

## **RENESAS SEMICONDUCTOR RELIABILITY REPORT**

GROUP : 78K0RKE3  
DEVICE : Refer to Product List  
APPLICATION : Consumer / Industry

Quality Assurance Div.  
Renesas Electronics Corporation

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Table. Reliability test results (QFP)

| Test Items                             | Reference              | Test Conditions                      | Results Failure/Size | Comment   |
|----------------------------------------|------------------------|--------------------------------------|----------------------|-----------|
| High Temperature Operating Life (HTOL) | JESD22-A108            | Ta=125 °C, Vccmax, 1000 hrs          | 0/22                 |           |
| High Temperature Storage Life (HTSL)   | JESD22-A103            | Ta=150 °C, 1000 hrs                  | 0/22                 |           |
| Temperature Humidity bias (THB) (*1)   | JESD22-A101            | Ta=85 °C, RH=85 %, Vccmax, 1000 hrs  | 0/22                 |           |
| Temperature Cycling (TC) (*1)          | JESD22-A104            | Ta=-65 °C to 150 °C , 300 cycles     | 0/22                 |           |
| Latch-Up (LU)                          | JESD78                 | Pulse Current Injection, I=+/-150 mA | 0/3                  |           |
| Electrostatic discharge (ESD-HBM)      | JS-001                 | 1.5 kΩ, 100 pF, +/-2000 V, 1 time    | 0/3                  | Class: 2  |
| Electrostatic discharge (ESD-CDM)      | JESD22-C101            | +/-500V,1time                        | 0/3                  | Class: C2 |
| Solderability (SD)                     | J-STD-002              | 245 °C, 5 s, Solder coverage ≥95 %   | 0/5                  |           |
| Resistance to Soldering Heat (PC)      | JESD22-A113, J-STD-020 | MSL3(Moisture Sensitivity Level 3)   | 0/22                 |           |

\*1) With preconditioning per JESD22-A113, MSL 3

•It is tested to confirm that all the samples are satisfied with an individual product specification.

Note :

Basically qualification tests were performed using a representative product with the same wafer process and the same package structure .

Table. Reliability test results (BGA)

| Test Items                             | Reference              | Test Conditions                      | Results<br>Failure/Size | Comment   |
|----------------------------------------|------------------------|--------------------------------------|-------------------------|-----------|
| High Temperature Operating Life (HTOL) | JESD22-A108            | Ta=125 °C, Vccmax, 1000 hrs          | 0/22                    |           |
| High Temperature Storage Life (HTSL)   | JESD22-A103            | Ta=150 °C, 1000 hrs                  | 0/22                    |           |
| Temperature Humidity bias (THB) (*1)   | JESD22-A101            | Ta=85 °C, RH=85 %, Vccmax, 1000 hrs  | 0/22                    |           |
| Temperature Cycling (TC) (*1)          | JESD22-A104            | Ta=-55 °C to 125 °C , 500 cycles     | 0/22                    |           |
| Latch-Up (LU)                          | JESD78                 | Pulse Current Injection, I=+/-150 mA | 0/3                     |           |
| Electrostatic discharge (ESD-HBM)      | JS-001                 | 1.5 kΩ, 100 pF, +/-2000 V, 1 time    | 0/3                     | Class: 2  |
| Electrostatic discharge (ESD-CDM)      | JESD22-C101            | +/-500V,1time                        | 0/3                     | Class: C2 |
| Resistance to Soldering Heat (PC)      | JESD22-A113, J-STD-020 | MSL3(Moisture Sensitivity Level 3)   | 0/22                    |           |

\*1) With preconditioning per JESD22-A113, MSL 3

•It is tested to confirm that all the samples are satisfied with an individual product specification.

Note :

Basically qualification tests were performed using a representative product with the same wafer process and the same package structure .

The failure rate of the device in an actual use condition can be estimated by the below procedure.

