

# RJK0603DPN-A0

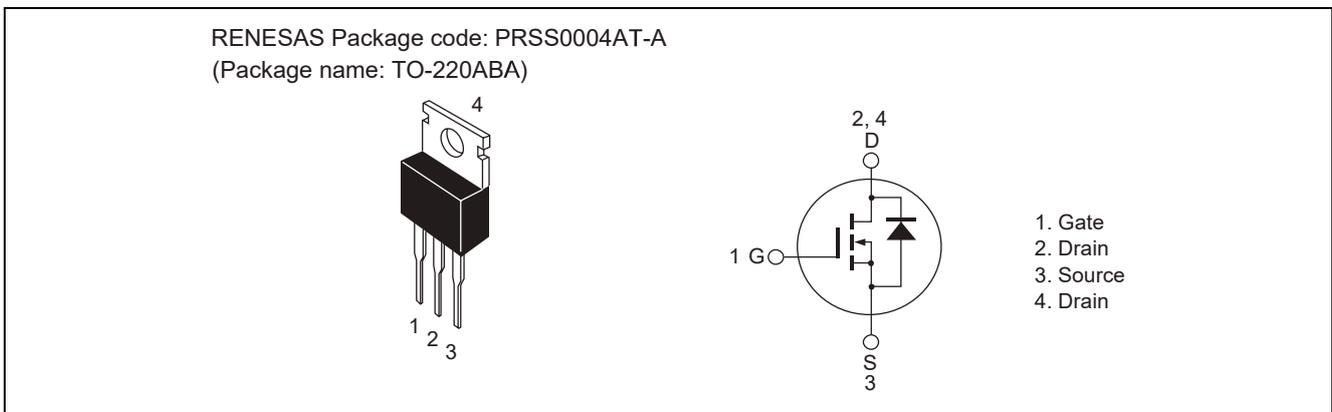
N-Channel MOSFET  
60 V, 80 A, 5.2 mΩ

R07DS1447EJ0101  
Rev.1.01  
2020.1.9

## Features

- High speed switching
- Low drive current
- Low on-resistance  $R_{DS(on)} = 4.1 \text{ m}\Omega$  typ. (at  $V_{GS} = 10 \text{ V}$ )
- Package TO-220ABA
- Quality Grade : Standard

## Outline



## Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

| Item                                   | Symbol                          | Ratings     | Unit             |
|--|---------------------------------|-------------|------------------|
| Drain to source voltage                | $V_{DSS}$                       | 60          | V                |
| Gate to source voltage                 | $V_{GSS}$                       | $\pm 20$    | V                |
| Drain current                          | $I_D$ <sup>Note1</sup>          | 80          | A                |
| Drain peak current                     | $I_{D(pulse)}$ <sup>Note2</sup> | 240         | A                |
| Body-drain diode reverse drain current | $I_{DR}$                        | 80          | A                |
| Avalanche current                      | $I_{AP}$ <sup>Note3</sup>       | 40          | A                |
| Avalanche energy                       | $E_{AS}$ <sup>Note3</sup>       | 120         | mJ               |
| Channel dissipation                    | $P_{ch}$ <sup>Note1</sup>       | 125         | W                |
| Channel temperature                    | $T_{ch}$                        | 150         | $^\circ\text{C}$ |
| Storage temperature                    | $T_{stg}$                       | -55 to +150 | $^\circ\text{C}$ |

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it is within the absolute maximum ratings. Please consider derating condition for appropriate reliability in reference Renesas Semiconductor Reliability Handbook (Recommendation for Handling and Usage of Semiconductor Devices) and individual reliability data.

Notes: 1.  $T_c = 25^\circ\text{C}$

2.  $PW \leq 10 \mu\text{s}$ , duty cycle  $\leq 1\%$

3. Value at  $L = 100 \mu\text{H}$ ,  $T_{ch} = 25^\circ\text{C}$ ,  $R_g \geq 50\Omega$ ,

## Thermal Impedance

| Item                              | Symbol          | Max. Value <sup>Note4</sup> | Unit                        |
|-----------------------------------|-----------------|-----------------------------|-----------------------------|
| Channel to case thermal impedance | $\theta_{ch-c}$ | 1.0                         | $^{\circ}\text{C}/\text{W}$ |

