To our customers,

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Renesas Electronics Corporation

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# SILICON TRANSISTOR
# GA4xxx

## RESISTOR BUILT-IN TYPE NPN TRANSISTOR

### FEATURES

- Compact package
- Resistors built-in type
- Complementary to GN4xxx

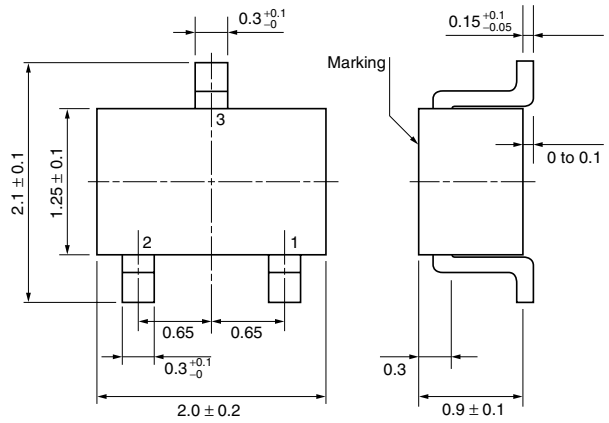
### ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|---|---|
| GA4xxx | SC-70 |

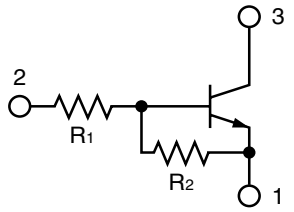
### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C)

| | | | | |
|---|---|---|---|---|
| | Collector to Base Voltage | $V_{CBO}$ | 60 | V |
| | Collector to Emitter Voltage | $V_{CEO}$ | 50 | V |
| <R> | Emitter to Base Voltage | $V_{EBO}$ | **Note1** | V |
| | Collector Current (DC) | $I_C$ | 0.1 | A |
| | Collector Current (pulse) **Note2** | $I_{C(pulse)}$ | 0.2 | A |
| <R> | Total Power Dissipation | $P_T$ | 0.15 | W |
| | Junction Temperature | $T_j$ | 150 | °C |
| | Storage Temperature | $T_{stg}$ | –55 to +150 | °C |

### PACKAGE DRAWING (Unit: mm)




### EQUIVALENT CIRCUIT




### PIN CONNECTION

1: Emitter
2: Base
3: Collector

<R> **Note 1.**

| PART NUMBER | $V_{EBO}$ (V) | MARK | $R_1$ (kΩ) | $R_2$ (kΩ) |
|---|---|---|---|---|
| GA4A4M | 10 | AA1 | 10.0 | 10.0 |
| GA4F4M | 10 | AB1 | 22.0 | 22.0 |
| GA4L4M | 10 | AC1 | 47.0 | 47.0 |
| GA4L3M | 10 | AD1 | 4.7 | 4.7 |
| GA4L3N | 5 | AE1 | 4.7 | 10.0 |
| GA4L3Z | 5 | AF1 | 4.7 | |
| GA4A3Q | 5 | AG1 | 1.0 | 10.0 |
| GA4A4P | 5 | AH1 | 10.0 | 47.0 |
| GA4F4N | 5 | AJ1 | 22.0 | 47.0 |

| PART NUMBER | $V_{EBO}$ (V) | MARK | $R_1$ (kΩ) | $R_2$ (kΩ) |
|---|---|---|---|---|
| GA4L4L | 15 | AK1 | 47.0 | 22.0 |
| GA4A4Z | 5 | AL1 | 10.0 | |
| GA4F4Z | 5 | AM1 | 22.0 | |
| GA4L4Z | 5 | AN1 | 47.0 | |
| GA4F3M | 10 | AP1 | 2.2 | 2.2 |
| GA4F3P | 5 | AQ1 | 2.2 | 10.0 |
| GA4F3R | 5 | AR1 | 2.2 | 47.0 |
| GA4A4L | 15 | AS1 | 10.0 | 4.7 |
| GA4L4K | 25 | AT1 | 47.0 | 10.0 |

**Note 2.** PW ≤ 10 ms, Duty Cycle ≤ 50%



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**The mark <R> shows major revised points.**
**The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.**

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$ = 50 V, $I_E$ = 0 | | | 100 | nA |
| DC Current Gain | $h_{FE1}$ | $V_{CE}$ = 5.0 V, $I_C$ = 5.0 mA | **Note1** | | | - |
| | $h_{FE2}$ | $V_{CE}$ = 5.0 V, $I_C$ = 50 mA | | | | - |
| Collector Saturation Voltage | $V_{CE(sat)}$ | $I_C$ = 5.0 mA, $I_B$ = 0.25 mA | | | 0.2 | V |
| Low-level Input Voltage | $V_{IL}$ | $V_{CE}$ = 5.0 V, $I_C$ = 100 $\mu$A | **Note2** | | | V |
| High-level Input Voltage | $V_{IH}$ | $V_{CE}$ = 0.2 V, $I_C$ = 5.0 mA | | | | V |
| Input Resistor | $R_1$ | | **Note3** | | | kΩ |
| Emitter to Base Resistor | $R_2$ | | | | | kΩ |

