



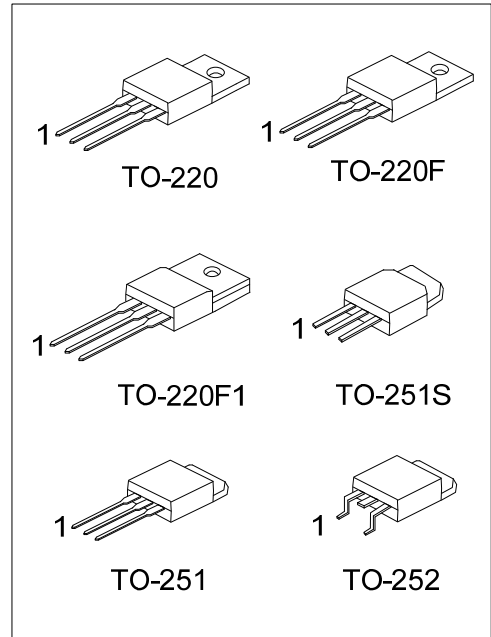
# 2SD1816

## NPN PLANAR TRANSISTOR

### HIGH CURRENT SWITCHING APPLICATIONS

■ FEATURES

- \* Low collector-to-emitter saturation voltage
- \* Good linearity of  $h_{FE}$
- \* Small and slim package facilitating compactness of sets.
- \* High  $f_T$
- \* Fast switching speed



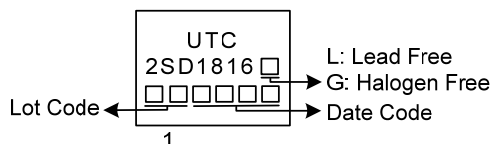
■ ORDERING INFORMATION

| Ordering Number  |                  | Package  | Pin Assignment |   |   | Packing   |
|------------------|------------------|----------|----------------|---|---|-----------|
| Lead Free        | Halogen Free     |          | 1              | 2 | 3 |           |
| 2SD1816L-x-TA3-T | 2SD1816G-x-TA3-T | TO-220   | B              | C | E | Tube      |
| 2SD1816L-x-TF1-T | 2SD1816G-x-TF1-T | TO-220F1 | B              | C | E | Tube      |
| 2SD1816L-x-TF3-T | 2SD1816G-x-TF3-T | TO-220F  | B              | C | E | Tube      |
| 2SD1816L-x-TM3-T | 2SD1816G-x-TM3-T | TO-251   | B              | C | E | Tube      |
| 2SD1816L-x-TMS-T | 2SD1816G-x-TMS-T | TO-251S  | B              | C | E | Tube      |
| 2SD1816L-x-TN3-R | 2SD1816G-x-TN3-R | TO-252   | B              | C | E | Tape Reel |

Note: Pin assignment: B: Base C: Collector E: Emitter

|   |  |
|---|--|
| <p>2SD1816G-x-TA3-T</p> <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Rank<br/>(4) Green Package</p> | <p>(1) T: Tube, R: Tape Reel<br/>(2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F, TM3: TO-251, TMS: TO-251S, TN3: TO-252<br/>(3) x: refer to Classification of <math>h_{FE1}</math><br/>(4) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|--|

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                   |                          | SYMBOL    | RATINGS    | UNIT             |
|-----------------------------|--------------------------|-----------|------------|------------------|
| Collector-Base Voltage      |                          | $V_{CBO}$ | 120        | V                |
| Collector-Emitter Voltage   |                          | $V_{CEO}$ | 100        | V                |
| Emitter-Base Voltage        |                          | $V_{EBO}$ | 6          | V                |
| Collector Current           | DC                       | $I_C$     | 4          | A                |
|                             | PULSE(Note 2)            |           | 8          | A                |
| Collector Power Dissipation | TO-220/TO-220F           | $P_D$     | 2          | W                |
|                             | TO-220F1                 |           |            |                  |
|                             | TO-251/TO-251S<br>TO-252 |           | 1          | W                |
| Junction Temperature        |                          | $T_J$     | +150       | $^\circ\text{C}$ |
| Storage Temperature         |                          | $T_{STG}$ | -40 ~ +150 | $^\circ\text{C}$ |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional operation is not implied.