Notes: 4. This data is the designed target maximum value on Renesas's measurement condition. (Not tested)

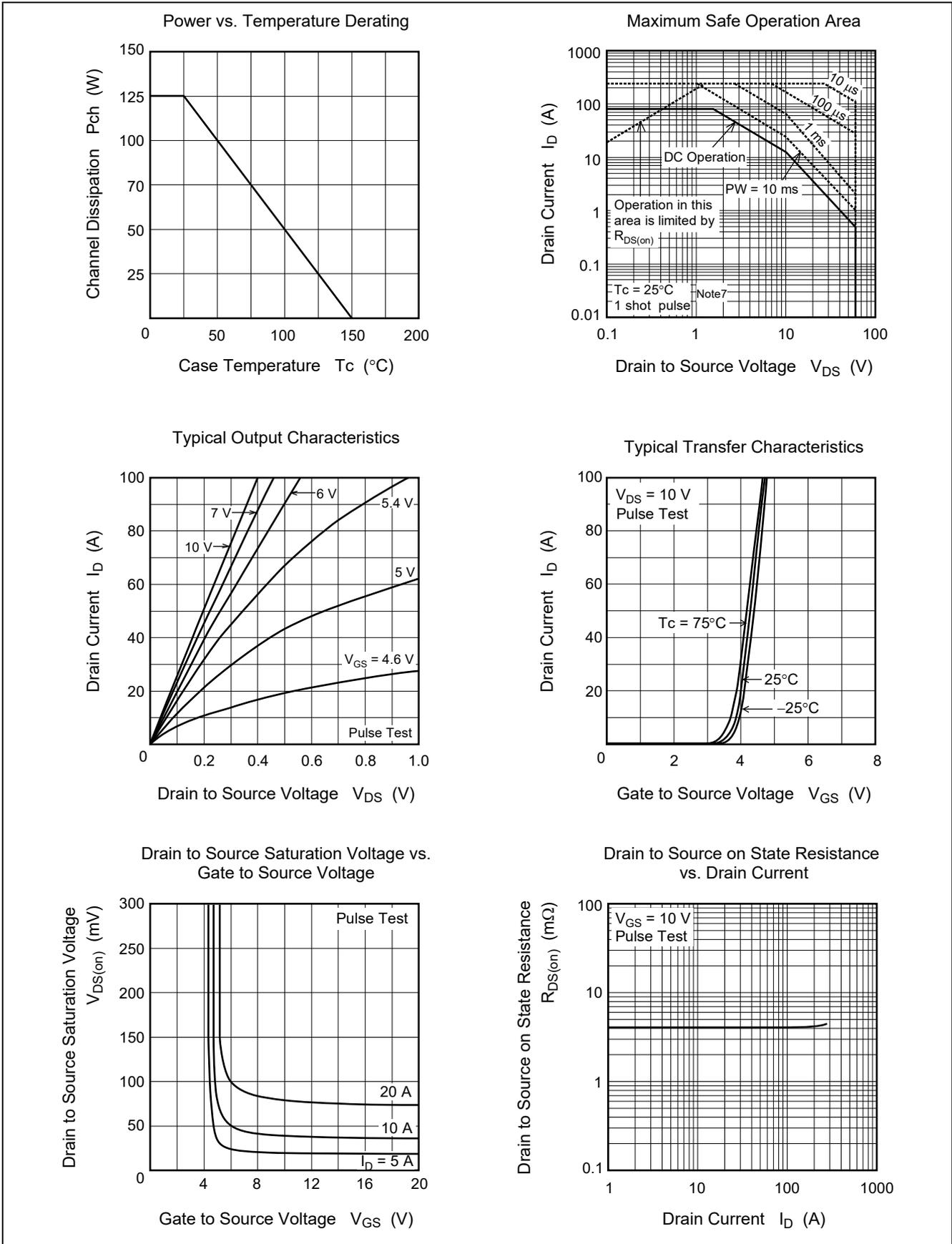
## Electrical Characteristics

( $T_a = 25^{\circ}\text{C}$ )