•Equation for the failure rate estimation ( $\lambda$ )

$$\lambda = \lambda_b \times \pi T \text{ (FIT)}$$

①Unique failure rate ( $\lambda_b$ )

$$\lambda_b = 8.19 \text{ FIT}$$

Unique failure rate at  $T_a=55^\circ\text{C}$  using 60 % confidence level.

②Temperature term ( $\pi T$ )

$$\pi T = \exp\{11600 \times E_a \times (1/(273+55) - 1/(273+T_a))\}$$

$E_a$  : Activation energy (eV)

$T_a$  : Ambient temperature ( $^\circ\text{C}$ )

$\pi T$  simplified chart as  $E_a=0.7 \text{ eV}$

| $T_a$<br>( $^\circ\text{C}$ ) | 40   | 50   | 55 | 60   | 65   | 70   | 75   | 80   | 85   | 90    | 100   | 110   |
|-------------------------------|------|------|----|------|------|------|------|------|------|-------|-------|-------|
| $\pi T$                       | 0.31 | 0.68 | 1  | 1.45 | 2.08 | 2.95 | 4.15 | 5.77 | 7.96 | 10.88 | 19.82 | 34.99 |

•MTTF ( Mean Time To Failure )

$$MTTF = 1/\lambda$$

## Reference about Renesas package code

| Package type                    |     | Package code *1 |
|---------------------------------|-----|-----------------|
| Lead type plastic package       | QFP | PxQP            |
|                                 | SOP | PxSP            |
| Non-lead type plastic package   | QFN | PxQN            |
| Grid array type plastic package | BGA | PxBG            |
|                                 | LGA | PxLG            |

