# CR04AM-12A

## Thyristor
## Low Power Use

R07DS0636EJ0100
Rev.1.00
Jan 16, 2012

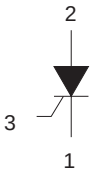
### Features

- $I_{T\,(AV)}$ : 0.4 A
- $V_{DRM}$ : 600 V
- $I_{GT}$: 100 μA
- Planar Type

### Outline

RENESAS Package code: PRSS0003EA-A (Package name: TO-92*)


PRSS0003DE-A (Package name: TO-92(3))


1. Cathode
2. Anode
3. Gate

### Applications

Solid state relay, igniter, strobe flasher, circuit breaker, and general purpose control applications

### Maximum Ratings

| Parameter | Symbol | Voltage class | Unit |
|---|---|---|---|
| | | 12 | |
| Repetitive peak reverse voltage | $V_{RRM}$ | 600 | V |
| Non-repetitive peak reverse voltage | $V_{RSM}$ | 720 | V |
| DC reverse voltage | $V_{R(DC)}$ | 480 | V |
| Repetitive peak off-state voltage Note1 | $V_{DRM}$ | 600 | V |
| DC off-state voltage Note1 | $V_{D(DC)}$ | 480 | V |

Notes: 1. With gate to cathode resistance $R_{GK}$=1 kΩ

| Parameter | Symbol | Ratings | Unit | Conditions |
|---|---|---|---|---|
| RMS on-state current | $I_{T(RMS)}$ | 0.63 | A | |
| Average on-state current | $I_{T(AV)}$ | 0.4 | A | Commercial frequency, sine half wave 180° conduction, Ta=54°C |
| Surge on-state current | $I_{TSM}$ | 10 | A | 60Hz sine half wave, 1full cycle, peak value, non-repetitive |
| $I^2t$ for fusing | $I^2t$ | 0.4 | $A^2s$ | Value corresponding to 1cycle of half wave 60Hz, surge on-state current |
| Peak gate power dissipation | $P_{GM}$ | 0.5 | W | |
| Average gate power dissipation | $P_{G(AV)}$ | 0.1 | W | |
| Peak gate forward voltage | $V_{FGM}$ | 6 | V | |
| Peak gate reverse voltage | $V_{RGM}$ | 6 | V | |
| Peak gate forward current | $I_{FGM}$ | 0.3 | A | |
| Junction temperature | Tj | – 40 to +125 | °C | |
| Storage temperature | Tstg | – 40 to +125 | °C | |
| Mass | — | 0.23 | g | Typical value |

## Electrical Characteristics

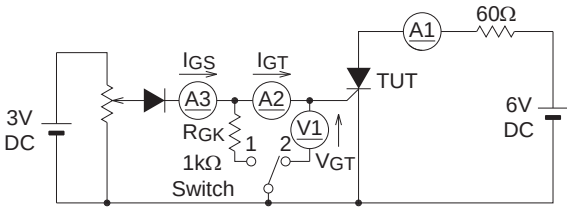
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test conditions |
|---|---|---|---|---|---|---|
| Repetitive peak reverse current | $I_{RRM}$ | — | — | 0.5 | mA | Tj = 125°C, $V_{RRM}$ applied |
| Repetitive peak off-state current | $I_{DRM}$ | — | — | 0.5 | mA | Tj = 125°C, $V_{DRM}$ applied $R_{GK}$=1 kΩ |
| On-state voltage | $V_{TM}$ | — | — | 1.2 | V | Tj = 25°C, $I_{TM}$ = 1.2 A instantaneous value |
| Gate trigger voltage | $V_{GT}$ | — | — | 0.8 | V | Tj = 25°C, $V_D$ = 6 V, $I_T$ = 0.1 A Note3 |
| Gate non-trigger voltage | $V_{GD}$ | 0.2 | — | — | V | Tj = 125°C, $V_D$ = 1/2 $V_{DRM}$ $R_{GK}$=1 KΩ |
| Gate trigger current | $I_{GT}$ | 1 Note2 | — | 100 Note2 | μA | Tj = 25°C, $V_D$ = 6 V, $I_T$ = 0.1 A Note3 |
| Holding current | $I_H$ | — | 1.5 | 3 | mA | Tj = 25°C, $V_D$ = 12 V, $R_{GK}$=1 kΩ |
| Thermal resistance | $R_{th(j-a)}$ | — | — | 150 | °C/W | Junction to ambient |

Notes: 2. If special values of $I_{GT}$ are required, choose item D or E from those listed in the table below if possible.

| Item | A | B | C | D | E |
|---|---|---|---|---|---|
| $I_{GT}$ (μA) | 1 to 30 | 20 to 50 | 40 to 100 | 1 to 50 | 20 to 100 |

The above values do not include the current flowing through the 1 kΩ resistance between the gate and cathode.