| Item                                       | Symbol        | Min | Typ  | Max       | Unit             | Test conditions  |
|--|---------------|-----|------|-----------|------------------|--|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 60  | —    | —         | V                | $I_D = 10\text{mA}$ , $V_{GS} = 0$                                       |
| Gate to source leak current                | $I_{GSS}$     | —   | —    | $\pm 0.1$ | $\mu\text{A}$    | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0$                                 |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —    | 1         | $\mu\text{A}$    | $V_{DS} = 60\text{V}$ , $V_{GS} = 0$                                     |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 2.0 | —    | 4.0       | V                | $V_{DS} = 10\text{V}$ , $I_D = 1\text{mA}$                               |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 4.1  | 5.2       | $\text{m}\Omega$ | $I_D = 40\text{A}$ , $V_{GS} = 10\text{V}$ <sup>Note5</sup>              |
| Forward transfer admittance                | $ y_{fs} $    | —   | 80   | —         | S                | $I_D = 40\text{A}$ , $V_D = 10\text{V}$ <sup>Note5</sup>                 |
| Input capacitance                          | $C_{iss}$     | —   | 4150 | —         | pF               | $V_{DS} = 10\text{V}$  |
| Output capacitance                         | $C_{oss}$     | —   | 950  | —         | pF               | $V_{GS} = 0$   |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 230  | —         | pF               | $f = 1\text{MHz}$  |
| Gate Resistance                            | $R_g$         | —   | 1.6  | —         | $\Omega$         |  |
| Total gate charge                          | $Q_g$         | —   | 57   | —         | nC               | $V_{DD} = 25\text{V}$  |
| Gate to source charge                      | $Q_{gs}$      | —   | 20   | —         | nC               | $V_{GS} = 10\text{V}$ ,  |
| Gate to drain charge                       | $Q_{gd}$      | —   | 10   | —         | nC               | $I_D = 40\text{A}$   |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 30   | —         | ns               | $V_{GS} = 10\text{V}$  |
| Rise time                                  | $t_r$         | —   | 12   | —         | ns               | $I_D = 40\text{A}$   |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 60   | —         | ns               | $V_{DD} \cong 30\text{V}$  |
| Fall time                                  | $t_f$         | —   | 13   | —         | ns               | $R_g = 4.7\Omega$  |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.85 | 1.5       | V                | $I_F = 80\text{A}$ , $V_{GS} = 0$ <sup>Note5</sup>                       |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 50   | —         | ns               | $I_F = 80\text{A}$ , $V_{GS} = 0$<br>$di_F/dt = 100\text{A}/\mu\text{s}$ |