**Note 1.**

| PART NUMBER | $h_{FE1}$ | | | $h_{FE2}$ | | | UNIT |
|---|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| GA4A4M | 35 | | 100 | 80 | | | - |
| GA4F4M | 60 | | 195 | 90 | | | - |
| GA4L4M | 85 | | 340 | 95 | | | - |
| GA4L3M | 20 | | 80 | 80 | | | - |
| GA4L3N | 35 | | 100 | 80 | | | - |
| GA4L3Z | 135 | | 600 | 100 | | | - |
| GA4A3Q | 35 | | 100 | 80 | | | - |
| GA4A4P | 85 | | 340 | 95 | | | - |
| GA4F4N | 85 | | 340 | 95 | | | - |
| GA4L4L | 60 | | 195 | 90 | | | - |
| GA4A4Z | 135 | | 600 | 100 | | | - |
| GA4F4Z | 135 | | 600 | 100 | | | - |
| GA4L4Z | 135 | | 600 | 100 | | | - |
| GA4F3M | 8 | | 50 | 50 | | | - |
| GA4F3P | 35 | | 100 | 80 | | | - |
| GA4F3R | 85 | | 340 | 95 | | | - |
| GA4A4L | 20 | | 80 | 80 | | | - |
| GA4L4K | 35 | | 100 | 80 | | | - |

**Note 2.**

| PART NUMBER | $V_{IL}$ | | | $V_{IH}$ | | | UNIT |
|---|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| GA4A4M | | | 0.8 | 3.0 | | | V |
| GA4F4M | | | 0.8 | 4.0 | | | V |
| GA4L4M | | | 0.8 | 5.0 | | | V |
| GA4L3M | | | 0.8 | 3.0 | | | V |
| GA4L3N | | | 0.6 | 3.0 | | | V |
| GA4L3Z | | | 0.5 | 1.2 | | | V |
| GA4A3Q | | | 0.5 | 2.0 | | | V |
| GA4A4P | | | 0.5 | 3.0 | | | V |
| GA4F4N | | | 0.6 | 3.0 | | | V |
| GA4L4L | | | 0.9 | 6.0 | | | V |
| GA4A4Z | | | 0.5 | 2.0 | | | V |
| GA4F4Z | | | 0.5 | 3.0 | | | V |
| GA4L4Z | | | 0.5 | 4.0 | | | V |
| GA4F3M | | | 0.8 | 3.0 | | | V |
| GA4F3P | | | 0.5 | 2.0 | | | V |
| GA4F3R | | | 0.5 | 2.0 | | | V |
| GA4A4L | | | 0.9 | 6.0 | | | V |
| GA4L4K | | | 2.0 | 8.0 | | | V |

**Note 3.**

| PART NUMBER | $R_1$ | | | $R_2$ | | | UNIT |
|---|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| GA4A4M | 7.00 | 10.00 | 13.00 | 7.00 | 10.00 | 13.00 | kΩ |
| GA4F4M | 15.40 | 22.00 | 28.60 | 15.40 | 22.00 | 28.60 | kΩ |
| GA4L4M | 32.90 | 47.00 | 61.10 | 32.90 | 47.00 | 61.10 | kΩ |
| GA4L3M | 3.29 | 4.70 | 6.11 | 3.29 | 4.70 | 6.11 | kΩ |
| GA4L3N | 3.29 | 4.70 | 6.11 | 7.00 | 10.00 | 13.00 | kΩ |
| GA4L3Z | 3.29 | 4.70 | 6.11 | | | | kΩ |
| GA4A3Q | 0.70 | 1.00 | 1.30 | 7.00 | 10.00 | 13.00 | kΩ |
| GA4A4P | 7.00 | 10.00 | 13.00 | 32.90 | 47.00 | 61.10 | kΩ |
| GA4F4N | 15.40 | 22.00 | 28.60 | 32.90 | 47.00 | 61.10 | kΩ |
| GA4L4L | 32.90 | 47.00 | 61.10 | 15.40 | 22.00 | 28.60 | kΩ |
| GA4A4Z | 7.00 | 10.00 | 13.00 | | | | kΩ |
| GA4F4Z | 15.40 | 22.00 | 28.60 | | | | kΩ |
| GA4L4Z | 32.90 | 47.00 | 61.10 | | | | kΩ |
| GA4F3M | 1.54 | 2.20 | 2.86 | 1.54 | 2.20 | 2.86 | kΩ |
| GA4F3P | 1.54 | 2.20 | 2.86 | 7.00 | 10.00 | 13.00 | kΩ |
| GA4F3R | 1.54 | 2.20 | 2.86 | 32.90 | 47.00 | 61.10 | kΩ |
| GA4A4L | 7.00 | 10.00 | 13.00 | 3.29 | 4.70 | 6.11 | kΩ |
| GA4L4K | 32.90 | 47.00 | 61.10 | 7.00 | 10.00 | 13.00 | kΩ |

TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE