0.4 | - | - | |
| TO-3P(L) | 2SC5199 | | 160 | 12 | 55 | 160 | 5 | 1 | 2.5 | 8 | 0.8 | 30 | 2SA1942 | Power Amps Output |
| | TTC0002 | | 160 | 18 | 80 | 160 | 5 | 1 | 2 | 9 | 0.9 | 30 | TTA0002 | Power Amps Output |
| | 2SC5949 | | 200 | 15 | 55 | 160 | 5 | 1 | 3 | 10 | 1 | 30 | 2SA2121 | Power Amps Output |
| | 2SC5200 | | 230 | 15 | 55 | 160 | 5 | 1 | 3 | 8 | 0.8 | 30 | 2SA1943 | Power Amps Output |
| | 2SC5359 | | 230 | 15 | 55 | 160 | 5 | 1 | 3 | 8 | 0.8 | 30 | 2SA1987 | Power Amps Output |
| | TTC5200 | | 230 | 15 | 80 | 160 | 5 | 1 | 3 | 8 | 0.8 | 30 | TTA1943 | Power Amps Output |

☆ New Products, % Darlington, # AEC-Q101 qualified



PNP + NPN

| Package | Part Number | Polarity | V _{CEO} (V) | I _C (A) | h _{FE} | | | | V _{CE(sat)} max (V) | | | f _r typ. (MHz) | Note |
|---------|-------------|----------|----------------------|--------------------|-----------------|------|----------------------|---------------------|------------------------------|---------------------|--------|---------------------------|----------------|
| | | | | | min | max | @V _{CE} (V) | @I _C (A) | @I _C (A) | @I _B (A) | | | |
| SMV | HN4B101J | PNP | -30 | -1 | 200 | 500 | -2 | -0.12 | -0.2 | -0.4 | -0.013 | - | Low Saturation |
| | | NPN | 30 | 1.2 | 200 | 500 | 2 | 0.12 | 0.17 | 0.4 | 0.013 | - | Low Saturation |
| | HN4B102J | PNP | -30 | -1.8 | 200 | 500 | -2 | -0.2 | -0.2 | -0.6 | -0.02 | - | Low Saturation |
| | | NPN | 30 | 2 | 200 | 500 | 2 | 0.2 | 0.14 | 0.6 | 0.02 | - | Low Saturation |
| PS-8 | TPCP8901 | PNP | -50 | -0.8 | 200 | 500 | -2 | -0.1 | -0.2 | -0.3 | -0.01 | - | Low Saturation |
| | | NPN | 50 | 1 | 400 | 1000 | 2 | 0.1 | 0.17 | 0.3 | 0.006 | - | Low Saturation |
| | TPCP8902 | PNP | -30 | -2 | 200 | 500 | -2 | -0.2 | -0.2 | -0.6 | -0.02 | - | Low Saturation |
| | | NPN | 30 | 2 | 200 | 500 | 2 | 0.2 | 0.14 | 0.6 | 0.02 | - | Low Saturation |

NPN + N-ch MOSFET

| Package | Part Number | Component Devices | V _{CEO} / V _{DSS} (V) | I _C / I _D (A) | h _{FE} | | | | V _{CE(sat)} max (V) / R _{DS(ON)} max (Ω) | | | f _r typ. (MHz) | Note |
|---------|-------------|-------------------|---|-------------------------------------|-----------------|-----|----------------------|---------------------|--|--|-------|---------------------------|----------------|
| | | | | | min | max | @V _{CE} (V) | @I _C (A) | @I _C (A) / V _{GS} (V) | @I _B (A) / I _D (A) | | | |
| PS-8 | TPCP8H02 | NPN | 30 | 3 | 250 | 400 | 2 | 0.3 | 0.14 | 1 | 0.033 | - | Low Saturation |
| | | MOSFET | 20 | 0.1 | - | - | - | - | 3 | 4 | 0.01 | - | |

NPN + HED

| Package | Part Number | Component Devices | V _{CEO} / V _{RRM} (V) | I _C / I _{F(AV)} (A) | h _{FE} | | | | V _{CE(sat)} max (V) / V _{FM} max (V) | | | t _{rr} max (ns) | Note |
|---------|-------------|-------------------|---|---|-----------------|------|----------------------|---------------------|--|---------------------|-------|--------------------------|------|
| | | | | | min | max | @V _{CE} (V) | @I _C (A) | @I _C / I _{FM} (A) | @I _B (A) | | | |
| PS-8 | TPCP8L01 % | NPN | 120 | 0.9 | 2000 | 9000 | 2 | 1 | 1.5 | 1 | 0.001 | - | |
| | | HED | 200 | 1 | - | - | - | - | 0.98 | 1 | - | 60 | |