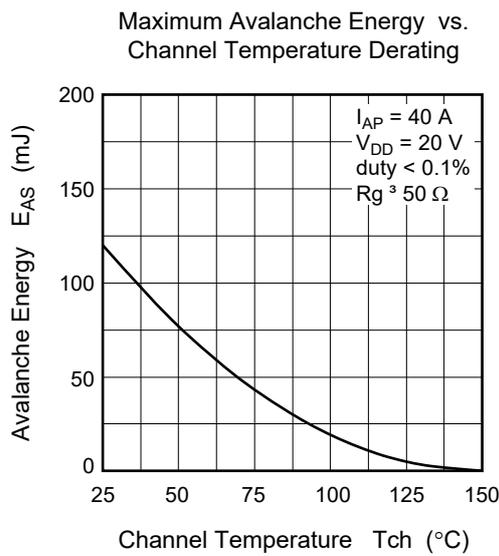
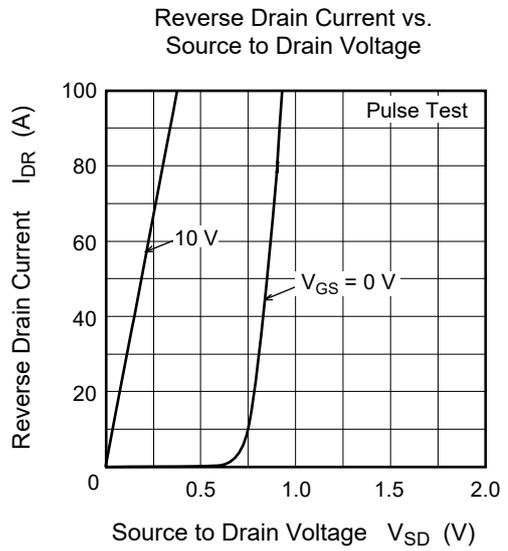
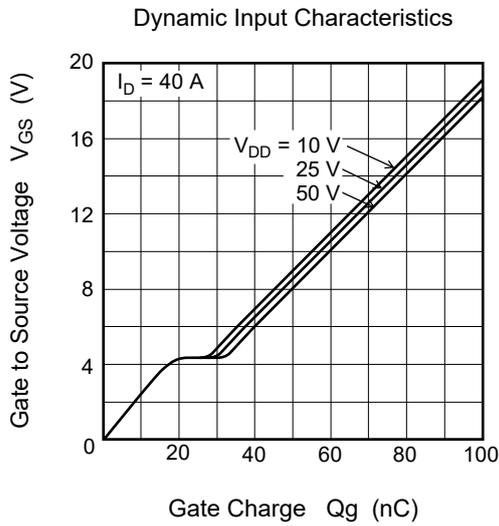
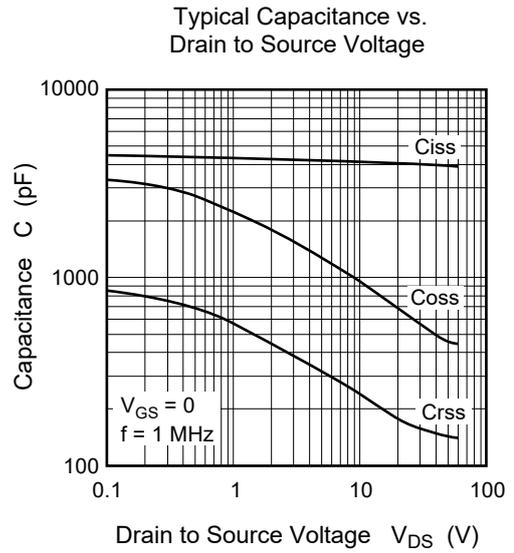
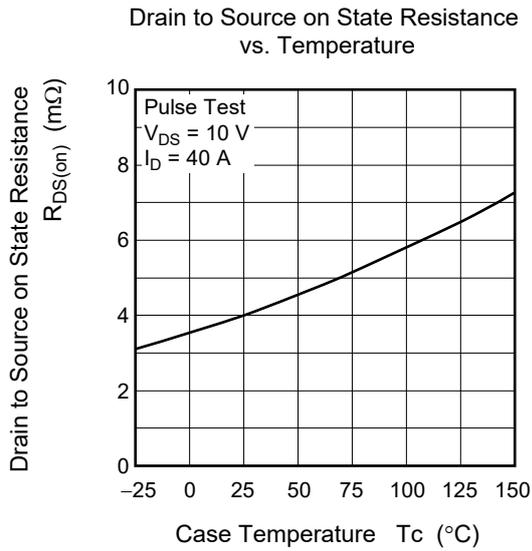
Notes: 5. Pulse test