2. Duty=1/2, Pw=20ms.

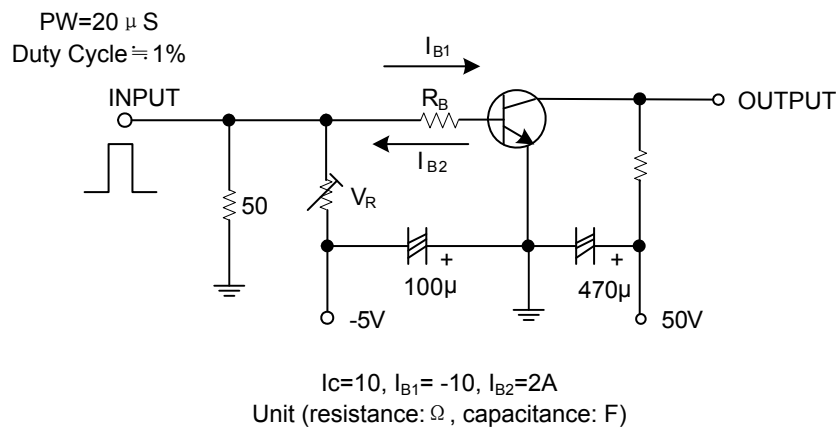
■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                            | SYMBOL        | TEST CONDITIONS   | MIN | TYP | MAX | UNIT          |
|--------------------------------------|---------------|---|-----|-----|-----|---------------|
| Collector Base Breakdown Voltage     | $BV_{CBO}$    | $I_C = 10\mu\text{A}, I_E = 0$                          | 120 |     |     | V             |
| Collector Emitter Breakdown Voltage  | $BV_{CEO}$    | $I_C = 1\text{mA}, R_B = \infty$                        | 100 |     |     | V             |
| Emitter Base Breakdown Voltage       | $BV_{EBO}$    | $I_E = 10\mu\text{A}, I_C = 0$                          | 6   |     |     | V             |
| Base-Emitter Saturation Voltage      | $V_{BE(SAT)}$ | $I_C = 2\text{A}, I_B = 0.2\text{A}$                    |     | 0.9 | 1.2 | V             |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C = 2\text{A}, I_B = 0.2\text{A}$                    |     | 150 | 400 | mV            |
| Collector Cut-Off Current            | $I_{CBO}$     | $V_{CB} = 100\text{V}, I_E = 0$                         |     |     | 1   | $\mu\text{A}$ |
| Emitter Cut-Off Current              | $I_{EBO}$     | $V_{EB} = 4\text{V}, I_C = 0$                           |     |     | 1   | $\mu\text{A}$ |
| DC Current Transfer Ratio            | $h_{FE1}$     | $V_{CE} = 5\text{V}, I_C = 0.5\text{A}$                 | 70  |     | 560 |               |
|                                      | $h_{FE2}$     | $V_{CE} = 5\text{V}, I_C = 3\text{A}$                   | 40  |     |     |               |
| Transition Frequency                 | $f_T$         | $V_{CE} = 10\text{V}, I_C = 0.5\text{A}$                |     | 180 |     | MHz           |
| Output Capacitance                   | $C_{ob}$      | $V_{CB} = 10\text{V}, I_E = 0\text{A}, f = 1\text{MHz}$ |     | 40  |     | pF            |
| Turn-on Time                         | $t_{ON}$      | See test circuit  |     | 100 |     | ns            |
| Storage Time                         | $t_{STG}$     | See test circuit  |     | 900 |     | ns            |
| Fall Time                            | $t_F$         | See test circuit  |     | 50  |     | ns            |