% Darlington

Part Naming Conventions

Bipolar Transistors

JEITA registration Item Series

Ex.) 2 S A ※※※※ B

① ② ③ ④ ⑤

- ① The value that subtracted 1 from the total number of terminals.
- ② S stands for Semiconductor
- ③ The kind of circuit
This section shows the kind of the circuit of a product. It is classified into form A to D by the circuit of a product.
A: a transistor of high-frequency and PNP structure
B: a transistor of low-frequency and PNP structure
C: a transistor of high-frequency and NPN structure
D: a transistor of low-frequency and NPN structure
- ④ Serial number
JEITA registration numbers.
- ⑤ Changes
The additional symbol which shows some changes.

TT※※※※ Series

Ex.) TT A ※※※※ B

① ② ③ ④

- ① Bipolar Transistor
- ② The kind of circuit
This section shows the kind of the circuit of a product. It is classified into form A to D by the circuit of a product.
A: a transistor of high-frequency and PNP structure
B: a transistor of low-frequency and PNP structure
C: a transistor of high-frequency and NPN structure
D: a transistor of low-frequency and NPN structure
- ③ Serial number
- ④ Changes
The additional symbol which shows some changes.

TPCP8※※※ Series

Ex.) TPCP8 5 04

① ② ③

- ① Package: PS-8 Series
- ② The kind of circuit
5: NPN transistor, Single
6: PNP transistor, Single
7: NPN transistor, Dual
8: PNP transistor, Dual
9: PNP transistor + NPN transistor
C: NPN transistor + SBD
D: PNP transistor + SBD
F: PNP transistor + N-ch MOSFET
G: PNP transistor + P-ch MOSFET
H: NPN transistor + N-ch MOSFET
J: NPN transistor + P-ch MOSFET
L: NPN transistor + HED
M: PNP transistor + HED
N: NPN transistor + Diode
P: NPN transistor + Diode
- ③ Serial number

HN※※※※ Series

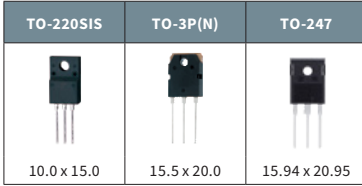
Ex.) HN 4 B 101 J

① ② ③ ④ ⑤

- ① HN means Multi Chip Device
- ② Internal connection
1: Point symmetrical arrangement
2: Parallel arrangement
3: Cascade arrangement
4: Common use of emitter or source or base
7: Different types of transistors are arrangement
- ③ The kind of the devices being loaded
A: PNP transistor x 2
B: PNP transistor + NPN transistor
C: NPN transistor x 2
D: general SW diode
E: transistor + diode
G: different types of transistors
S: SBD
- ④ Serial number
- ⑤ Package type
JE: ESV FU: US6, USV
JU: USV F: SM6
J: SMV FS: fS6
FE: ES6, ESV

3. Discrete IGBTs

Package Dimensions (unit: mm)