\*1. First four digit

Table. Product list

| No | Group    | Product part number           | Package code | No  | Group    | Product part number           | Package code |
|----|----------|-------------------------------|--------------|-----|----------|-------------------------------|--------------|
| 1  | 78KORKE3 | UPD78F1142AGA(R)-XXX-HAB-AX   | PTQP0064*    | 51  | 78KORKE3 | UPD78F1144AF1(S)-XXX-BA4-E1-A | PLBG0064*    |
| 2  | 78KORKE3 | UPD78F1142AGA(S)-HAB-AX       | PTQP0064*    | 52  | 78KORKE3 | UPD78F1144AF1(S)-XXX-BA4-E2-A | PLBG0064*    |
| 3  | 78KORKE3 | UPD78F1142AGA(S)-XXX-HAB-AX   | PTQP0064*    | 53  | 78KORKE3 | UPD78F1144AF1-BA4-A           | PLBG0064*    |
| 4  | 78KORKE3 | UPD78F1142AGA-HAB-AX          | PTQP0064*    | 54  | 78KORKE3 | UPD78F1144AF1-XXX-BA4-A       | PLBG0064*    |
| 5  | 78KORKE3 | UPD78F1142AGA-XXX-HAB-AX      | PTQP0064*    | 55  | 78KORKE3 | UPD78F1144AF1-XXX-BA4-E1-A    | PLBG0064*    |
| 6  | 78KORKE3 | UPD78F1143AGA(R)-HAB-AX       | PTQP0064*    | 56  | 78KORKE3 | UPD78F1144AF1-XXX-BA4-E2-A    | PLBG0064*    |
| 7  | 78KORKE3 | UPD78F1143AGA(R)-XXX-HAB-AX   | PTQP0064*    | 57  | 78KORKE3 | UPD78F1145AF1(R)-XXX-BA4-A    | PLBG0064*    |
| 8  | 78KORKE3 | UPD78F1143AGA(S)-XXX-HAB-AX   | PTQP0064*    | 58  | 78KORKE3 | UPD78F1145AF1(R)-XXX-BA4-E1-A | PLBG0064*    |
| 9  | 78KORKE3 | UPD78F1143AGA-HAB-AX          | PTQP0064*    | 59  | 78KORKE3 | UPD78F1145AF1(R)-XXX-BA4-E2-A | PLBG0064*    |
| 10 | 78KORKE3 | UPD78F1143AGA-XXX-HAB-AX      | PTQP0064*    | 60  | 78KORKE3 | UPD78F1145AF1(S)-XXX-BA4-A    | PLBG0064*    |
| 11 | 78KORKE3 | UPD78F1144AGA(R)-HAB-AX       | PTQP0064*    | 61  | 78KORKE3 | UPD78F1145AF1(S)-XXX-BA4-E1-A | PLBG0064*    |
| 12 | 78KORKE3 | UPD78F1144AGA(R)-XXX-HAB-AX   | PTQP0064*    | 62  | 78KORKE3 | UPD78F1145AF1(S)-XXX-BA4-E2-A | PLBG0064*    |
| 13 | 78KORKE3 | UPD78F1144AGA(S)-HAB-AX       | PTQP0064*    | 63  | 78KORKE3 | UPD78F1145AF1-BA4-A           | PLBG0064*    |
| 14 | 78KORKE3 | UPD78F1144AGA(S)-XXX-HAB-AX   | PTQP0064*    | 64  | 78KORKE3 | UPD78F1145AF1-XXX-BA4-A       | PLBG0064*    |
| 15 | 78KORKE3 | UPD78F1144AGA-HAB-AX          | PTQP0064*    | 65  | 78KORKE3 | UPD78F1145AF1-XXX-BA4-E1-A    | PLBG0064*    |