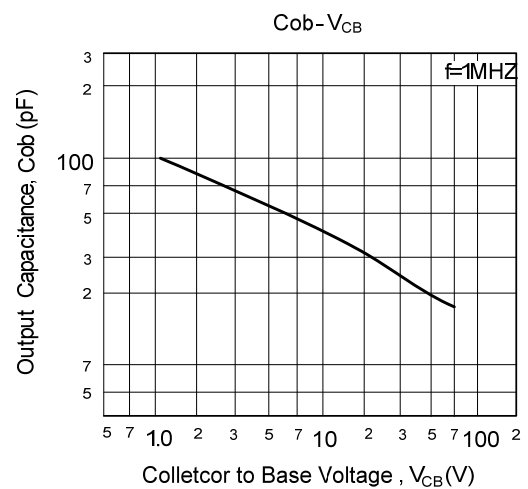
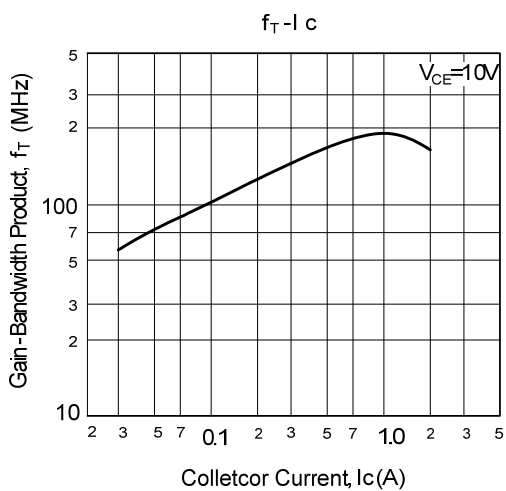
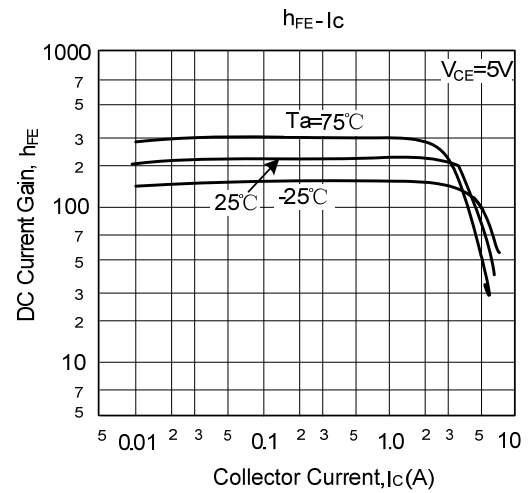
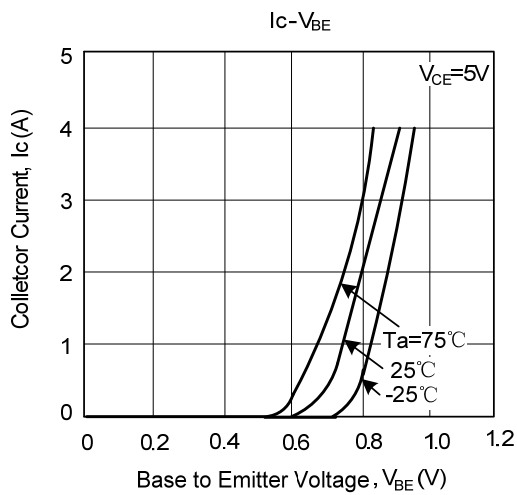
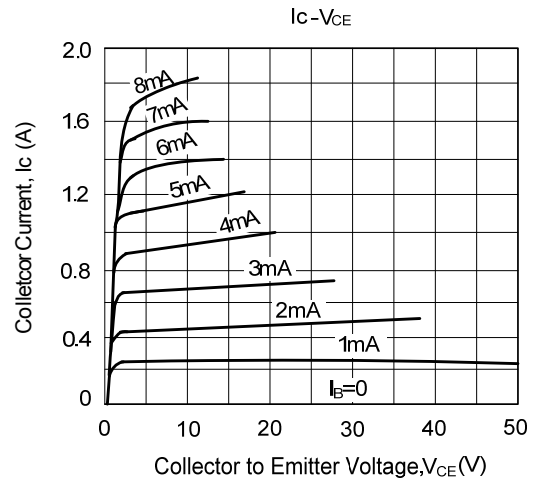
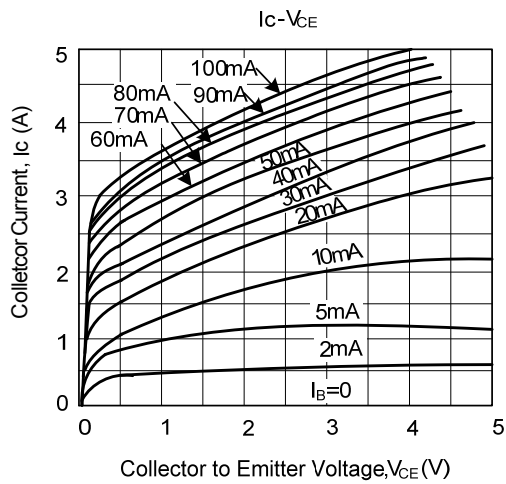
■ CLASSIFICATION of  $h_{FE1}$