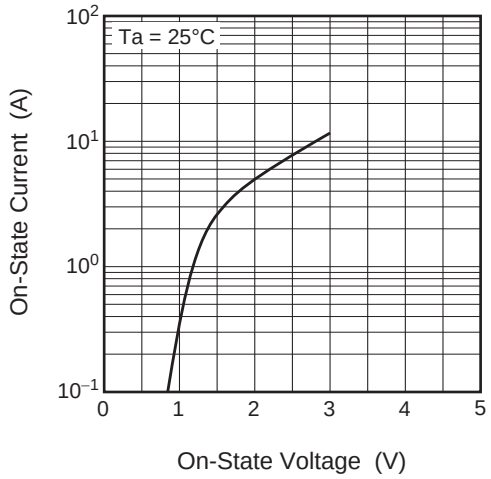
3. $I_{GT}$, $V_{GT}$ measurement circuit.



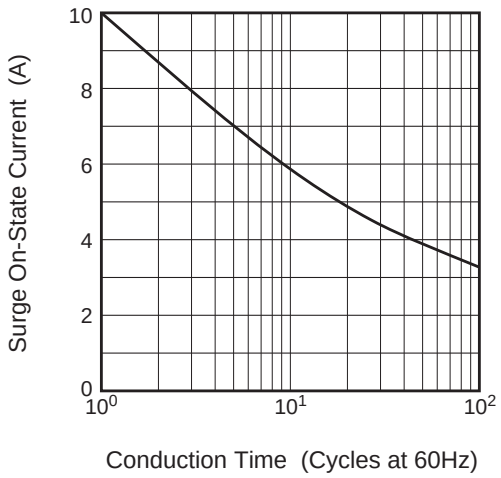

Switch 1 : $I_{GT}$ measurement
Switch 2 : $V_{GT}$ measurement
(Inner resistance of voltage meter is about 1kΩ)