| 16 | 78KORKE3 | UPD78F1144AGA-XXX-HAB-AX      | PTQP0064*    | 66  | 78KORKE3 | UPD78F1145AF1-XXX-BA4-E2-A    | PLBG0064*    |
| 17 | 78KORKE3 | UPD78F1145AGA(R)-XXX-HAB-AX   | PTQP0064*    | 67  | 78KORKE3 | UPD78F1146AF1(R)-BA4-A        | PLBG0064*    |
| 18 | 78KORKE3 | UPD78F1145AGA(S)-XXX-HAB-AX   | PTQP0064*    | 68  | 78KORKE3 | UPD78F1146AF1(R)-XXX-BA4-A    | PLBG0064*    |
| 19 | 78KORKE3 | UPD78F1145AGA-HAB-AX          | PTQP0064*    | 69  | 78KORKE3 | UPD78F1146AF1(R)-XXX-BA4-E1-A | PLBG0064*    |
| 20 | 78KORKE3 | UPD78F1145AGA-XXX-HAB-AX      | PTQP0064*    | 70  | 78KORKE3 | UPD78F1146AF1(R)-XXX-BA4-E2-A | PLBG0064*    |
| 21 | 78KORKE3 | UPD78F1146AGA(R)-HAB-AX       | PTQP0064*    | 71  | 78KORKE3 | UPD78F1146AF1(S)-XXX-BA4-A    | PLBG0064*    |
| 22 | 78KORKE3 | UPD78F1146AGA(R)-XXX-HAB-AX   | PTQP0064*    | 72  | 78KORKE3 | UPD78F1146AF1(S)-XXX-BA4-E1-A | PLBG0064*    |
| 23 | 78KORKE3 | UPD78F1146AGA(S)-HAB-AX       | PTQP0064*    | 73  | 78KORKE3 | UPD78F1146AF1(S)-XXX-BA4-E2-A | PLBG0064*    |
| 24 | 78KORKE3 | UPD78F1146AGA(S)-XXX-HAB-AX   | PTQP0064*    | 74  | 78KORKE3 | UPD78F1146AF1-BA4-A           | PLBG0064*    |
| 25 | 78KORKE3 | UPD78F1146AGA-HAB-AX          | PTQP0064*    | 75  | 78KORKE3 | UPD78F1146AF1-XXX-BA4-A       | PLBG0064*    |
| 26 | 78KORKE3 | UPD78F1146AGA-XXX-HAB-AX      | PTQP0064*    | 76  | 78KORKE3 | UPD78F1146AF1-XXX-BA4-E1-A    | PLBG0064*    |
| 27 | 78KORKE3 | UPD78F1142AF1(R)-XXX-BA4-A    | PLBG0064*    | 77  | 78KORKE3 | UPD78F1146AF1-XXX-BA4-E2-A    | PLBG0064*    |
| 28 | 78KORKE3 | UPD78F1142AF1(R)-XXX-BA4-E1-A | PLBG0064*    | 78  | 78KORKE3 | UPD78F1142AF1(R)-AN1-A        | PVBG0064*    |
| 29 | 78KORKE3 | UPD78F1142AF1(R)-XXX-BA4-E2-A | PLBG0064*    | 79  | 78KORKE3 | UPD78F1142AF1(R)-XXX-AN1-A    | PVBG0064*    |
| 30 | 78KORKE3 | UPD78F1142AF1(S)-XXX-BA4-A    | PLBG0064*    | 80  | 78KORKE3 | UPD78F1142AF1(R)-XXX-AN1-E1-A | PVBG0064*    |
| 31 | 78KORKE3 | UPD78F1142AF1(S)-XXX-BA4-E1-A | PLBG0064*    | 81  | 78KORKE3 | UPD78F1142AF1(R)-XXX-AN1-E2-A | PVBG0064*    |
| 32 | 78KORKE3 | UPD78F1142AF1(S)-XXX-BA4-E2-A | PLBG0064*    | 82  | 78KORKE3 | UPD78F1142AF1(S)-XXX-AN1-A    | PVBG0064*    |
| 33 | 78KORKE3 | UPD78F1142AF1-BA4-A           | PLBG0064*    | 83  | 78KORKE3 | UPD78F1142AF1(S)-XXX-AN1-E1-A | PVBG0064*    |
