



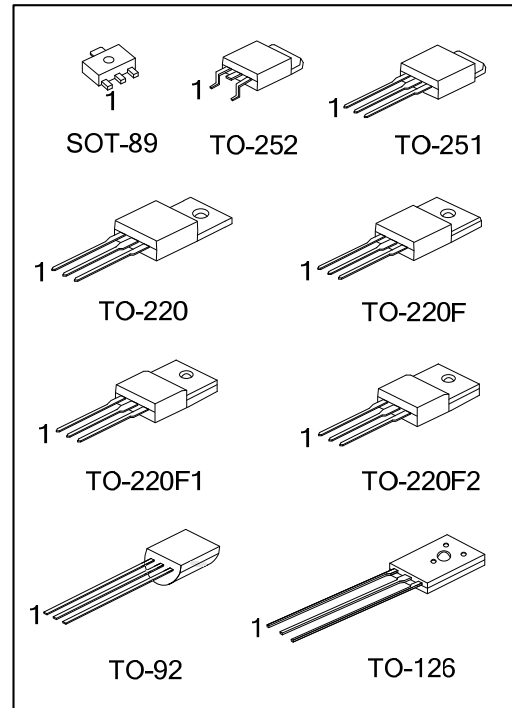
2SD1060/A

NPN SILICON TRANSISTOR

NPN PLANAR SILICON TRANSISTOR

■ FEATURES

* Low collector-to-emitter saturation voltage:
 $V_{CE(SAT)}=0.4V \text{ max} / I_C=3A, I_B=0.3A$



■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|------------------|-------------------|----------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| - | 2SD1060G-x-AB3-R | SOT-89 | B | C | E | Tape Reel |
| - | 2SD1060AG-x-AB3-R | SOT-89 | B | C | E | Tape Reel |
| 2SD1060L-x-TA3-T | 2SD1060G-x-TA3-T | TO-220 | B | C | E | Tube |
| 2SD1060L-x-TF3-T | 2SD1060G-x-TF3-T | TO-220F | B | C | E | Tube |
| 2SD1060L-x-TF1-T | 2SD1060G-x-TF1-T | TO-220F1 | B | C | E | Tube |
| 2SD1060L-x-TF2-T | 2SD1060G-x-TF2-T | TO-220F2 | B | C | E | Tube |
| 2SD1060L-x-TM3-T | 2SD1060G-x-TM3-T | TO-251 | B | C | E | Tube |
| 2SD1060L-x-TN3-R | 2SD1060G-x-TN3-R | TO-252 | B | C | E | Tape Reel |
| 2SD1060L-x-T60-K | 2SD1060G-x-T60-K | TO-126 | B | C | E | Bulk |
| 2SD1060L-x-T92-B | 2SD1060G-x-T92-B | TO-92 | E | C | B | Tape Box |
| 2SD1060L-x-T92-K | 2SD1060G-x-T92-K | TO-92 | E | C | B | Bulk |

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

| | |
|--|--|
| <p>2SD1060G-x-AB3-R</p> <p>(1)Packing Type (2)Package Type (3)Rank (4)Green Package</p> | <p>(1)B: Tape Box, K: Bulk, R: Tape Reel, T: Tube (2) AB3: SOT-89, TA3: TO-220, TF3: TO-220F TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252, T60: TO-126, T92: TO-92 (3) x: refer to Classification of h_{FE1} (4) L: Lead Free, G: Halogen Free and Lead Free</p> |
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2SD1060/A

NPN SILICON TRANSISTOR

MARKING

| PACKAGE | | MARKING | |
|-------------------------------|------------------------------|--|--------------------|
| | | 2SD1060 | 2SD1060A |
| SOT-89 | | <p>→ Date Code</p> | <p>→ Date Code</p> |
| TO-220 TO-220F TO-220F1 | TO-220F2 TO-251 TO-252 | <p>Lot Code ←</p> <p>→ L: Lead Free → G: Halogen Free → Data Code</p> <p>1</p> | - |
| TO-126 | | <p>→ Data Code → L: Lead Free → G: Halogen Free</p> <p>1</p> | - |
| TO-92 | | <p>→ L: Lead Free → G: Halogen Free → Data Code</p> <p>1</p> | - |

