# THE DATASHEET OF

# BYV10MX-600PQ

# BYV10MX-600P

## Ultrafast power diode

Rev.02 - 20 October 2021 Product data sheet

## 1. General description

Ultrafast power diode in 2-lead TO220F plastic package.

## 2. Features and benefits

- Low forward voltage drop
- Low leakage current
- Soft reverse recovery characteristics
- High thermal cycling performance

## 3. Applications

- Home appliance power supply
- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)

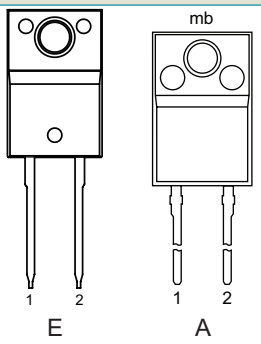
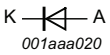
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Values | | | | Unit |
|---|---|---|---|---|---|---|---|
| **Absolute maximum rating** | | | | | | | |
| $V_{RRM}$ | repetitive peak reverse voltage | | 600 | | | | V |
| $I_{F(AV)}$ | average forward current | δ = 0.5 ; square-wave pulse; $T_h \leq 73$ °C; Fig. 1; Fig. 2; Fig. 3 | 10 | | | | A |
| $I_{FRM}$ | repetitive peak forward current | δ = 0.5 ; $t_p$ = 25 µs; $T_h \leq 73$ °C; square-wave pulse | 20 | | | | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4 | 100 | | | | A |
| | | $t_p$ = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse | 110 | | | | A |
| **Symbol** | **Parameter** | **Conditions** | | **Min** | **Typ** | **Max** | **Unit** |
| **Static characteristics** | | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 10 A; $T_j$ = 25 °C; Fig. 6 | | - | 1.5 | 2 | V |
| | | $I_F$ = 10 A; $T_j$ = 150 °C; Fig. 6 | | - | - | 1.6 | V |
| **Dynamic characteristics** | | | | | | | |
| $t_{rr}$ | reverse recovery time | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 24 | 35 | ns |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | K | cathode |   |   |
| 2 | A | anode | | |
| mb | n.c. | mounting base; isolated | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|---|---|---|---|---|---|---|
| BYV10MX-600P | TO220F-2L | BYV10MX-600PQ | Tube | 50 | TO220FE-2L (E) | 21-Dec-2020 |
| | | | | | SOD113A (A) | 10-April-2014 |

## 7. Marking

**Table 4. Marking codes**

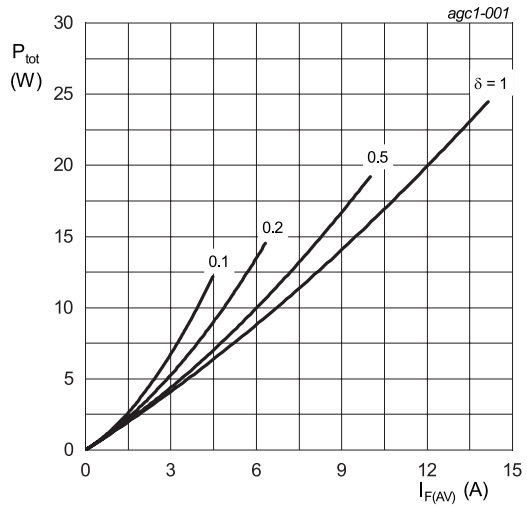
| Type number | Marking codes | |
|---|---|---|
| | Assembly factory: E | Assembly factory: A |
| BYV10MX-600P | BYV10MX<br>600P<br>PJExxxx xx | BYV10MX<br>600P<br>PJAxxxx xx |