| RANK  | Q        | R         | S         | T         | H         |
|-------|----------|-----------|-----------|-----------|-----------|
| RANGE | 70 - 140 | 100 - 200 | 140 - 280 | 200 - 400 | 270 - 560 |

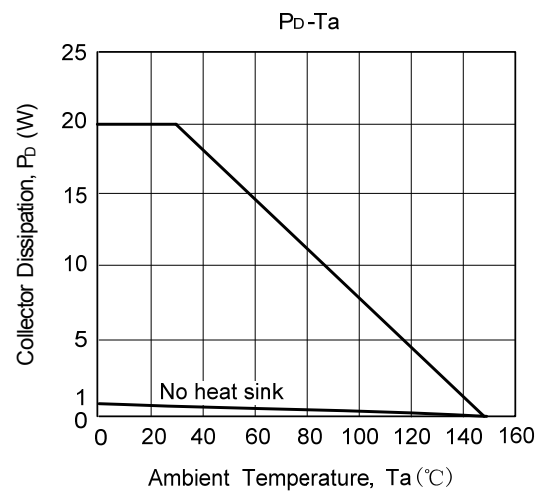
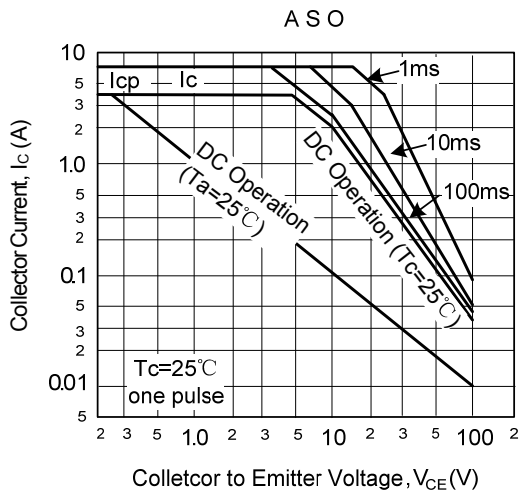
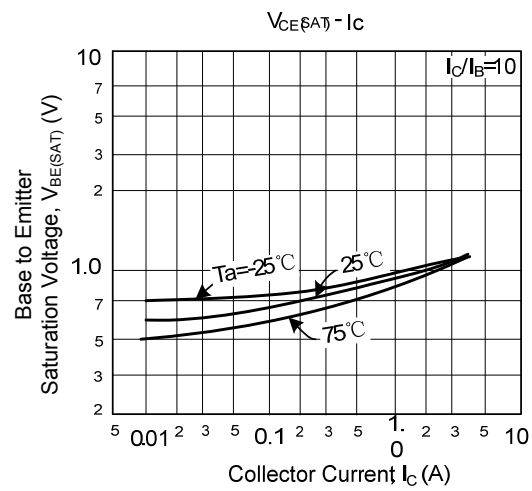
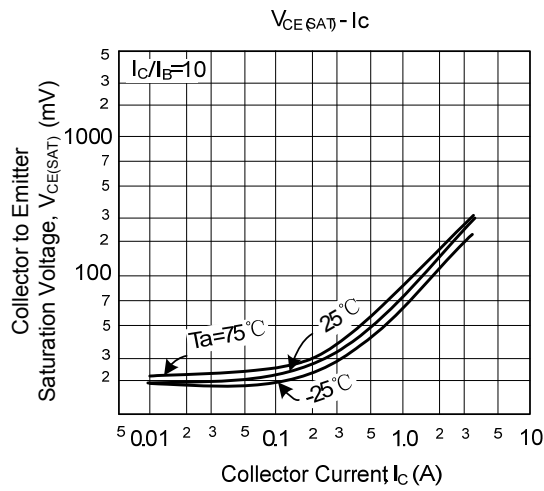
■ TEST CIRCUIT



## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



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