2SD1060/A

NPN SILICON TRANSISTOR

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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|------------------------------|-------------------|-----------|------------|------------------|
| Collector to Base Voltage | 2SD1060 | V_{CB0} | 60 | V |
| | 2SD1060A | | 100 | V |
| Collector to Emitter Voltage | | V_{CEO} | 50 | V |
| Emitter to Base Voltage | | V_{EBO} | 6 | V |
| Collector Current | | I_C | 5 | A |
| Collector Current (Pulse) | | I_{CP} | 9 | A |
| Collector Dissipation | SOT-89 | P_C | 500 | mW |
| | TO-220/TO-220F | | 2 | W |
| | TO-220F1/TO-220F2 | | | |
| | TO-126/TO-251 | | 1 | W |
| | TO-252 | | | |
| TO-92 | 625 | mW | | |
| Junction Temperature | | T_J | +150 | $^\circ\text{C}$ |
| Storage Temperature | | T_{STG} | -40 ~ +150 | $^\circ\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

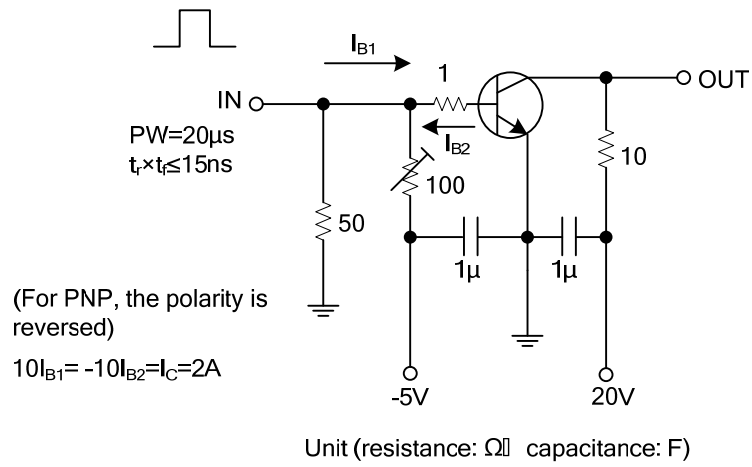
■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---------------|------------------------------------|----------|-----|-----|---------------|
| Collector-to-Base Breakdown Voltage | BV_{CB0} | $I_C=1\text{mA}, I_E=0$ | 2SD1060 | 60 | | V |
| | | | 2SD1060A | 100 | | V |
| Collector-to-Emitter Breakdown Voltage | BV_{CEO} | $I_C=1\text{mA}, R_{BE}=\infty$ | 50 | | | V |
| Emitter-to-Base Breakdown Voltage | BV_{EBO} | $I_C=0, I_E=1\text{mA}$ | 6 | | | V |
| Collector Cut-Off Current | I_{CBO} | $V_{CB}=40\text{V}, I_E=0$ | | | 0.1 | mA |
| Emitter Cut-Off Current | I_{EBO} | $V_{EB}=4\text{V}, I_C=0$ | | | 0.1 | mA |
| DC Current Gain | h_{FE1} | $V_{CE}=2\text{V}, I_C=1\text{A}$ | 70 | | 360 | |
| | h_{FE2} | $V_{CE}=2\text{V}, I_C=3\text{A}$ | 30 | | | |
| Gain Bandwidth Product | f_T | $V_{CE}=5\text{V}, I_C=1\text{A}$ | | 30 | | MHZ |
| Output Capacitance | C_{ob} | $V_{CB}=10\text{V}, f=1\text{MHz}$ | | 100 | | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C=3\text{A}, I_B=0.3\text{A}$ | | | 0.4 | V |
| Turn-ON Time | t_{ON} | See specified test circuit | | 0.1 | | μs |
| Storage Time | t_{STG} | See specified test circuit | | 1.4 | | μs |
| Fall Time | t_F | See specified test circuit | | 0.2 | | μs |

■ CLASSIFICATION of h_{FE1}

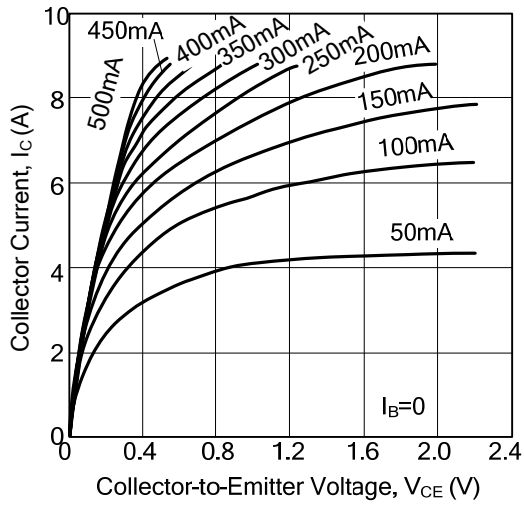
| RANK | Q | R | S |
|-------|--------|---------|---------|
| RANGE | 70-140 | 100-200 | 180-360 |