# 8. Limiting values

**Table 5. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

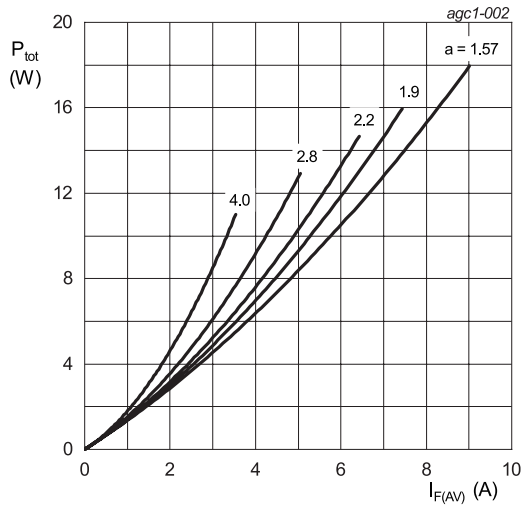
| Symbol | Parameter | Conditions | Values | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | repetitive peak reverse voltage | | 600 | V |
| $V_{RWM}$ | crest working reverse voltage | | 600 | V |
| $V_R$ | reverse voltage | DC | 600 | V |
| $I_{F(AV)}$ | average forward current | δ = 0.5 ; square-wave pulse; $T_h \leq 73$ °C; Fig. 1; Fig. 2; Fig. 3 | 10 | A |
| $I_{FRM}$ | repetitive peak forward current | δ = 0.5 ; $t_p$ = 25 µs; $T_h \leq 73$ °C; square-wave pulse | 20 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4 | 100 | A |
| | | $t_p$ = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse | 110 | A |
| $T_{stg}$ | storage temperature | | -65 to 175 | °C |
| $T_j$ | junction temperature | | 175 | °C |




$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$

$V_o$ = 1.271 V; $R_s$ = 0.0325 Ω

**Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values**




a = form factor = $I_{F(RMS)} / I_{F(AV)}$

$V_o$ = 1.271 V; $R_s$ = 0.0325 Ω

**Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values**

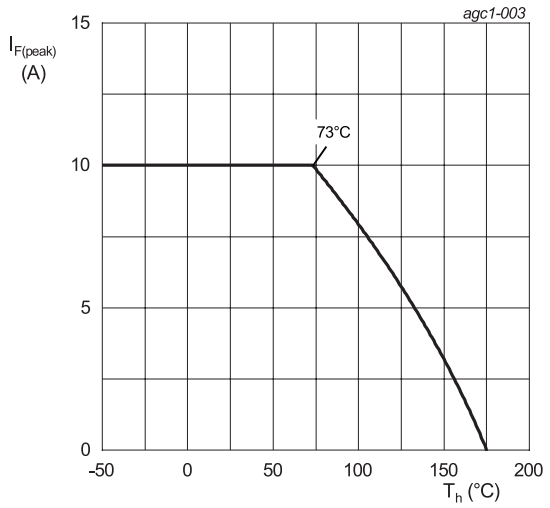



**Fig. 3. Forward current as a function of heatsink temperature; maximum values**

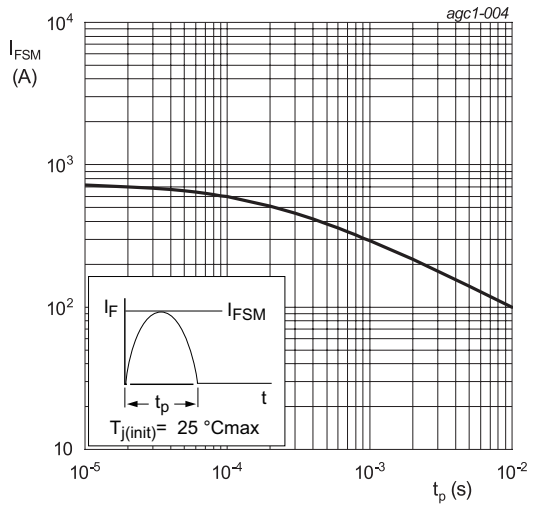



**Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values**

# 9. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-h)}$ | thermal resistance from junction to heatsink | with heatsink compound; Fig. 5 | | - | - | 5.3 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | | - | 55 | - | K/W |