## Performance Curves

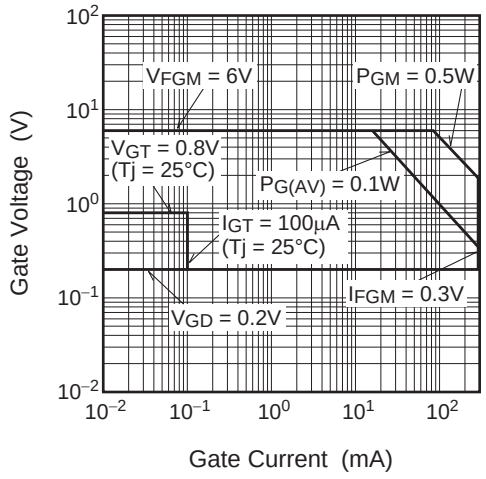
Maximum On-State Characteristics



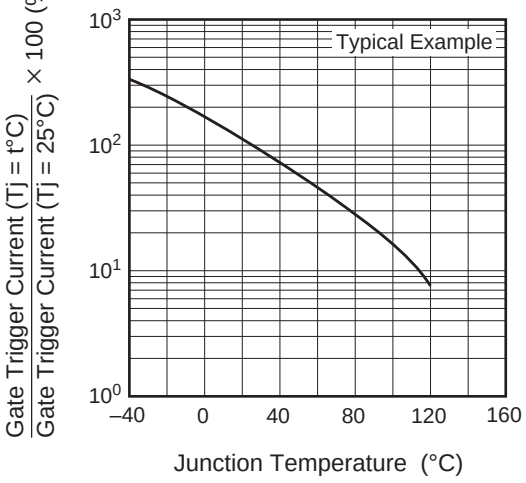

Rated Surge On-State Current



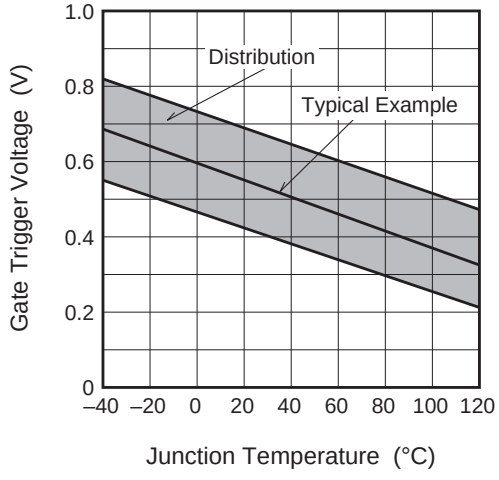

Gate Characteristics



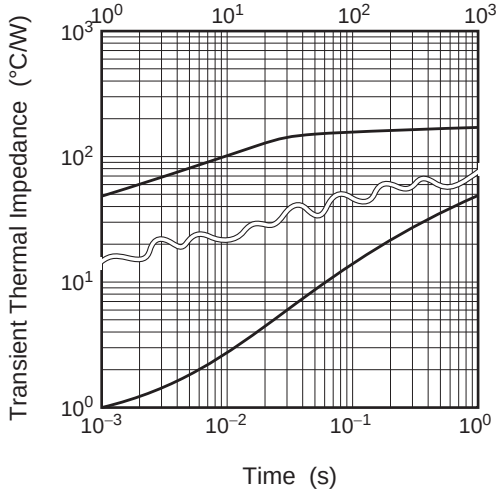

Gate Trigger Current vs. Junction Temperature



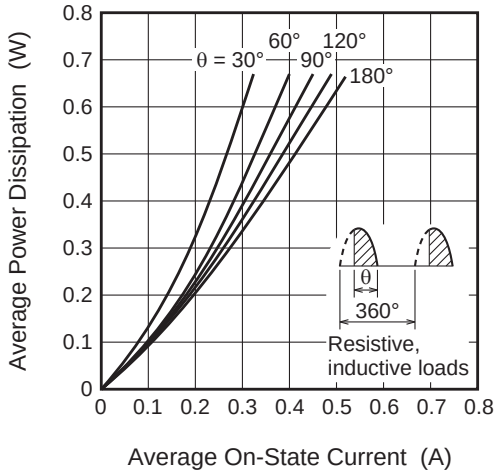

Gate Trigger Voltage vs. Junction Temperature



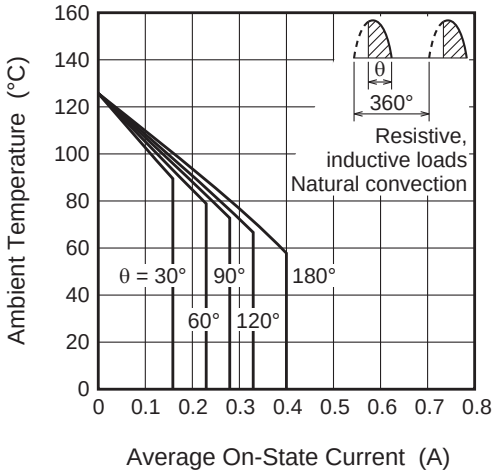

Maximum Transient Thermal Impedance Characteristics (Junction to ambient)



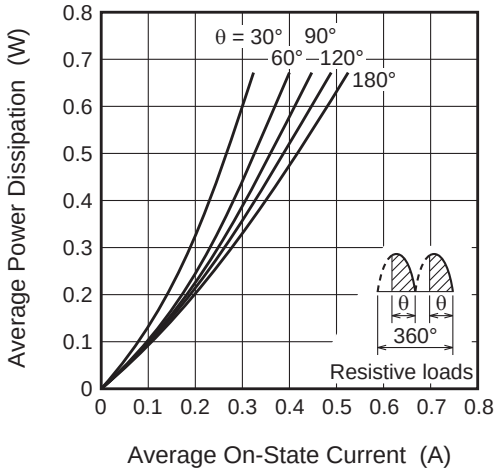
Maximum Average Power Dissipation
(Single-Phase Half Wave)



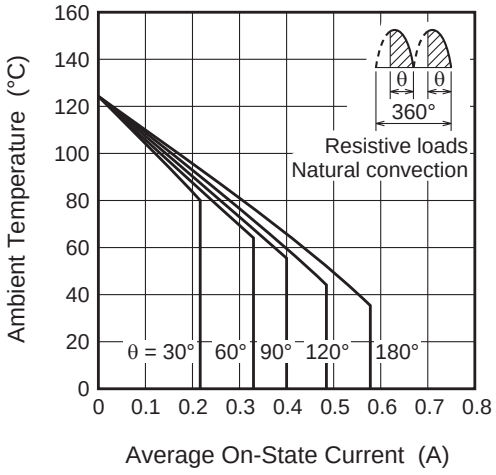

Allowable Ambient Temperature vs.
Average On-State Current
(Single-Phase Half Wave)



