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# RQA0005MXAQS

## Silicon N-Channel MOS FET

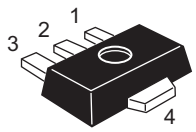
REJ03G1568-0100
Rev.1.00
Jul 04, 2007

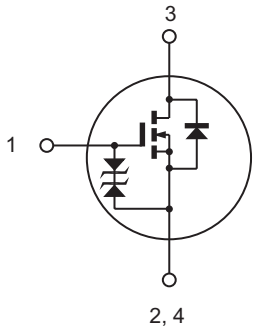
### Features

- High Output Power, High Gain, High Efficiency
  Pout = +33 dBm, Linear Gain = 21 dB, PAE = 68% (f = 520 MHz)
- Compact package capable of surface mounting

### Outline

RENESAS Package code: PLZZ0004CA-A
(Package Name : UPAK® )




1. Gate
2. Source
3. Drain
4. Source

Note: Marking is “MX”.

*UPAK is a trademark of Renesas Technology Corp.

### Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to source voltage | $V_{DSS}$ | 16 | V |
| Gate to source voltage | $V_{GSS}$ | ±5 | V |
| Drain current | $I_D$ | 0.8 | A |
| Channel dissipation | Pch[note] | 9 | W |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | –50 to +150 | °C |

Note: Value at Tc = 25°C

This device is sensitive to electro static discharge. An adequate careful handling procedure is requested.



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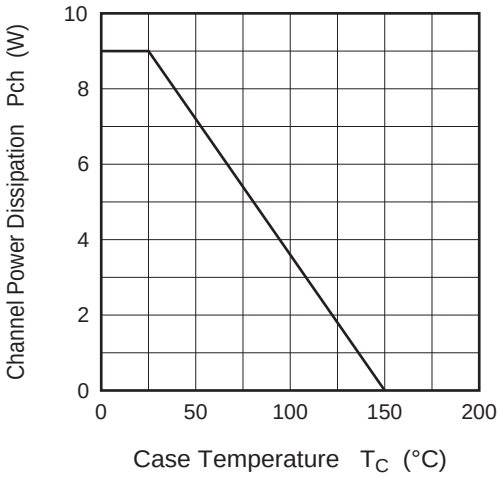
## Electrical Characteristics

(Ta = 25°C)

| Item | Symbol | Min. | Typ | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Zero gate voltage drain current | $I_{DSS}$ | — | — | 10 | µA | $V_{DS}$ = 16 V, $V_{GS}$ = 0 |
| Gate to source leakage current | $I_{GSS}$ | — | — | ±2 | µA | $V_{GS}$ = ±5 V, $V_{DS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 0.15 | 0.45 | 0.75 | V | $V_{DS}$ = 6 V, $I_D$ = 1mA |
| Forward Transfer Admittance | \|yfs\| | — | 1.1 | — | S | $V_{DS}$ = 6 V, $I_D$ = 600mA |
| Input capacitance | Ciss | — | 22 | — | pF | $V_{GS}$ = 5 V, $V_{DS}$ = 0, f = 1 MHz |
| Output capacitance | Coss | — | 12 | — | pF | $V_{DS}$ = 6 V, $V_{GS}$ = 0, f = 1 MHz |
| Reverse transfer capacitance | Crss | — | 2.6 | — | pF | $V_{DG}$ = 6 V, $V_{GS}$ = 0, f = 1 MHz |
| Output Power | Pout | — | 33 | — | dBm | $V_{DS}$ = 6V, $I_{DQ}$ = 200 mA<br>f = 520 MHz, Pin = +20 dBm |
| | | — | 2 | — | W | |
| Power Added Efficiency | PAE | — | 68 | — | % | |