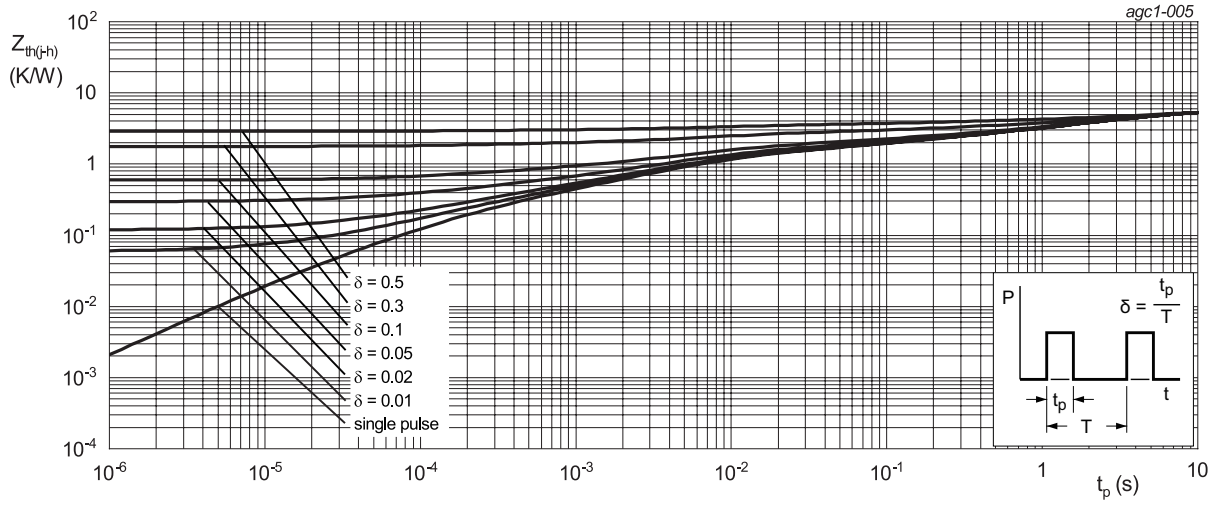



**Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration**

# 10. Isolation characteristics

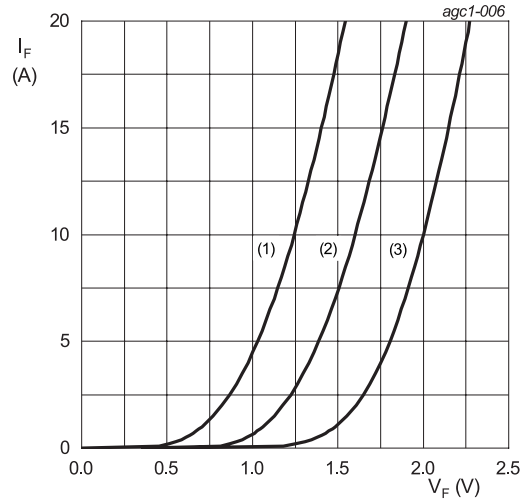
**Table 7. Isolation characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{isol(RMS)}$ | RMS isolation voltage | 50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free | | - | - | 2500 | V |
| $C_{isol}$ | isolation capacitance | from cathode to external heatsink | | - | 10 | - | pF |

# 11. Characteristics

**Table 8. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $V_F$ | forward current | $I_F$ = 10 A; $T_j$ = 25 °C; Fig. 6 | | - | 1.5 | 2 | V |
| | | $I_F$ = 10 A; $T_j$ = 150 °C; Fig. 6 | | - | - | 1.6 | V |
| $I_R$ | reverse current | $V_R$ = 600 V; $T_j$ = 25 °C | | - | - | 8 | µA |
| | | $V_R$ = 600 V; $T_j$ = 150 °C | | - | - | 120 | µA |
| **Dynamic characteristics** | | | | | | | |
| $Q_r$ | reverse charge | $I_F$ = 10 A; $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 105 | - | nC |
| | | $I_F$ = 10 A; $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $T_j$ = 125 °C; Fig. 7 | | - | 282 | - | nC |
| $t_{rr}$ | reverse recovery time | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 24 | 35 | ns |
| | | $I_F$ = 10 A; $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 45 | - | ns |
| | | $I_F$ = 10 A; $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $T_j$ = 125 °C; Fig. 7 | | - | 76 | - | ns |
| $I_{RM}$ | peak reverse recovery current | $I_F$ = 10 A; $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $T_j$ = 25 °C; Fig. 7 | | - | 4.6 | - | A |
| | | $I_F$ = 10 A; $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $T_j$ = 125 °C; Fig. 7 | | - | 7.5 | - | A |




$V_o$ = 1.271 V; $R_s$ = 0.0325 Ω
(1) $T_j$ = 125 °C; typical values
(2) $T_j$ = 125 °C; maximum values
(3) $T_j$ = 25 °C; maximum values