| Package | Part Number | V _{CE(s)} (V) | I _c (A) | V _{CE(sat)} typ. (V) | | | t _r typ. (μs) | | | t _{rr} typ. (μs) | Note | | |
|-----------|-------------|---------------------------|-----------------------|-------------------------------|------------------------|----|--------------------------|------------------------|-------------------|------------------------------|-----------|------------------|------------------|
| | | | | @V _{GE} (V) | @I _c (A) | | @V _{CC} (V) | @I _c (A) | Load Condition | | | | |
| TO-220SIS | GT15J341 | ◆ | 600 | 15 | 1.5 | 15 | 15 | 0.08 | 300 | 15 | Inductive | 0.08 | Hard switching |
| | GT20J121 | | 600 | 20 | 1.25 | 15 | 20 | 0.27 | 300 | 20 | Resistive | - | Partial PFC |
| | GT20J341 | ◆ | 600 | 20 | 1.5 | 15 | 20 | 0.05 | 300 | 20 | Inductive | 0.09 | Hard switching |
| TO-3P(N) | GT30J121 | | 600 | 30 | 2 | 15 | 30 | 0.05 | 300 | 30 | Inductive | - | Hard switching |
| | GT30J122A | | 600 | 30 | 1.7 | 15 | 50 | 0.2 | 300 | 50 | Resistive | - | Partial PFC |
| | GT40J322 | ◆ | 600 | 40 | 1.7 | 15 | 40 | 0.2 | 300 | 40 | Resistive | 0.2 max | Current resonant |
| | GT50J341 | ◆ | 600 | 50 | 1.6 | 15 | 50 | 0.15 | 300 | 50 | Resistive | 0.1 | Current resonant |
| | GT50JR21 | ◆ | 600 | 50 | 1.45 | 15 | 50 | 0.08 | 300 | 50 | Resistive | 0.35 | Current resonant |
| | GT50JR22 | ◆ | 600 | 50 | 1.55 | 15 | 50 | 0.05 | 300 | 50 | Resistive | 0.35 | Current resonant |
| | GT30J341 | ◆ | 600 | 59 | 1.5 | 15 | 30 | 0.04 | 300 | 30 | Inductive | 0.05 | Hard switching |
| | GT50J123 | | 600 | 59 | 1.9 | 15 | 50 | 0.04 | 300 | 30 | Inductive | - | Hard switching |
| | GT30J65MRB | ◆ | 650 | 60 | 1.4 | 15 | 30 | 0.04 | 400 | 15 | Inductive | 0.2 | Active PFC |
| | GT50NR21 | ◆ | 1050 | 50 | 1.8 | 15 | 50 | 0.2 | 600 | 50 | Resistive | 0.5 | Voltage resonant |
| | GT30J110SRA | ◆ | 1100 | 60 | 1.6 | 15 | 30 | 0.17 | 600 | 60 | Resistive | - | Voltage resonant |
| | GT60PR21 | ◆ | 1100 | 60 | 2 | 15 | 60 | 0.16 | 600 | 60 | Resistive | 0.6 | Voltage resonant |
| | GT40QR21 | ◆ | 1200 | 40 | 1.9 | 15 | 40 | 0.2 | 600 | 40 | Resistive | 0.6 | Voltage resonant |
| | GT40RR21 | ◆ | 1350 | 40 | 2.05 | 15 | 40 | 0.21 | 600 | 40 | Resistive | 0.6 | Voltage resonant |
| GT40WR21 | ◆ | 1800 | 40 | 2.9 | 15 | 40 | 0.15 | 600 | 40 | Resistive | 1 | Voltage resonant | |
| TO-247 | GT20N135SRA | ◆ | 1350 | 40 | 2 | 15 | 40 | 0.25 | 600 | 40 | Resistive | - | Voltage resonant |
| | GT30N135SRA | ◆ | 1350 | 60 | 2.15 | 15 | 60 | 0.25 | 600 | 60 | Resistive | - | Voltage resonant |

◆ Built-in Diode

Part Naming Conventions

Discrete IGBTs

New Naming Conventions

(New products after 2019)

Ex.) GT 20 N 135 S R A
① ② ③ ④ ⑤ ⑥ ⑦

- ① Discrete IGBT
- ② Maximum DC Collector Current
 $I_C \text{ max @ } T_C = 100^\circ\text{C}$
(note: this rating is defined relative to the equivalent class of non-isolated packages in case of isolation packages.)
- ③ Package
A: TO-220SIS E: TO-220
J: TO-3P(N) N: TO-247
P: DPAK / New PW-Mold
- ④ Maximum Collector-emitter Voltage V_{CES}
 V_{CES} Divided by 10
Ex.) 65: 650 V (= 65 x 10)
110: 1100 V (= 110 x 10)
135: 1350 V (= 135 x 10)
- ⑤ Major application
H: for hard switching application
S: for soft switching application
M: other or special application
- ⑥ Type (Structure)
1: Single die of IGBT
2: Co-pack of IGBT and Diode (FWD)
R: RC-IGBT
- ⑦ Generation or Die design rule
A: 6th & 6.5th generation
B: 7th generation