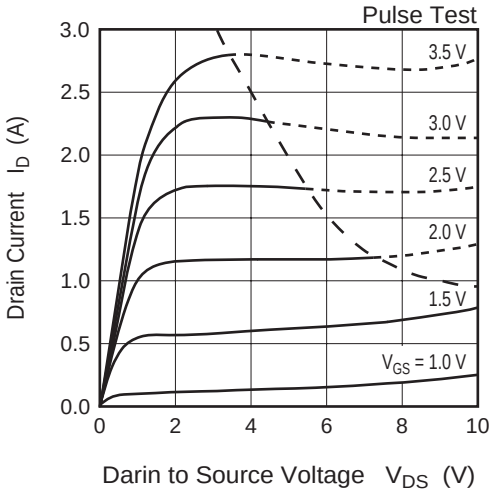
## Main Characteristics

Maximum Channel Power Dissipation Curve

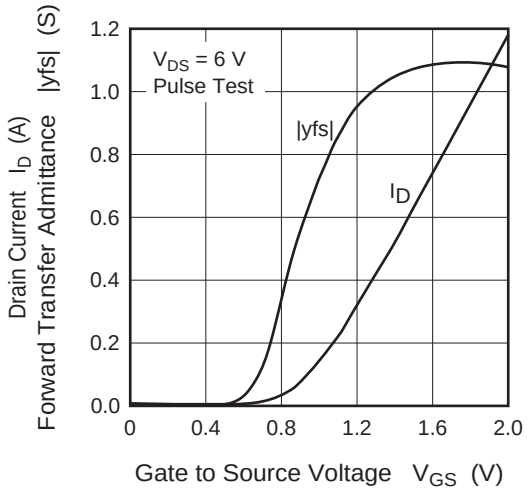



Typical Output Characteristics

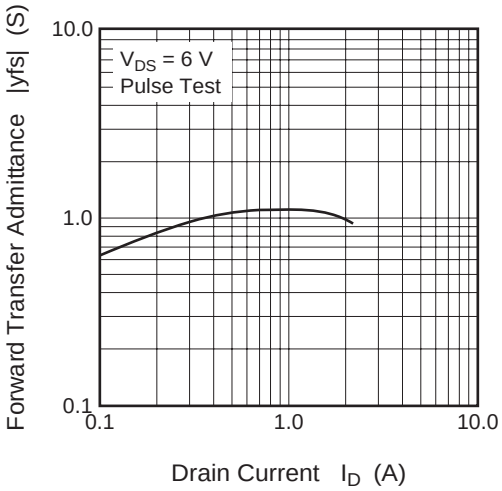
Pulse Test




Typical Transfer Characterisitics




Forward Transfer Admittance vs. Drain Current



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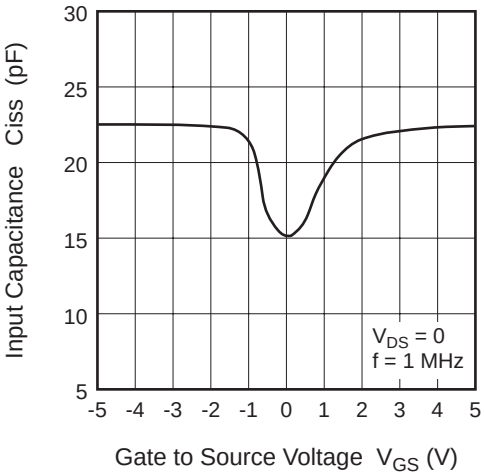
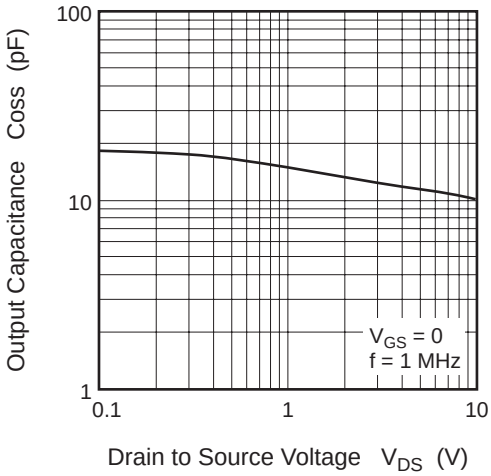
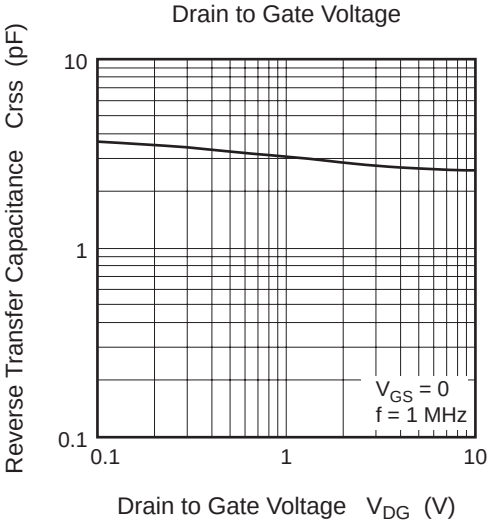
Input Capacitance vs.
Gate to Source Voltage