**Fig. 6. Forward current as a function of forward voltage**

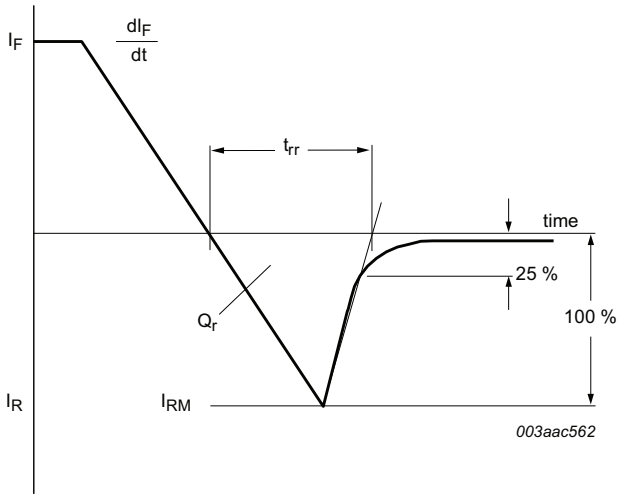
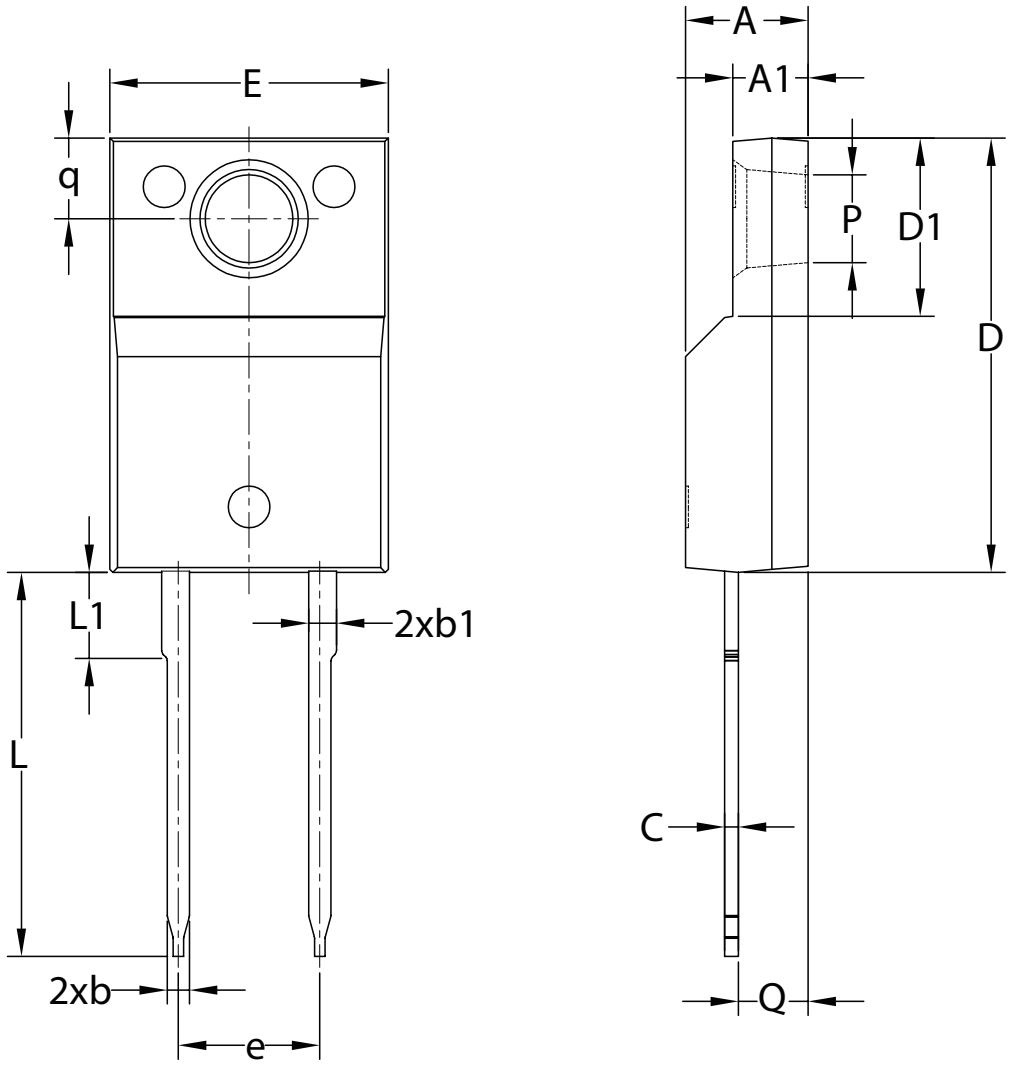