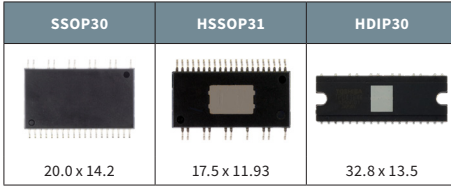
Conventional Naming

Ex.) GT 60 M 3 03 A
① ② ③ ④ ⑤ ⑥

- ① Discrete IGBT
- ② Collector current rating (I_C)
- ③ Voltage rating (V_{CES})
C: 150 (V) D: 200 (V) E: 250 (V)
F: 300 (V) G: 400 (V) H: 500 (V)
J: 600 (V) K: 700 (V) L: 800 (V)
M: 900 (V) N: 1000 (V) P: 1100 (V)
Q: 1200 (V) R: 1300 (V) S: 1400 (V)
T: 1500 (V) U: 1600 (V) V: 1700 (V)
W: 1800 (V)
- ④ Type
1: N-ch
2: P-ch
3: N-ch with built-in freewheeling diode
R: N-ch RC-IGBT with built-in freewheeling diode
- ⑤ Serial number
- ⑥ Version

4. Three-Phase Brushless DC Motor Driver ICs (with Built-in Power Device)

Package Dimensions (unit: mm)



■ Square-wave PWM control type

| Package | Part Number | V _{BB} (V) | I _{out} (A) | V _{CEsat} max (V) | | Hall sensor input | FGC Rotate Pulse Select | Forward Reverse select | Protection Functions | | | |
|---------|-------------|---------------------|----------------------|----------------------------|----------|-------------------|-------------------------|------------------------|----------------------|--------------|-----|------|
| | | | | High Side | Low Side | | | | Current Limit | Over Current | TSD | UVLO |
| HSSOP31 | TPD4162F | 600 | 0.7 | 3 | 3 | ✓ | ✓ | - | ✓ | ✓ | ✓ | ✓ |
| | TPD4166F | 600 | 1 | 3 | 3 | ✓ | ✓ | - | ✓ | ✓ | ✓ | ✓ |

■ Sine-wave PWM control type

| Package | Part Number | V _{BB} (V) | I _{out} (A) | V _{CEsat} max (V) | | R _{DS(on)} max (Ω) | | Protection Functions | | | Diagnosis Functions |
|---------|-------------|---------------------|----------------------|----------------------------|----------|-----------------------------|----------|----------------------|-----|------|---------------------|
| | | | | High Side | Low Side | High Side | Low Side | Over Current | TSD | UVLO | |
| SSOP30 | TPD4206F | 500 | 2.5 | - | - | 2.3 | 2.3 | ✓ | ✓ | ✓ | ✓ |
| | TPD4213F ★ | 600 | 1.5 | - | - | TBD | TBD | ✓ | ✓ | ✓ | ✓ |
| | TPD4213AF ★ | 600 | 1.5 | - | - | TBD | TBD | ✓ | ✓ | ✓ | ✓ |
| | TPD4204F | 600 | 2.5 | - | - | 3.2 | 3.2 | ✓ | ✓ | ✓ | ✓ |
| | TPD4214F ★ | 600 | 2.5 | - | - | 3.2 | 3.2 | ✓ | ✓ | ✓ | ✓ |
| | TPD4214AF ★ | 600 | 2.5 | - | - | 3.2 | 3.2 | ✓ | ✓ | ✓ | ✓ |
| | TPD4207F | 600 | 5 | - | - | 0.56 | 0.56 | ✓ | ✓ | ✓ | ✓ |
| | TPD4217F ★ | 600 | 5 | - | - | 0.56 | 0.56 | ✓ | ✓ | ✓ | ✓ |
| HSSOP31 | TPD4163F ☆ | 600 | 1 | 3 | 3 | - | - | ✓ | ✓ | ✓ | ✓ |
| | TPD4164F ☆ | 600 | 2 | 3 | 3 | - | - | ✓ | ✓ | ✓ | ✓ |
| HDIP30 | TPD4163K ☆ | 600 | 1 | 3 | 3 | - | - | ✓ | ✓ | ✓ | ✓ |
| | TPD4164K ☆ | 600 | 2 | 3 | 3 | - | - | ✓ | ✓ | ✓ | ✓ |
| | TPD4165K ★ | 600 | 3 | 3 | 3 | - | - | ✓ | ✓ | ✓ | ✓ |

☆ New Products, ★ Under Development (The specification is subject to change without notice.)