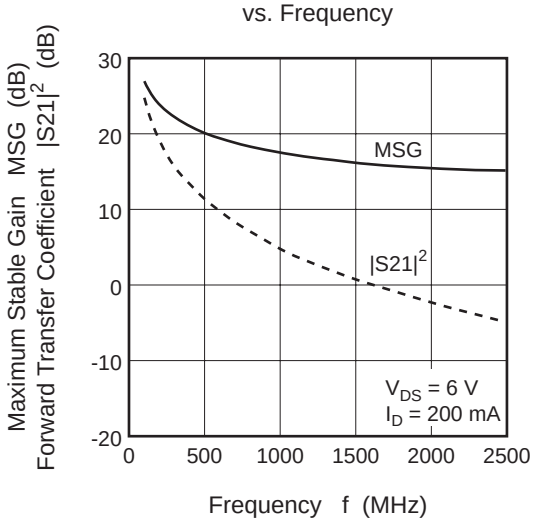

Output Capacitance vs.
Drain to Source Voltage



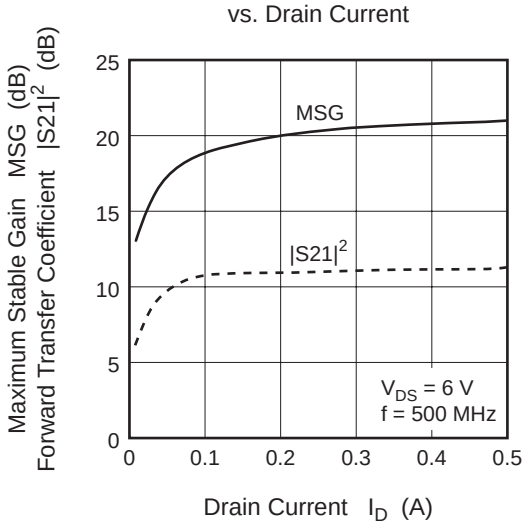

Reverse Transfer Capacitance vs.
Drain to Gate Voltage




Maximum Stable Gain, $|S21|^2$
vs. Frequency




Maximum Stable Gain, $|S21|^2$
vs. Drain Current



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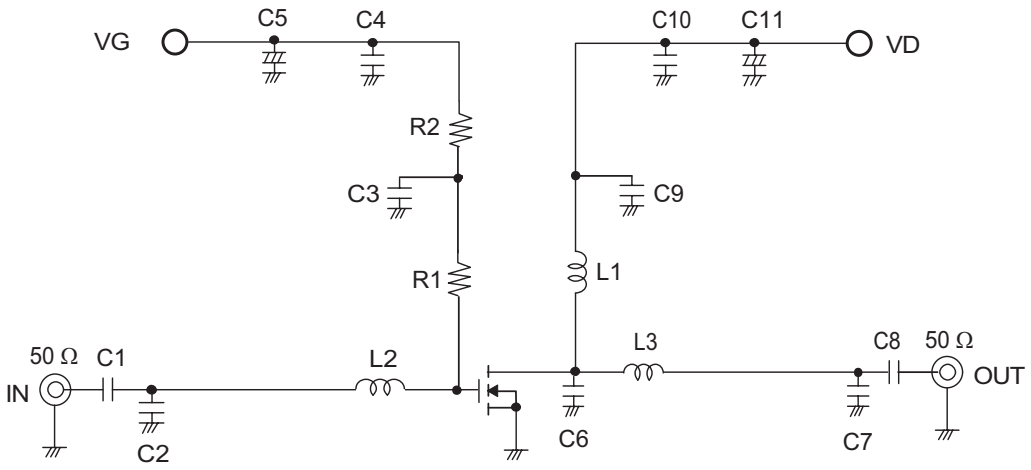
## Evaluation Circuit (f = 520 MHz)




| | |
|---|---|
| C1, C8 | 68 pF Chip Capacitor |
| C2 | 16 pF Chip Capacitor |
| C3, C9 | 100 pF Chip Capacitor |
| C4, C10 | 1000 pF Chip Capacitor |