# Typical Characteristics

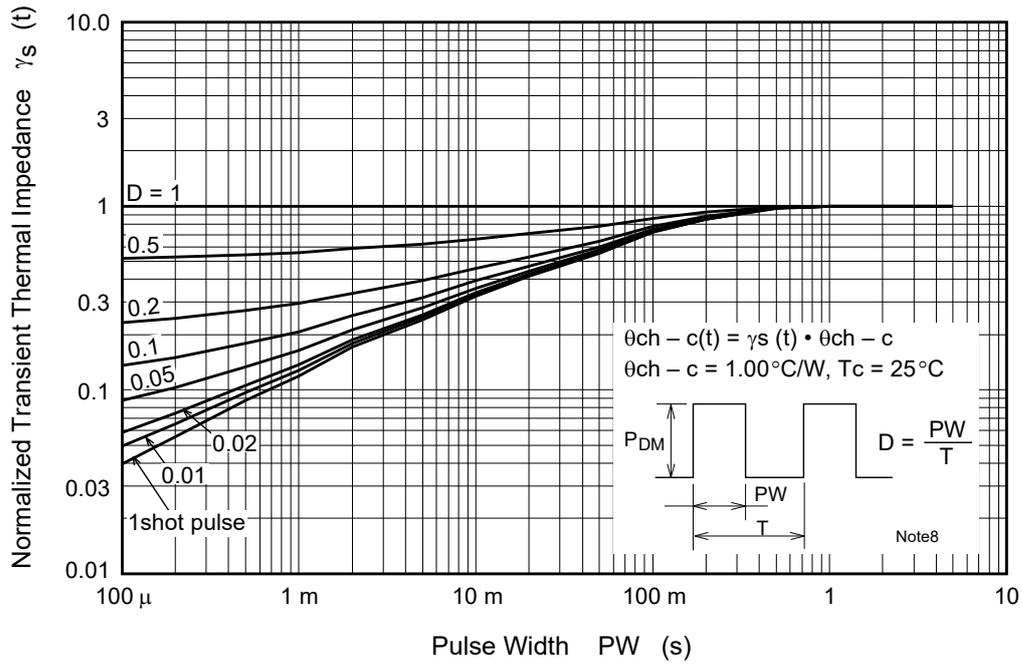


Notes: 6. Designed target value on Renesas measurement condition.

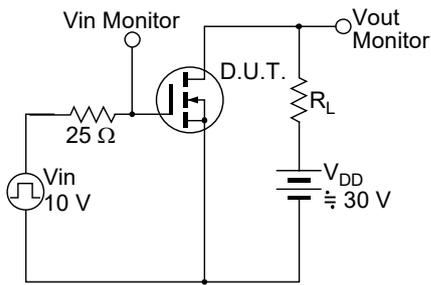
7. This data is the designed value on Renesas's measurement condition. Renesas recommends that operating conditions are designed according to a document "Power MOSFET/IGBT Attention of Handling Semiconductor Devices (R07ZZ0010)".



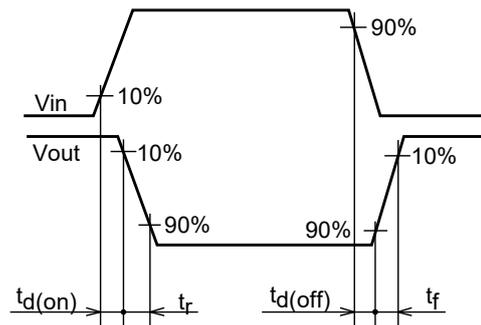
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



Waveform

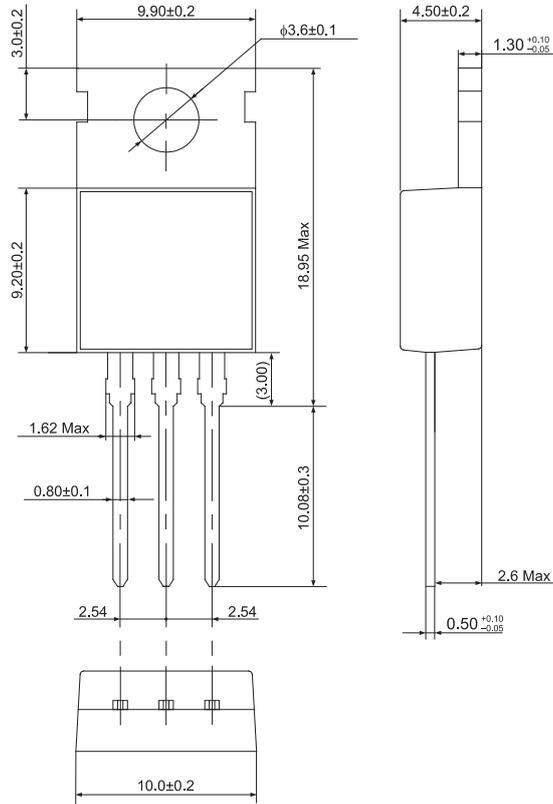


Notes: 8. This data is the designed target maximum value on Renesas's measurement condition.

## Package Dimensions

| Package Name | JEDEC Package Code | RENESAS Code | Previous Code | MASS (Typ) [g] |
|--------------|--------------------|--------------|---------------|----------------|
| TO-220ABA    | TO-220AB           | PRSS0004AT-A | TO-220ABA     | 2.1            |

Unit: mm



## Ordering Information

| Orderable Part Number | Quantity | Shipping Container |
|-----------------------|----------|--------------------|
| RJK0603DPN-A0-T2      | 50 pcs   | Magazine (Tube)    |

Note: The symbol of 2nd "-" is occasionally presented as "#".

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