| 34 | 78KORKE3 | UPD78F1142AF1-XXX-BA4-A       | PLBG0064*    | 84  | 78KORKE3 | UPD78F1142AF1(S)-XXX-AN1-E2-A | PVBG0064*    |
| 35 | 78KORKE3 | UPD78F1142AF1-XXX-BA4-E1-A    | PLBG0064*    | 85  | 78KORKE3 | UPD78F1142AF1-AN1-A           | PVBG0064*    |
| 36 | 78KORKE3 | UPD78F1142AF1-XXX-BA4-E2-A    | PLBG0064*    | 86  | 78KORKE3 | UPD78F1142AF1-XXX-AN1-A       | PVBG0064*    |
| 37 | 78KORKE3 | UPD78F1143AF1(R)-XXX-BA4-A    | PLBG0064*    | 87  | 78KORKE3 | UPD78F1142AF1-XXX-AN1-E1-A    | PVBG0064*    |
| 38 | 78KORKE3 | UPD78F1143AF1(R)-XXX-BA4-E1-A | PLBG0064*    | 88  | 78KORKE3 | UPD78F1142AF1-XXX-AN1-E2-A    | PVBG0064*    |
| 39 | 78KORKE3 | UPD78F1143AF1(R)-XXX-BA4-E2-A | PLBG0064*    | 89  | 78KORKE3 | UPD78F1143AF1(R)-XXX-AN1-A    | PVBG0064*    |
| 40 | 78KORKE3 | UPD78F1143AF1(S)-XXX-BA4-A    | PLBG0064*    | 90  | 78KORKE3 | UPD78F1143AF1(R)-XXX-AN1-E1-A | PVBG0064*    |
| 41 | 78KORKE3 | UPD78F1143AF1(S)-XXX-BA4-E1-A | PLBG0064*    | 91  | 78KORKE3 | UPD78F1143AF1(R)-XXX-AN1-E2-A | PVBG0064*    |
| 42 | 78KORKE3 | UPD78F1143AF1(S)-XXX-BA4-E2-A | PLBG0064*    | 92  | 78KORKE3 | UPD78F1143AF1(S)-AN1-A        | PVBG0064*    |
| 43 | 78KORKE3 | UPD78F1143AF1-BA4-A           | PLBG0064*    | 93  | 78KORKE3 | UPD78F1143AF1(S)-XXX-AN1-A    | PVBG0064*    |
| 44 | 78KORKE3 | UPD78F1143AF1-XXX-BA4-A       | PLBG0064*    | 94  | 78KORKE3 | UPD78F1143AF1(S)-XXX-AN1-E1-A | PVBG0064*    |
| 45 | 78KORKE3 | UPD78F1143AF1-XXX-BA4-E1-A    | PLBG0064*    | 95  | 78KORKE3 | UPD78F1143AF1(S)-XXX-AN1-E2-A | PVBG0064*    |
| 46 | 78KORKE3 | UPD78F1143AF1-XXX-BA4-E2-A    | PLBG0064*    | 96  | 78KORKE3 | UPD78F1143AF1-AN1-A           | PVBG0064*    |
| 47 | 78KORKE3 | UPD78F1144AF1(R)-XXX-BA4-A    | PLBG0064*    | 97  | 78KORKE3 | UPD78F1143AF1-XXX-AN1-A       | PVBG0064*    |
| 48 | 78KORKE3 | UPD78F1144AF1(R)-XXX-BA4-E1-A | PLBG0064*    | 98  | 78KORKE3 | UPD78F1143AF1-XXX-AN1-E1-A    | PVBG0064*    |
| 49 | 78KORKE3 | UPD78F1144AF1(R)-XXX-BA4-E2-A | PLBG0064*    | 99  | 78KORKE3 | UPD78F1143AF1-XXX-AN1-E2-A    | PVBG0064*    |
| 50 | 78KORKE3 | UPD78F1144AF1(S)-XXX-BA4-A    | PLBG0064*    | 100 | 78KORKE3 | UPD78F1144AF1(R)-XXX-AN1-A    | PVBG0064*    |