| C5, C11 | 2.2 μF Electrolysis Capacitor |
| C6 | 4 pF Chip Capacitor |
| C7 | 11 pF Chip Capacitor |
| L1 | 8 Turns D: 0.5 mm, ϕ 2.4 mm Enamel Wire |
| L2 | 2.2 nH Chip Inductor |
| L3 | 3.3 nH Chip Inductor |
| R1 | 33 Ω Chip Resistor |
| R2 | 2.7 kΩ Chip Resistor |

Micro strip line width = 2.2 mm / 50 Ω, εr 3.6



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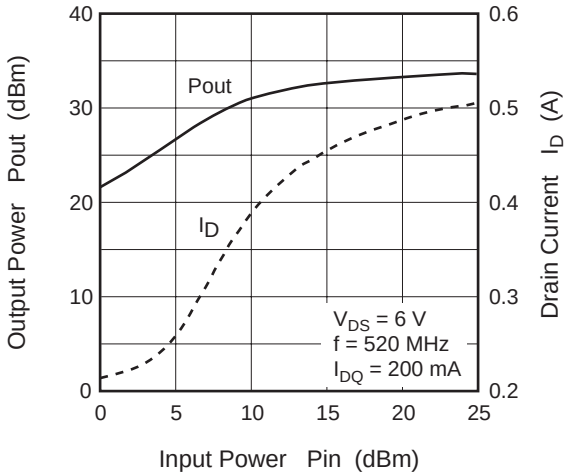
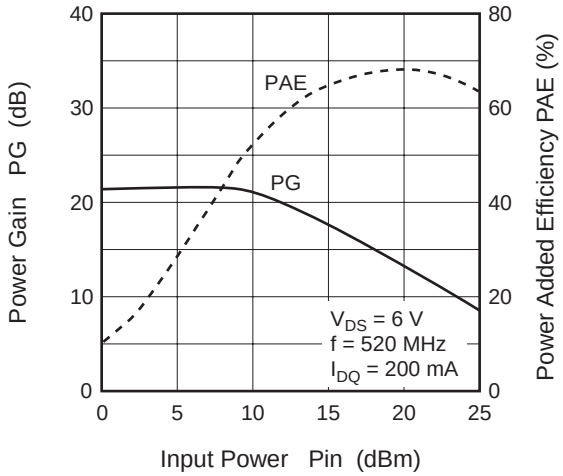
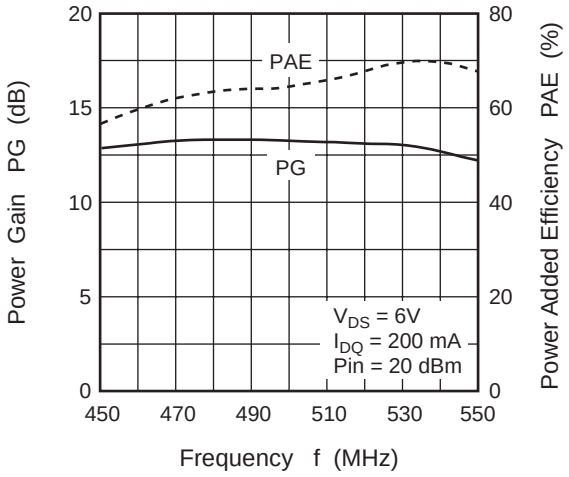
Output Power, Drain Current vs. Input Power