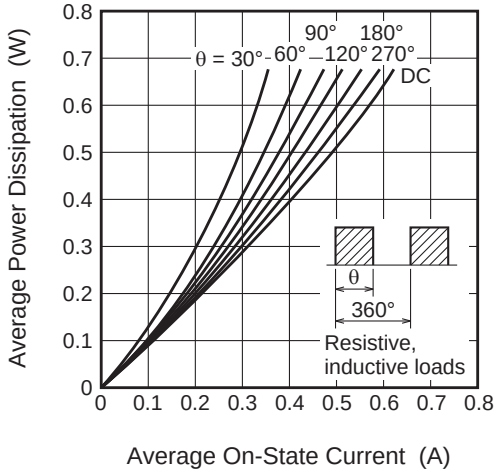

Maximum Average Power Dissipation
(Single-Phase Full Wave)



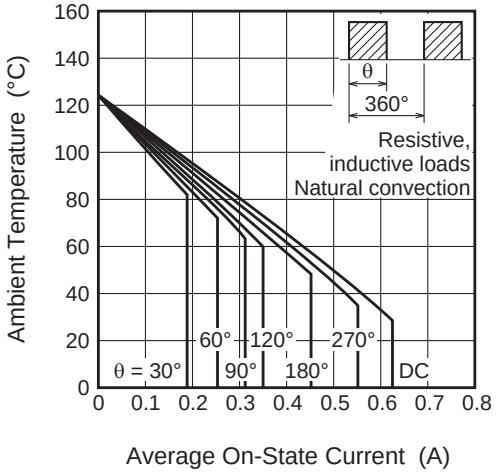

Allowable Ambient Temperature vs.
Average On-State Current
(Single-Phase Full Wave)



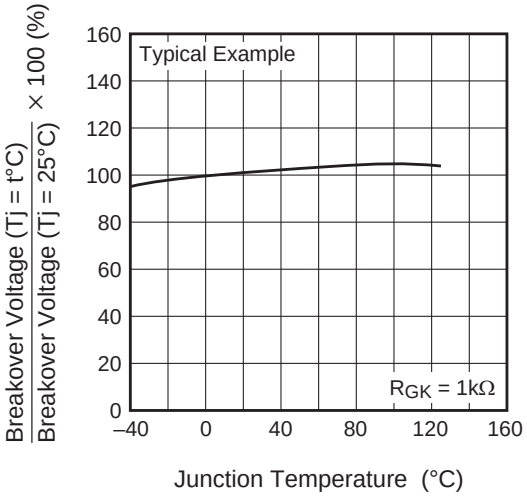

Maximum Average Power Dissipation
(Rectangular Wave)



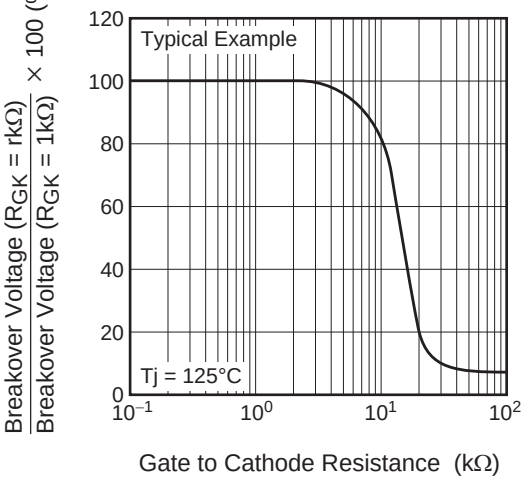

Allowable Ambient Temperature vs.
Average On-State Current
(Rectangular Wave)



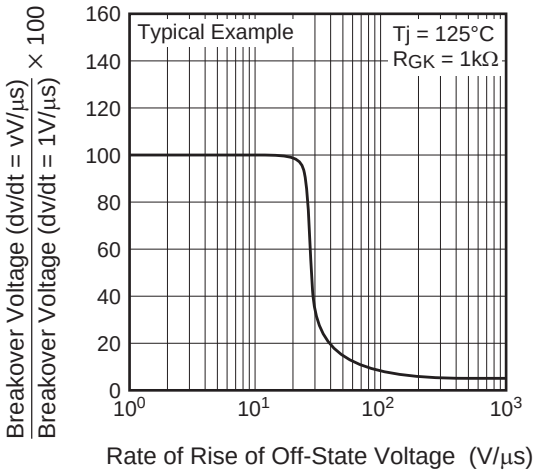
Breakover Voltage vs.
Junction Temperature