SWITCHING TIME TEST CIRCUIT

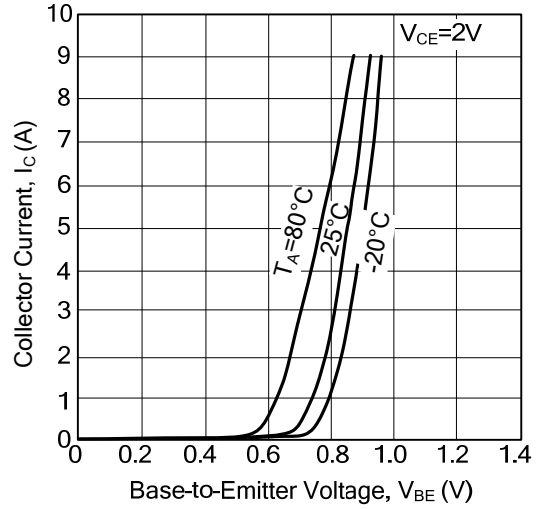


TYPICAL CHARACTERISTICS

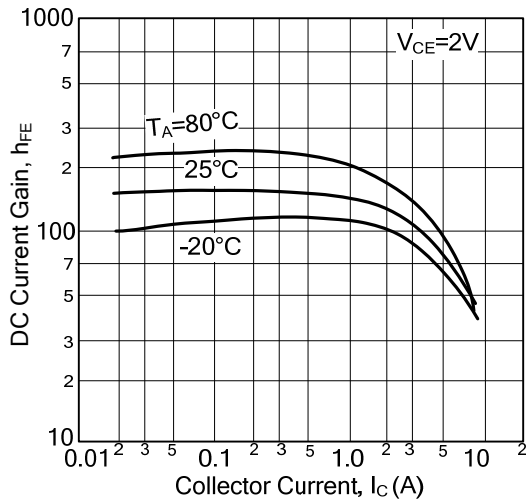
Collector Current vs. Collector-to-Emitter Voltage



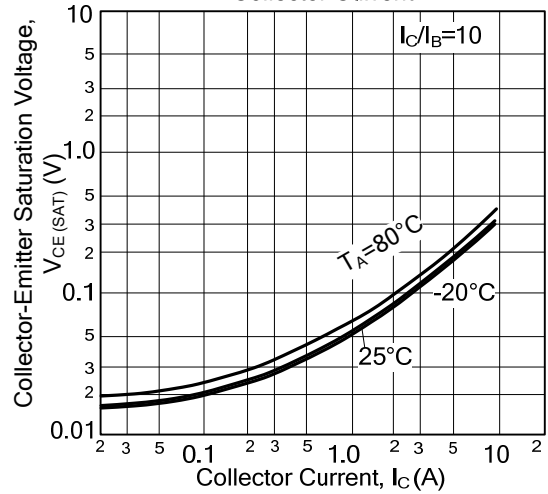
Collector Current vs. Base-to-Emitter Voltage