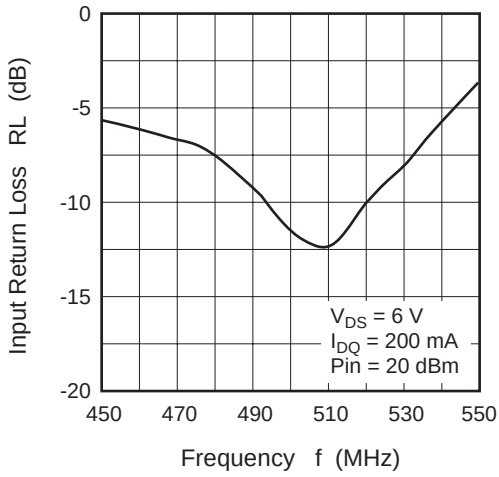

Power Gain, Power Added Efficiency vs. Input Power



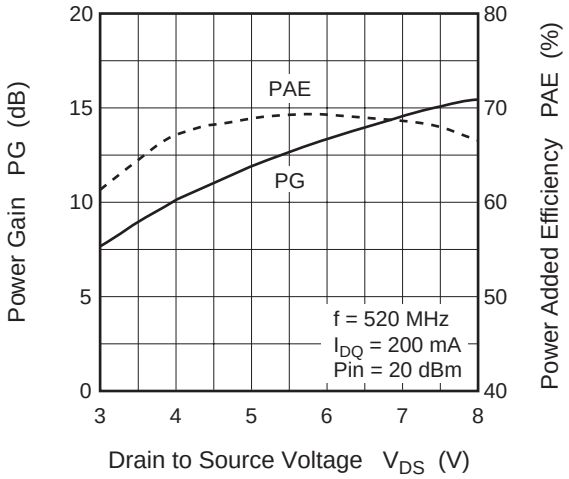

Power Gain, Powe Added Efficiency vs. Frequency



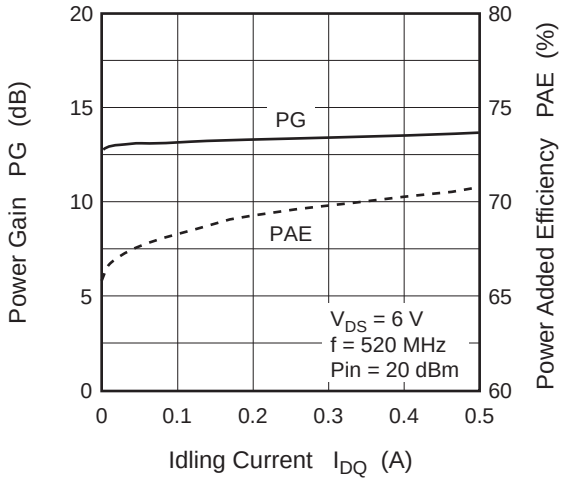

Input Return Loss vs. Frequency




Power Gain, Power Added Efficiency vs. Drain to Source Voltage




Power Gain, Power Added Efficiency vs. Idling Current



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## S Parameter

($V_{DS}$ = 6 V, $I_{DQ}$ = 200 mA, Zo = 50 Ω)