**Fig. 7. Reverse recovery definitions; ramp recovery**

## 12. Package outline

*Assembly factory: E*

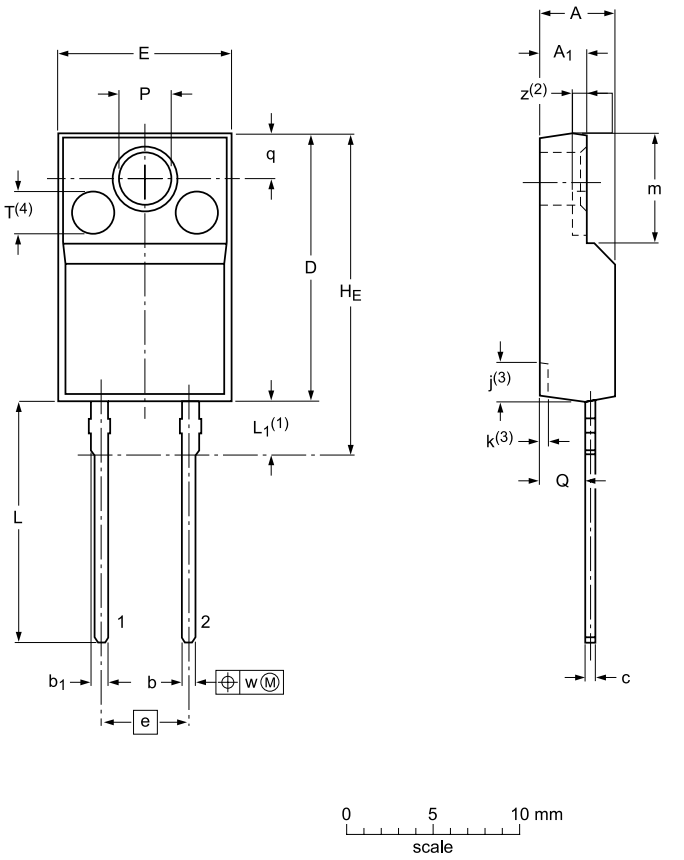
Plastic single-ended package; isolated heatsink mounted;1 mounting hole; 2 leads TO-220 'full pack' TO220F-2L




| Unit | | A | A1 | b | b1 | c | D | D1 | E | e | L | L1 | P | Q | q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MM | min | 4.20 | 2.50 | 0.70 | 0.90 | 0.40 | 15.40 | 6.00 | 9.70 | 5.08 (BSC) | 13.50 | 2.80 | 3.00 | 2.30 | 2.60 |
| | max | 4.60 | 2.90 | 0.90 | 1.30 | 0.60 | 15.80 | 6.40 | 10.30 | | 14.40 | 3.30 | 3.30 | 2.60 | 3.00 |

*Assembly factory: A*

**Plastic single-ended package; isolated heasink mounted;**
**1 mounting hole; 2-lead TO-220F 'full pack'** **SOD113A**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | b | $b_1$ | c | D | E | e | $H_E$ max | $j^{(3)}$ | $k^{(3)}$ | L | $L_1{}^{(1)}$ | m | P | Q | q | $T^{(4)}$ | W | $z^{(2)}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 4.6 | 3.1 | 0.9 | 1.1 | 0.7 | 15.8 | 10.3 | | | 2.7 | 0.8 | 14.4 | 3.3 | 6.5 | 3.2 | 2.8 | | | | |
| | nom | | | | | | | | 5.08 | 19.0 | | | | | | | | 2.6 | 2.55 | 0.4 | 0.8 |
| | min | 4.0 | 2.5 | 0.7 | 0.9 | 0.4 | 15.2 | 9.7 | | | 1.7 | 0.4 | 13.5 | 2.8 | 6.3 | 3.0 | 2.3 | | | | |

Note
1. Terminals are uncontrolled within zone L1.
2. z is depth of T.
3. Dot lines area designs may vary.
4. Eject pin mark is for reference only.

*sod113a_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOD113A | | 2 LEADS TO220F | | | | ~~14-01-14~~ 14-04-10 |

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|---|---|---|
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| Product [short] data sheet | Production | This document contains the product specification. |

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**Date of release: 31 March 2021**

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