Part Naming Conventions

Three-Phase Brushless DC Motor Driver ICs (with Built-in Power Device)

Ex.) TPD 41 62 F







① ② ③ ④

- ① TPD means intelligent power device [Three-Phase Brushless DC Motor Driver (with Built-in Power Device)]
- ② Three-phase brushless DC motor driver
 - 41: Monolithic type
 - 42: Multi-Chip module type
- ③ Serial number
- ④ Package
 - F: HSSOP31 or SSOP30
 - K: HDIP30

5. Low Voltage IPDs (Intelligent Power Devices)

Package Dimensions (unit: mm)

Automotive Driver ICs

| PS-8 | WSON10 | WSON10A | SSOP16 | SSOP30 | WQFN32 |
|---|--|--|---|---|--|
|  | Bottom View  | Bottom View  |  |  | Bottom View  |
| 2.9 x 2.8 | 3.0 x 3.0 | 3.0 x 3.0 | 5.0 x 6.4 | 9.7 x 7.6 | 5.0 x 5.0 |

High-side Switch

| Package | Part Number | V _{DD} (V) | I _O / I _{OUT} (A) | R _{DS(ON)} max (Ω) | V _{DD(opr)} (V) | T _{opr} (°C) | Protective Functions | | | Diagnosis Functions | | |
|---------|-------------|---------------------|---------------------------------------|-----------------------------|--------------------------|-----------------------|----------------------|-----|--------------|---------------------|-----|-----------|
| | | | | | | | Over Current | TSD | Active Clamp | Over Current | TSD | Open load |
| PS-8 | TPD1052F # | -0.3 to 25 | 0.8 | 0.8 | 5 to 18 | -40 to 125 | ✓ | ✓ | - | ✓ | ✓ | - |
| WSON10 | TPD1055FA # | -0.3 to 25 | 3 | 0.12 | 5 to 18 | -40 to 125 | ✓ | ✓ | - | ✓ | ✓ | ✓ |

Low-side Switch

| Package | Part Number | V _{DS} / V _{OUT} (V) | I _D / I _{OUT} (A) | R _{DS(ON)} max (Ω) | V _{DD(opr)} (V) | T _{opr} (°C) | Protection Functions | | | Diagnosis Functions | | |
|---------|-------------|--|---------------------------------------|-----------------------------|--------------------------|-----------------------|----------------------|-----|--------------|---------------------|-----|-----------|
| | | | | | | | Over Current | TSD | Active Clamp | Over Current | TSD | Open load |
| PS-8 | TPD1044F # | 41 | 1 | 0.6 | Up to 41 | -40 to 125 | ✓ | ✓ | ✓ | - | - | - |
| | TPD1054F # | 40 | 1 | 0.8 | 4.5 to 5.5 | -40 to 125 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| WSON10 | TPD1058FA # | 40 | 6 | 0.1 | 4.5 to 5.5 | -40 to 125 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

MOSFET Gate Drivers

| Package | Part Number | V _{DD} (V) | I _{OUT} (A) | V _{DD(opr)} (V) | T _{opr} (°C) | Protect Function and Features | Topology |
|---------|---------------|---------------------|--|--------------------------|-----------------------|--|-------------------------|
| PS-8 | TPD7104AF # | -0.3 to 24 | Source: Internal capacity Sink: 5 mA | 5 to 18 | -40 to 125 | <ul style="list-style-type: none"> Built-in charge pump circuit Over current protection and diagnostic output Reverse battery protection | High-Side Switch |
| SSOP16 | TPD7106F # | -18 to 27 | Source: 10 mA Sink: 10 mA / 0.4 A | 4.5 to 27 | -40 to 150 | <ul style="list-style-type: none"> Built-in charge pump circuit Diagnosis output for under voltage of charge pump circuit Reverse battery protection Rapidly shut down by control pin (+400 mA) | |
| WSON10A | TPD7107F # | -0.3 to 26 | Source: Internal capacity Sink: 5 mA | 5.75 to 26 | -40 to 125 | <ul style="list-style-type: none"> Built-in charge pump circuit Power supply voltage unusual protection and diagnostic output (Under voltage, Over voltage, Reverse battery) Load current sensing Over current protection and diagnostic output Thermal protection and diagnostic output Abnormalities in Drain-source voltage of external N-ch MOSFET Protection for disconnection of GND terminal V_{DD} short of load line (Short circuit between source of external N-ch MOSFET and V_{DD}) Disconnection of load line. | |
| PS-8 | TPD7211F | -0.5 to 35 | ±0.5 | 5 to 18 | -40 to 125 | •High side P-ch MOSFET drive | Half-Bridge |
| WQFN32 | TPD7212F # | -0.3 to 25 | +1.5 / -1 | 4.5 to 18 | -40 to 150 | <ul style="list-style-type: none"> Built-in charge pump circuit Power supply unusual protection and diagnostic output Output voltage unusual protection and diagnostic output | Three-Phase Full-Bridge |
| SSOP30 | TPD7212FN # @ | -0.3 to 25 | +1.5 / -1 | 4.5 to 18 | -40 to 150 | <ul style="list-style-type: none"> Built-in charge pump circuit Power supply unusual protection and diagnostic output Output voltage unusual protection and diagnostic output | |