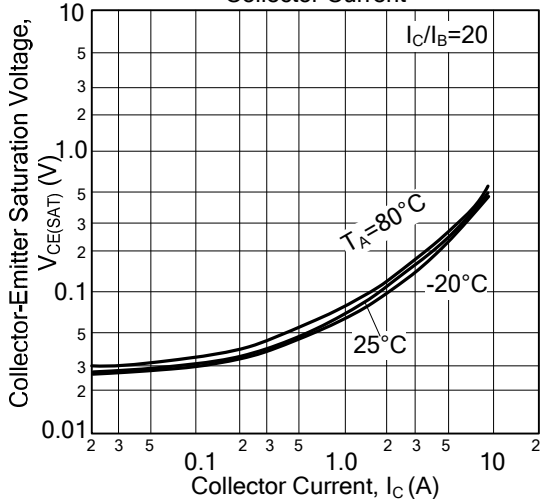
DC Current Gain vs. Collector Current



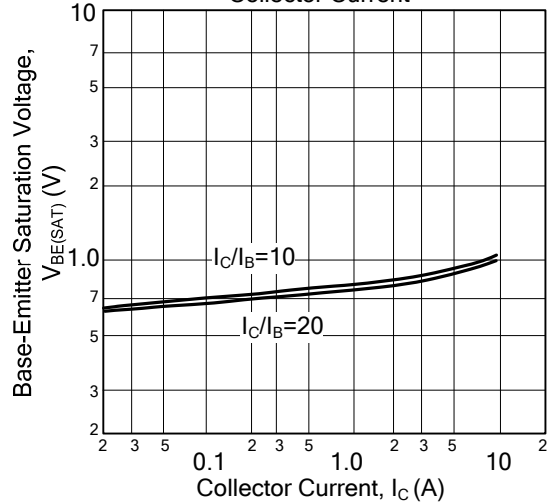
Collector-Emitter Saturation Voltage vs. Collector Current



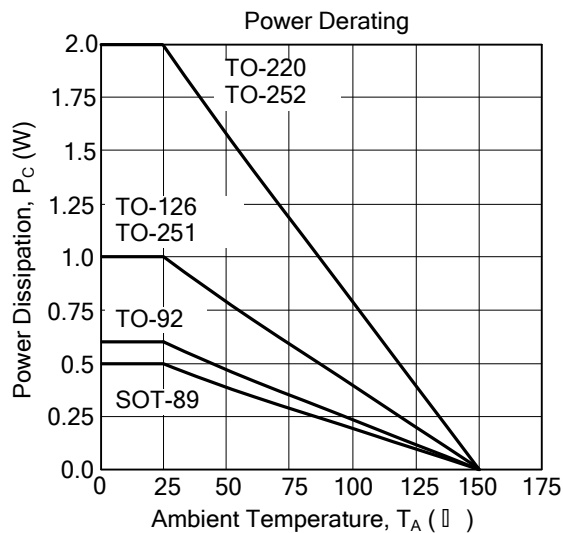
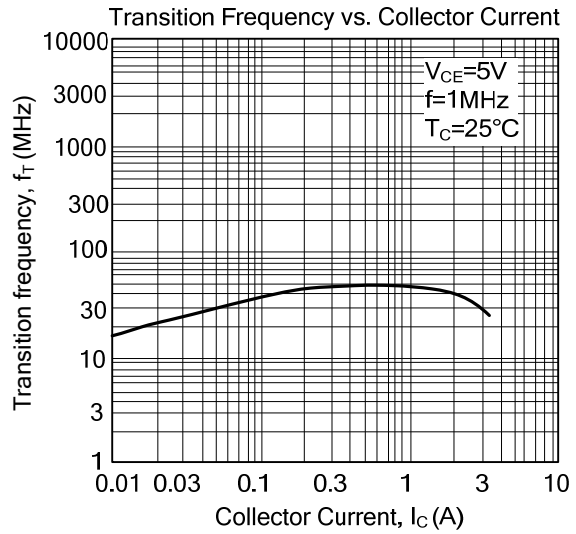
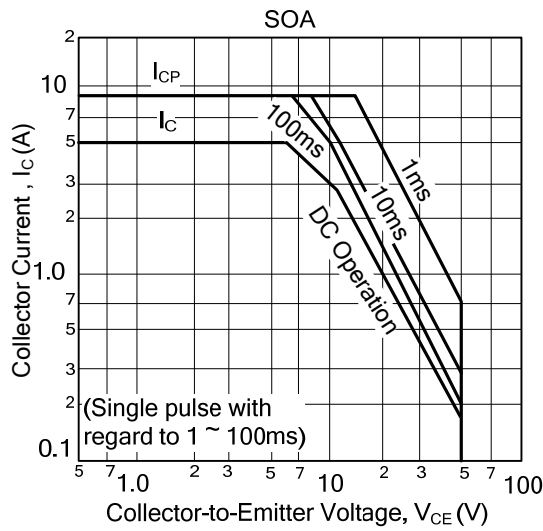
Collector-Emitter Saturation Voltage vs. Collector Current



Base-Emitter Saturation Voltage vs. Collector Current



■ TYPICAL CHARACTERISTICS(Cont.)



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