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| | MAG | ANG (deg.) | MAG | ANG (deg.) | MAG | ANG (deg.) | MAG | ANG (deg.) |
| 100 | 0.843 | -136.4 | 12.72 | 104.1 | 0.037 | -5.7 | 0.765 | -150.7 |
| 150 | 0.863 | -154.9 | 11.92 | 89.1 | 0.037 | -6.3 | 0.727 | -162.2 |
| 200 | 0.853 | -161.8 | 9.13 | 79.6 | 0.037 | -7.4 | 0.728 | -166.8 |
| 250 | 0.847 | -167.1 | 7.38 | 72.5 | 0.037 | -13.4 | 0.730 | -170.8 |
| 300 | 0.844 | -170.8 | 6.16 | 66.1 | 0.037 | -19.0 | 0.733 | -173.5 |
| 350 | 0.843 | -173.7 | 5.27 | 60.0 | 0.037 | -24.0 | 0.734 | -175.5 |
| 400 | 0.841 | -176.2 | 4.59 | 54.2 | 0.037 | -29.2 | 0.735 | -177.3 |
| 450 | 0.840 | -178.2 | 4.08 | 48.7 | 0.037 | -33.6 | 0.736 | -178.8 |
| 500 | 0.841 | 180.0 | 3.65 | 43.3 | 0.036 | -38.4 | 0.738 | 180.0 |
| 550 | 0.842 | 178.4 | 3.31 | 37.9 | 0.036 | -42.7 | 0.741 | 178.8 |
| 600 | 0.843 | 176.9 | 3.02 | 32.6 | 0.035 | -47.0 | 0.743 | 177.8 |
| 650 | 0.844 | 175.6 | 2.78 | 27.5 | 0.035 | -51.4 | 0.746 | 176.9 |
| 700 | 0.845 | 174.3 | 2.56 | 22.2 | 0.035 | -55.3 | 0.746 | 176.0 |
| 750 | 0.844 | 173.1 | 2.38 | 17.1 | 0.034 | -59.6 | 0.748 | 174.9 |
| 800 | 0.845 | 171.8 | 2.21 | 12.0 | 0.034 | -63.9 | 0.750 | 174.0 |
| 850 | 0.845 | 170.6 | 2.07 | 6.9 | 0.033 | -67.9 | 0.753 | 173.2 |
| 900 | 0.848 | 169.5 | 1.94 | 1.9 | 0.033 | -71.9 | 0.755 | 172.4 |
| 950 | 0.851 | 168.4 | 1.83 | -3.1 | 0.032 | -76.0 | 0.758 | 171.4 |
| 1000 | 0.853 | 167.4 | 1.73 | -8.0 | 0.032 | -79.8 | 0.760 | 170.5 |
| 1050 | 0.856 | 166.4 | 1.64 | -12.9 | 0.031 | -83.8 | 0.764 | 169.7 |
| 1100 | 0.858 | 165.5 | 1.55 | -17.7 | 0.031 | -87.6 | 0.765 | 168.7 |
| 1150 | 0.860 | 164.5 | 1.47 | -22.5 | 0.030 | -91.4 | 0.769 | 167.8 |
| 1200 | 0.861 | 163.5 | 1.40 | -27.4 | 0.030 | -95.3 | 0.774 | 166.9 |
| 1250 | 0.862 | 162.5 | 1.33 | -32.1 | 0.029 | -98.9 | 0.778 | 166.1 |
| 1300 | 0.864 | 161.5 | 1.27 | -37.0 | 0.029 | -102.6 | 0.780 | 165.3 |
| 1350 | 0.865 | 160.5 | 1.21 | -41.8 | 0.028 | -106.3 | 0.784 | 164.4 |
| 1400 | 0.867 | 159.4 | 1.16 | -46.6 | 0.028 | -109.9 | 0.789 | 163.5 |
| 1450 | 0.868 | 158.5 | 1.11 | -51.3 | 0.027 | -113.4 | 0.792 | 162.8 |