AEC-Q100 qualified
@ Dry-packed

■ Industrial Driver ICs

High-side Switch

| Package | Part Number | V _{DD} (V) | I _{OUT} (A) | R _{DS(ON)} max (Ω) | V _{DD(opr)} (V) | T _{opr} (°C) | Protective Functions | | | Diagnosis Functions | | | Number of Switch channels |
|---------|---------------|---------------------|----------------------|-----------------------------|--------------------------|-----------------------|----------------------|-----|--------------|---------------------|-----|-----------|---------------------------|
| | | | | | | | Over Current | TSD | Active Clamp | Over Current | TSD | Open load | |
| SSOP30 | TPD2015FN ☆ @ | -0.3 to 40 | 1 | 0.55 | 8 to 40 | -40 to 110 | ✓ | ✓ | - | - | - | - | 8ch |

Low-side Switch

| Package | Part Number | V _{OUT} (V) | I _{OUT} (A) | R _{DS(ON)} max (Ω) | V _{DD(opr)} (V) | T _{opr} (°C) | Protection Functions | | | Diagnosis Functions | | | Number of Switch channels |
|---------|---------------|----------------------|----------------------|-----------------------------|--------------------------|-----------------------|----------------------|-----|--------------|---------------------|-----|-----------|---------------------------|
| | | | | | | | Over Current | TSD | Active Clamp | Over Current | TSD | Open load | |
| SSOP30 | TPD2017FN ☆ @ | Up to 40 | 1 | 0.55 | 2.7 to 5.5 | -40 to 110 | ✓ | ✓ | ✓ | - | - | - | 8ch |

☆ New Products

@ Dry-packed

Part Naming Conventions

Low Voltage IPDs

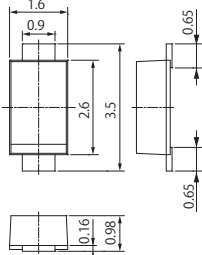
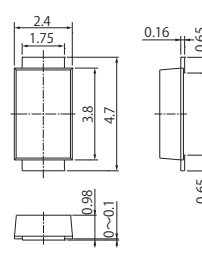
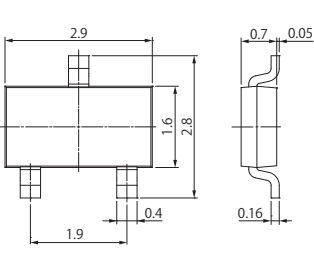
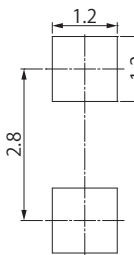
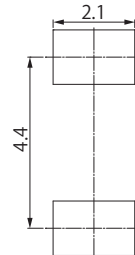
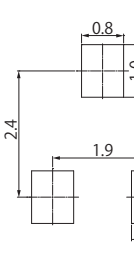
Ex.) TPD 10 55 F A

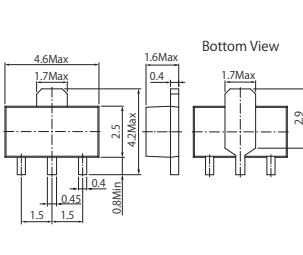
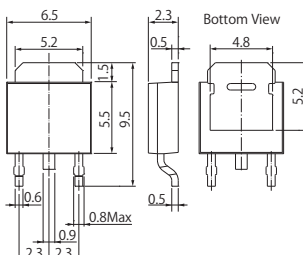
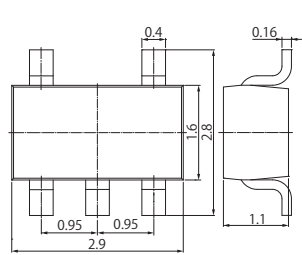
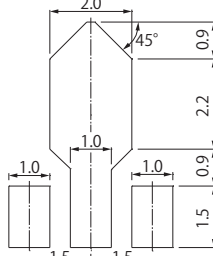
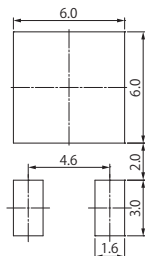
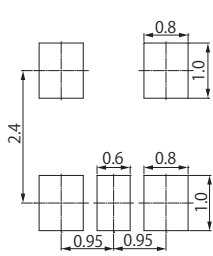
① ② ③ ④ ⑤