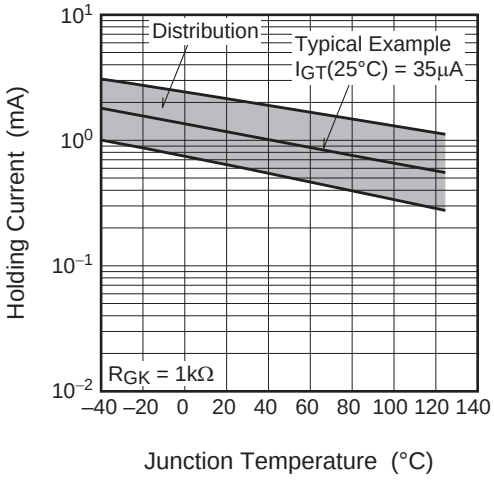

Breakover Voltage vs.
Gate to Cathode Resistance



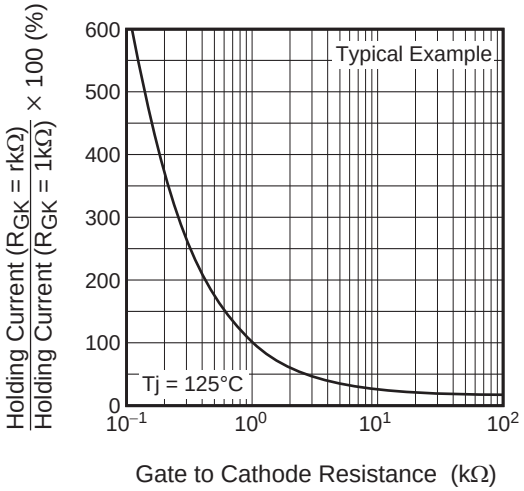

Breakover Voltage vs.
Rate of Rise of Off-State Voltage



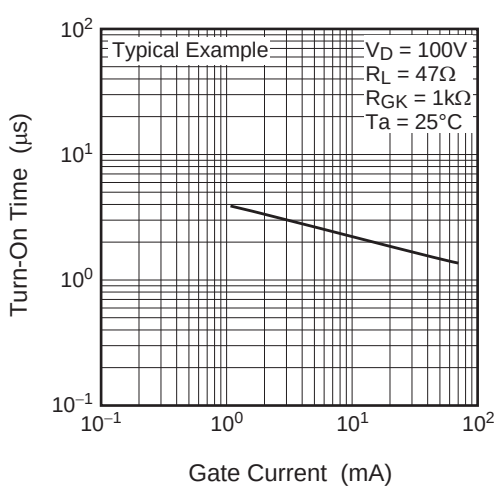

Holding Current vs.
Junction Temperature



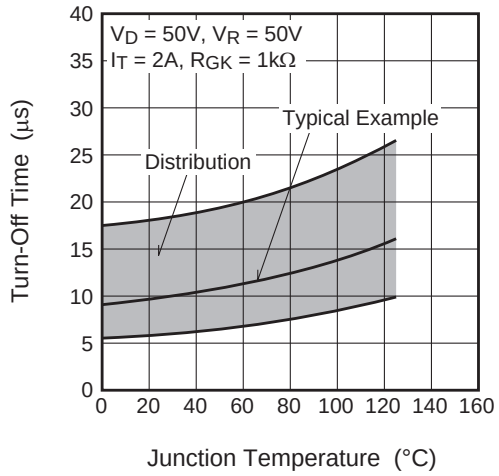

Holding Current vs.
Gate to Cathode Resistance



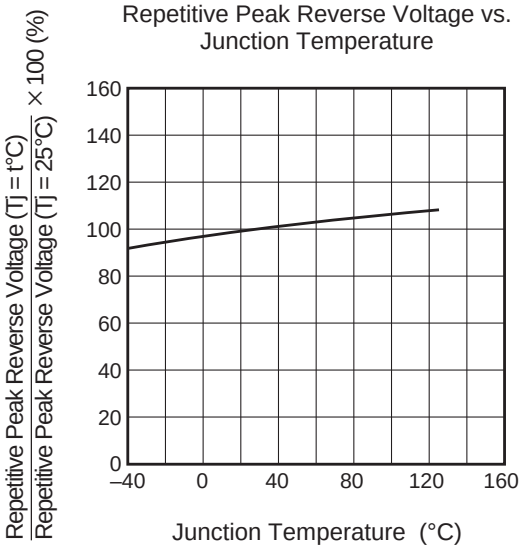

Turn-On Time vs.
Gate Current



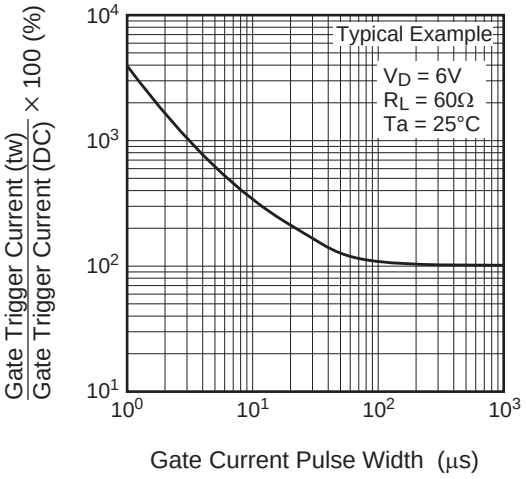
Turn-Off Time vs.
Junction Temperature




Repetitive Peak Reverse Voltage vs.
Junction Temperature



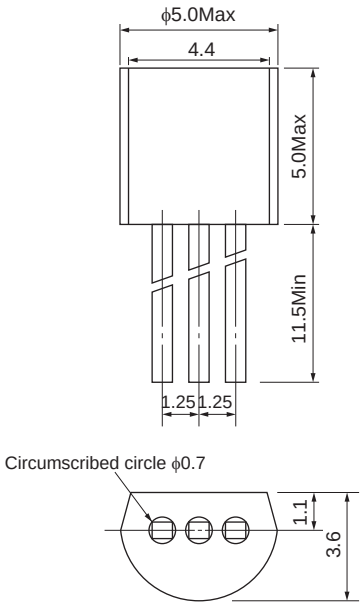

Gate Trigger Current vs.
Gate Current Pulse Width



## Package dimensions

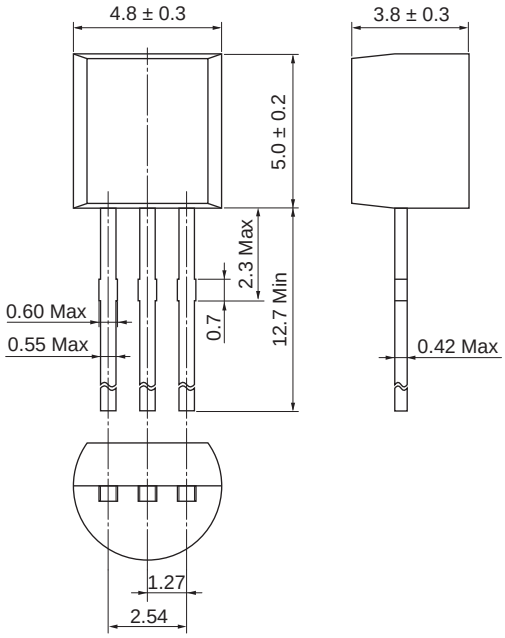
| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|---|
| TO-92* | SC-43A | PRSS0003EA-A | T920 | 0.23g |

Unit: mm




| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|---|
| TO-92(3) | SC-43A | PRSS0003DE-A | TO-92(3)/TO-92(3)V | 0.23g |

Unit: mm



## Ordering Information

| Orderable Part Number | Packing | Quantity | Remark |
|---|---|---|---|
| CR04AM-12A#B00 | Bag | 500 pcs. | Straight Type, TO-92* |
| CR04AM-12A-B#B00 | Bag | 500 pcs. | Straight Type, TO-92*, $I_{GT}$ item:B |
| CR04AM-12A-A6#B00 | Bag | 500 pcs. | A6 Lead form, TO-92* |
| CR04AM-12A-BA6#B00 | Bag | 500 pcs. | A6 Lead form, TO-92*, $I_{GT}$ item:B |
| CR04AM-12A-TB#B00 | Adhesive Tape | 2000 pcs. | A8 Lead form, TO-92* |
| CR04AM-12A-BTB#B00 | Adhesive Tape | 2000 pcs. | A8 Lead form, TO-92*, $I_{GT}$ item:B |
| CR04AM-12A#B10 | Bag | 500 pcs. | Straight Type, TO-92(3) |
| CR04AM-12A-B#B10 | Bag | 500 pcs. | Straight Type, TO-92(3), $I_{GT}$ item:B |

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