| 1500 | 0.871 | 157.5 | 1.06 | -56.0 | 0.027 | -116.7 | 0.794 | 161.9 |
| 1550 | 0.874 | 156.6 | 1.02 | -60.6 | 0.026 | -120.2 | 0.796 | 161.1 |
| 1600 | 0.876 | 155.7 | 0.98 | -65.4 | 0.025 | -123.4 | 0.799 | 160.2 |
| 1650 | 0.878 | 154.8 | 0.94 | -70.1 | 0.025 | -126.8 | 0.801 | 159.3 |
| 1700 | 0.879 | 154.0 | 0.91 | -74.8 | 0.024 | -130.3 | 0.803 | 158.5 |
| 1750 | 0.879 | 153.2 | 0.88 | -79.3 | 0.024 | -133.2 | 0.805 | 157.4 |
| 1800 | 0.880 | 152.4 | 0.85 | -83.8 | 0.023 | -136.4 | 0.808 | 156.4 |
| 1850 | 0.882 | 151.5 | 0.82 | -88.2 | 0.023 | -139.6 | 0.812 | 155.5 |
| 1900 | 0.886 | 150.2 | 0.79 | -92.7 | 0.022 | -142.7 | 0.814 | 154.5 |
| 1950 | 0.888 | 148.9 | 0.76 | -97.3 | 0.022 | -146.0 | 0.818 | 153.4 |
| 2000 | 0.890 | 147.8 | 0.74 | -101.7 | 0.021 | -149.0 | 0.820 | 152.5 |
| 2050 | 0.893 | 146.8 | 0.71 | -106.2 | 0.021 | -151.9 | 0.825 | 151.7 |
| 2100 | 0.897 | 145.9 | 0.69 | -110.6 | 0.020 | -155.0 | 0.826 | 150.7 |
| 2150 | 0.900 | 145.0 | 0.67 | -115.2 | 0.020 | -157.7 | 0.829 | 149.6 |
| 2200 | 0.902 | 144.1 | 0.65 | -119.7 | 0.019 | -160.4 | 0.832 | 148.6 |
| 2250 | 0.904 | 143.3 | 0.63 | -124.1 | 0.019 | -163.0 | 0.837 | 147.8 |
| 2300 | 0.904 | 142.5 | 0.61 | -128.6 | 0.019 | -165.3 | 0.839 | 146.9 |
| 2350 | 0.904 | 141.7 | 0.59 | -133.0 | 0.018 | -168.3 | 0.839 | 145.9 |
| 2400 | 0.903 | 140.9 | 0.57 | -137.5 | 0.018 | -170.7 | 0.841 | 144.8 |
| 2450 | 0.901 | 139.9 | 0.55 | -142.0 | 0.018 | -173.1 | 0.843 | 144.0 |
| 2500 | 0.898 | 138.9 | 0.54 | -146.5 | 0.017 | -175.5 | 0.842 | 143.0 |



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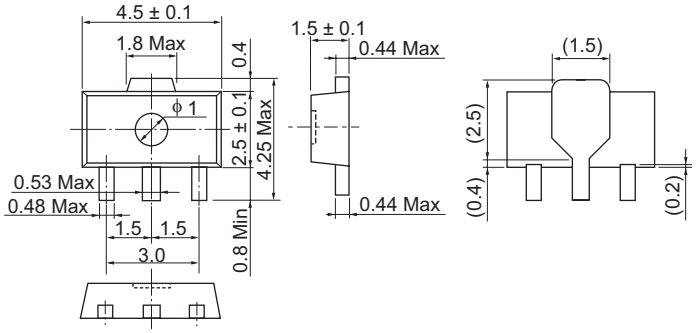
## Package Dimensions

| JEITA Package Code | RENESAS Code | Package Name | MASS[Typ.] |
|---|---|---|---|
| SC-62 | PLZZ0004CA-A | UPAK / UPAKV | 0.050g |

Unit: mm




## Ordering Information

| Part Name | Quantity | Shipping Container |
|---|---|---|
| RQA0005MXTL-E | 1000 pcs. | φ178 mm reel, 12 mm emboss taping |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.



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