- ① TPD means intelligent power device
- ② The type of topology
 - 10: Single or dual switch
 - 20: Multi output switch
 - 71: High-side MOSFET gate driver
 - 72: Bridge MOSFET gate driver
- ③ Serial number
- ④ Package
 - F: Surface mount type
 - FN: Flat Package (2 direction SOP Lead Pitch 0.65 mm)
- ⑤ Changes
 - The additional symbol which shows some changes.

6. Device Package

Surface Mount Type

| S-FLAT™ (1.6 x 3.5) | M-FLAT™ (2.4 x 4.7) | TSM (2.9 x 2.8) |
|--|--|--|
| <p>Package dimension unit: mm</p>  | <p>Package dimension unit: mm</p>  | <p>Package dimension unit: mm</p>  |
| <p>Land pattern example unit: mm</p>  | <p>Land pattern example unit: mm</p>  | <p>Land pattern example unit: mm</p>  |

| PW-Mini (4.6 x 4.2) | New PW-Mold (6.5 x 9.5) | SMV (SOT-25) (2.9 x 2.8) |
|--|--|---|
| <p>Package dimension unit: mm</p>  | <p>Package dimension unit: mm</p>  | <p>Package dimension unit: mm</p>  |
| <p>Land pattern example unit: mm</p>  | <p>Land pattern example unit: mm</p>  | <p>Land pattern example unit: mm</p>  |

| DFN8x8 (8.0 x 8.0) | PS-8 (2.9 x 2.8) | WSN10 (3.0 x 3.0) |
|---|---|---|
| <p>Package dimension unit : mm</p> <p>Bottom View</p> | <p>Package dimension unit : mm</p> <p>Bottom View</p> | <p>Package dimension unit : mm</p> <p>Bottom View</p> |
| <p>Land pattern example unit : mm</p> | <p>Land pattern example unit : mm</p> | <p>Land pattern example unit : mm</p> |

| WSN10A (3.0 x 3.0) | SSOP16 (5.0 x 6.4) | SSOP24 (13.0 x 8.0) |
|---|---------------------------------------|---------------------------------------|
| <p>Package dimension unit : mm</p> <p>Bottom View</p> | <p>Package dimension unit : mm</p> | <p>Package dimension unit : mm</p> |
| <p>Land pattern example unit : mm</p> | <p>Land pattern example unit : mm</p> | <p>Land pattern example unit : mm</p> |

| SSOP30 (20.0 x 14.2) | SSOP30 (9.7 x 7.6) | HSSOP31 (17.5 x 11.93) |
|---------------------------------------|---------------------------------------|---------------------------------------|
| <p>Package dimension unit : mm</p> | <p>Package dimension unit : mm</p> | <p>Package dimension unit : mm</p> |
| <p>Land pattern example unit : mm</p> | <p>Land pattern example unit : mm</p> | <p>Land pattern example unit : mm</p> |

| WQFN32 (5.0 x 5.0) | |
|------------------------------------|---------------------------------------|
| <p>Package dimension unit : mm</p> | <p>Land pattern example unit : mm</p> |

Through Hole Type

| TO-220-2L (10.05 x 15.3) | | TO-220F-2L (10.0 x 15.0) | | TO-247-2L (15.94 x 20.95) | |
|--------------------------|-----------|--------------------------|-----------|---------------------------|-----------|
| Package dimension | unit : mm | Package dimension | unit : mm | Package dimension | unit : mm |
| | | | | | |

| New PW-Mold2 (6.5 x 5.5) | | TO-126N (8.0 x 11.0) | | TO-220SIS (SC-67) (10.0 x 15.0) | |
|--------------------------|-----------|----------------------|-----------|---------------------------------|-----------|
| Package dimension | unit : mm | Package dimension | unit : mm | Package dimension | unit : mm |
| | | | | | |

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