Table. Product list

MCR-22-0657

| No  | Group    | Product part number           | Package code | No  | Group    | Product part number         | Package code |
|-----|----------|-------------------------------|--------------|-----|----------|-----------------------------|--------------|
| 101 | 78KORKE3 | UPD78F1144AF1(R)-XXX-AN1-E1-A | PVBG0064*    | 161 | 78KORKE3 | UPD78F1142GK(R)-GAJ-AX      | PLQP0064*    |
| 102 | 78KORKE3 | UPD78F1144AF1(R)-XXX-AN1-E2-A | PVBG0064*    | 162 | 78KORKE3 | UPD78F1143GK(S)-GAJ-AX      | PLQP0064*    |
| 103 | 78KORKE3 | UPD78F1144AF1(S)-XXX-AN1-A    | PVBG0064*    | 163 | 78KORKE3 | UPD78F1145GK(S)-GAJ-AX      | PLQP0064*    |
| 104 | 78KORKE3 | UPD78F1144AF1(S)-XXX-AN1-E1-A | PVBG0064*    | 164 | 78KORKE3 | UPD78F1146GK(R)-GAJ-AX      | PLQP0064*    |
| 105 | 78KORKE3 | UPD78F1144AF1(S)-XXX-AN1-E2-A | PVBG0064*    | 165 | 78KORKE3 | UPD78F1146GK-GAJ-AX         | PLQP0064*    |
| 106 | 78KORKE3 | UPD78F1144AF1-AN1-A           | PVBG0064*    | 166 | 78KORKE3 | UPD78F1142AGB(R)-GAH-AX     | PLQP0064*    |
| 107 | 78KORKE3 | UPD78F1144AF1-XXX-AN1-A       | PVBG0064*    | 167 | 78KORKE3 | UPD78F1142AGB(R)-XXX-GAH-AX | PLQP0064*    |
| 108 | 78KORKE3 | UPD78F1144AF1-XXX-AN1-E1-A    | PVBG0064*    | 168 | 78KORKE3 | UPD78F1142AGB(S)-GAH-AX     | PLQP0064*    |
| 109 | 78KORKE3 | UPD78F1144AF1-XXX-AN1-E2-A    | PVBG0064*    | 169 | 78KORKE3 | UPD78F1142AGB(S)-XXX-GAH-AX | PLQP0064*    |
| 110 | 78KORKE3 | UPD78F1145AF1(R)-XXX-AN1-A    | PVBG0064*    | 170 | 78KORKE3 | UPD78F1142AGB-GAH-AX        | PLQP0064*    |
| 111 | 78KORKE3 | UPD78F1145AF1(R)-XXX-AN1-E1-A | PVBG0064*    | 171 | 78KORKE3 | UPD78F1142AGB-XXX-GAH-AX    | PLQP0064*    |
| 112 | 78KORKE3 | UPD78F1145AF1(R)-XXX-AN1-E2-A | PVBG0064*    | 172 | 78KORKE3 | UPD78F1143AGB(R)-GAH-AX     | PLQP0064*    |
| 113 | 78KORKE3 | UPD78F1145AF1(S)-XXX-AN1-A    | PVBG0064*    | 173 | 78KORKE3 | UPD78F1143AGB(R)-XXX-GAH-AX | PLQP0064*    |
| 114 | 78KORKE3 | UPD78F1145AF1(S)-XXX-AN1-E1-A | PVBG0064*    | 174 | 78KORKE3 | UPD78F1143AGB(S)-GAH-AX     | PLQP0064*    |
| 115 | 78KORKE3 | UPD78F1145AF1(S)-XXX-AN1-E2-A | PVBG0064*    | 175 | 78KORKE3 | UPD78F1143AGB(S)-XXX-GAH-AX | PLQP0064*    |
| 116 | 78KORKE3 | UPD78F1145AF1-AN1-A           | PVBG0064*    | 176 | 78KORKE3 | UPD78F1143AGB-GAH-AX        | PLQP0064*    |
| 117 | 78KORKE3 | UPD78F1145AF1-XXX-AN1-A       | PVBG0064*    | 177 | 78KORKE3 | UPD78F1143AGB-XXX-GAH-AX    | PLQP0064*    |
| 118 | 78KORKE3 | UPD78F1145AF1-XXX-AN1-E1-A    | PVBG0064*    | 178 | 78KORKE3 | UPD78F1144AGB(R)-GAH-AX     | PLQP0064*    |
| 119 | 78KORKE3 | UPD78F1145AF1-XXX-AN1-E2-A    | PVBG0064*    | 179 | 78KORKE3 | UPD78F1144AGB(R)-XXX-GAH-AX | PLQP0064*    |
| 120 | 78KORKE3 | UPD78F1146AF1(R)-AN1-A        | PVBG0064*    | 180 | 78KORKE3 | UPD78F1144AGB(S)-GAH-AX     | PLQP0064*    |
| 121 | 78KORKE3 | UPD78F1146AF1(R)-XXX-AN1-A    | PVBG0064*    | 181 | 78KORKE3 | UPD78F1144AGB(S)-XXX-GAH-AX | PLQP0064*    |
| 122 | 78KORKE3 | UPD78F1146AF1(R)-XXX-AN1-E1-A | PVBG0064*    | 182 | 78KORKE3 | UPD78F1144AGB-GAH-AX        | PLQP0064*    |
| 123 | 78KORKE3 | UPD78F1146AF1(R)-XXX-AN1-E2-A | PVBG0064*    | 183 | 78KORKE3 | UPD78F1144AGB-XXX-GAH-AX    | PLQP0064*    |
| 124 | 78KORKE3 | UPD78F1146AF1(S)-AN1-A        | PVBG0064*    | 184 | 78KORKE3 | UPD78F1145AGB(R)-GAH-AX     | PLQP0064*    |
| 125 | 78KORKE3 | UPD78F1146AF1(S)-XXX-AN1-A    | PVBG0064*    | 185 | 78KORKE3 | UPD78F1145AGB(R)-XXX-GAH-AX | PLQP0064*    |
| 126 | 78KORKE3 | UPD78F1146AF1(S)-XXX-AN1-E1-A | PVBG0064*    | 186 | 78KORKE3 | UPD78F1145AGB(S)-GAH-AX     | PLQP0064*    |
| 127 | 78KORKE3 | UPD78F1146AF1(S)-XXX-AN1-E2-A | PVBG0064*    | 187 | 78KORKE3 | UPD78F1145AGB(S)-XXX-GAH-AX | PLQP0064*    |
| 128 | 78KORKE3 | UPD78F1146AF1-AN1-A           | PVBG0064*    | 188 | 78KORKE3 | UPD78F1145AGB-GAH-AX        | PLQP0064*    |
| 129 | 78KORKE3 | UPD78F1146AF1-XXX-AN1-A       | PVBG0064*    | 189 | 78KORKE3 | UPD78F1145AGB-GAH-E3-AX     | PLQP0064*    |
| 130 | 78KORKE3 | UPD78F1146AF1-XXX-AN1-E1-A    | PVBG0064*    | 190 | 78KORKE3 | UPD78F1145AGB-XXX-GAH-AX    | PLQP0064*    |
| 131 | 78KORKE3 | UPD78F1146AF1-XXX-AN1-E2-A    | PVBG0064*    | 191 | 78KORKE3 | UPD78F1146AGB(R)-GAH-AX     | PLQP0064*    |
| 132 | 78KORKE3 | UPD78F1142AGK(R)-GAJ-AX       | PLQP0064*    | 192 | 78KORKE3 | UPD78F1146AGB(R)-XXX-GAH-AX | PLQP0064*    |
| 133 | 78KORKE3 | UPD78F1142AGK(R)-XXX-GAJ-AX   | PLQP0064*    | 193 | 78KORKE3 | UPD78F1146AGB(S)-GAH-AX     | PLQP0064*    |
| 134 | 78KORKE3 | UPD78F1142AGK(S)-GAJ-AX       | PLQP0064*    | 194 | 78KORKE3 | UPD78F1146AGB(S)-XXX-GAH-AX | PLQP0064*    |
| 135 | 78KORKE3 | UPD78F1142AGK(S)-XXX-GAJ-AX   | PLQP0064*    | 195 | 78KORKE3 | UPD78F1146AGB-GAH-AX        | PLQP0064*    |
| 136 | 78KORKE3 | UPD78F1142AGK-GAJ-AX          | PLQP0064*    | 196 | 78KORKE3 | UPD78F1146AGB-GAH-E3-AX     | PLQP0064*    |
| 137 | 78KORKE3 | UPD78F1142AGK-XXX-GAJ-AX      | PLQP0064*    | 197 | 78KORKE3 | UPD78F1146AGB-XXX-GAH-AX    | PLQP0064*    |
| 138 | 78KORKE3 | UPD78F1143AGK(R)-GAJ-AX       | PLQP0064*    | 198 | 78KORKE3 | UPD78F1142GB(R)-GAH-AX      | PLQP0064*    |
| 139 | 78KORKE3 | UPD78F1143AGK(R)-XXX-GAJ-AX   | PLQP0064*    | 199 | 78KORKE3 | UPD78F1142GB(R)-XXX-GAH-AX  | PLQP0064*    |
| 140 | 78KORKE3 | UPD78F1143AGK(S)-GAJ-AX       | PLQP0064*    | 200 | 78KORKE3 | UPD78F1142GB(S)-GAH-AX      | PLQP0064*    |
| 141 | 78KORKE3 | UPD78F1143AGK(S)-XXX-GAJ-AX   | PLQP0064*    | 201 | 78KORKE3 | UPD78F1142GB-GAH-AX         | PLQP0064*    |
| 142 | 78KORKE3 | UPD78F1143AGK-GAJ-AX          | PLQP0064*    | 202 | 78KORKE3 | UPD78F1143GB-GAH-AX         | PLQP0064*    |
| 143 | 78KORKE3 | UPD78F1143AGK-XXX-GAJ-AX      | PLQP0064*    | 203 | 78KORKE3 | UPD78F1143GB-GAH-E3-AX      | PLQP0064*    |
| 144 | 78KORKE3 | UPD78F1144AGK(R)-GAJ-AX       | PLQP0064*    | 204 | 78KORKE3 | UPD78F1144GB(S)-GAH-AX      | PLQP0064*    |
| 145 | 78KORKE3 | UPD78F1144AGK(R)-XXX-GAJ-AX   | PLQP0064*    | 205 | 78KORKE3 | UPD78F1144GB-GAH-AX         | PLQP0064*    |
| 146 | 78KORKE3 | UPD78F1144AGK(S)-GAJ-AX       | PLQP0064*    | 206 | 78KORKE3 | UPD78F1144GB-GAH-E3-AX      | PLQP0064*    |
| 147 | 78KORKE3 | UPD78F1144AGK(S)-XXX-GAJ-AX   | PLQP0064*    | 207 | 78KORKE3 | UPD78F1145GB-GAH-AX         | PLQP0064*    |
| 148 | 78KORKE3 | UPD78F1144AGK-GAJ-AX          | PLQP0064*    | 208 | 78KORKE3 | UPD78F1145GB-GAH-E2-AX      | PLQP0064*    |
| 149 | 78KORKE3 | UPD78F1144AGK-XXX-GAJ-AX      | PLQP0064*    | 209 | 78KORKE3 | UPD78F1145GB-GAH-E3-AX      | PLQP0064*    |
| 150 | 78KORKE3 | UPD78F1145AGK(R)-GAJ-AX       | PLQP0064*    | 210 | 78KORKE3 | UPD78F1146GB(S)-GAH-AX      | PLQP0064*    |
| 151 | 78KORKE3 | UPD78F1145AGK(R)-XXX-GAJ-AX   | PLQP0064*    | 211 | 78KORKE3 | UPD78F1146GB-GAH-AX         | PLQP0064*    |
| 152 | 78KORKE3 | UPD78F1145AGK(S)-XXX-GAJ-AX   | PLQP0064*    | 212 | 78KORKE3 | UPD78F1146GB-GAH-E3-AX      | PLQP0064*    |
| 153 | 78KORKE3 | UPD78F1145AGK-GAJ-AX          | PLQP0064*    | 213 |          |                             |              |
| 154 | 78KORKE3 | UPD78F1145AGK-XXX-GAJ-AX      | PLQP0064*    | 214 |          |                             |              |
| 155 | 78KORKE3 | UPD78F1146AGK(R)-GAJ-AX       | PLQP0064*    | 215 |          |                             |              |
| 156 | 78KORKE3 | UPD78F1146AGK(R)-XXX-GAJ-AX   | PLQP0064*    | 216 |          |                             |              |
| 157 | 78KORKE3 | UPD78F1146AGK(S)-GAJ-AX       | PLQP0064*    | 217 |          |                             |              |
| 158 | 78KORKE3 | UPD78F1146AGK(S)-XXX-GAJ-AX   | PLQP0064*    | 218 |          |                             |              |
| 159 | 78KORKE3 | UPD78F1146AGK-GAJ-AX          | PLQP0064*    | 219 |          |                             |              |
| 160 | 78KORKE3 | UPD78F1146AGK-XXX-GAJ-AX      | PLQP0064*    | 220 |          |                             |              |