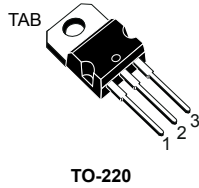
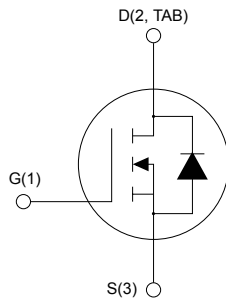


## Automotive N-channel 100 V, 3.6 mΩ typ., 110 A, STripFET F7 Power MOSFET in a TO-220 package




TO-220



AM01475v1\_noZen

### Features

Order code	$V_{DS}$	$R_{DS(on)}$ max.	$I_D$
STP150N10F7AG	100 V	4.2 mΩ	110 A

- Designed for automotive application 
- Standard level  $V_{GS(TH)}$
- 175°C junction temperature
- 100% avalanche rated

### Applications

- Switching applications

### Description

This N-channel Power MOSFET utilizes STripFET F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.



#### Product status link

[STP150N10F7AG](#)

#### Product summary

<b>Order code</b>	STP150N10F7AG
<b>Marking</b>	150N10F7AG
<b>Package</b>	TO-220
<b>Packing</b>	Tube

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	100	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	110	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$		
$I_{DM}^{(2)}$	Drain current (pulsed)	440	A
$P_{TOT}$	Total power dissipation at $T_C = 25\text{ }^\circ\text{C}$	250	W
$I_{AV}$	Single pulse avalanche current (pulse width limited by maximum junction temperature)	30	A
$E_{AS}$	Single pulse avalanche energy ( $T_J = 25\text{ }^\circ\text{C}$ , $I_D = I_{AV}$ , $V_{DD} = 25\text{ V}$ )	650	mJ
$T_J$	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		

1. Current limited by package.
2. Pulse width limited by safe operating area.

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance, junction-to-case	0.6	$^\circ\text{C/W}$
$R_{thJB}^{(1)}$	Thermal resistance, junction-to-board	62.5	$^\circ\text{C/W}$

1. When mounted on 1 inch<sup>2</sup> FR-4, 2 Oz copper board.

## 2 Electrical characteristics

(T<sub>CASE</sub> = 25 °C unless otherwise specified)

**Table 3. On/off-state**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source breakdown voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	100			V
I <sub>DSS</sub>	Zero gate voltage drain current	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = max ratings			1	μA
I <sub>GSS</sub>	Gate body leakage current	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			100	nA
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5	3.5	4.5	V
R <sub>DS(on)</sub>	Static drain-source on-resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 55 A		3.6	4.2	mΩ

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 50 V, f = 1 MHz, V <sub>GS</sub> = 0 V	-	9000	-	pF
C <sub>oss</sub>	Output capacitance			2000		pF
C <sub>rss</sub>	Reverse transfer capacitance			80		pF
Q <sub>g</sub>	Total gate charge	V <sub>DD</sub> = 50 V, I <sub>D</sub> = 110 A, V <sub>GS</sub> = 10 V (see Figure 13. Test circuit for gate charge behavior)	-	127	-	nC
Q <sub>gs</sub>	Gate-source charge			56		nC
Q <sub>gd</sub>	Gate-drain charge			32		nC

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> = 50 V, I <sub>D</sub> = 55 A, R <sub>G</sub> = 4.7 mΩ, V <sub>GS</sub> = 10 V (see Figure 12. Test circuit for resistive load switching times and Figure 16. Unclamped inductive waveform)	-	37	-	ns
t <sub>r</sub>	Rise time			54		
t <sub>d(off)</sub>	Turn-off delay time			68		
t <sub>f</sub>	Fall time			33		

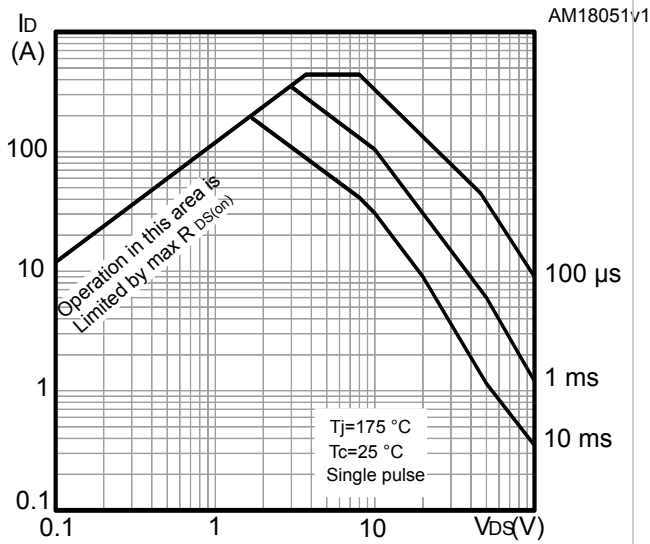
**Table 6. Source-drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 110\text{ A}$ , $V_{GS} = 0$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 110\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 80\text{ V}$ , $T_j = 25^\circ\text{C}$ (see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	60	-	ns
$Q_{rr}$	Reverse recovery charge		-	83	-	nC
$I_{RRM}$	Reverse recovery current		-	2.75	-	A

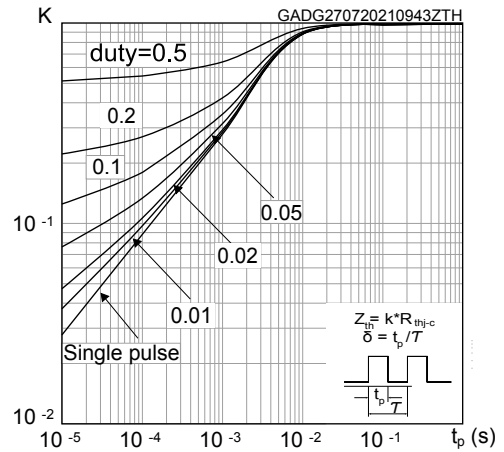
1. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

## 2.1 Electrical characteristics (curves)

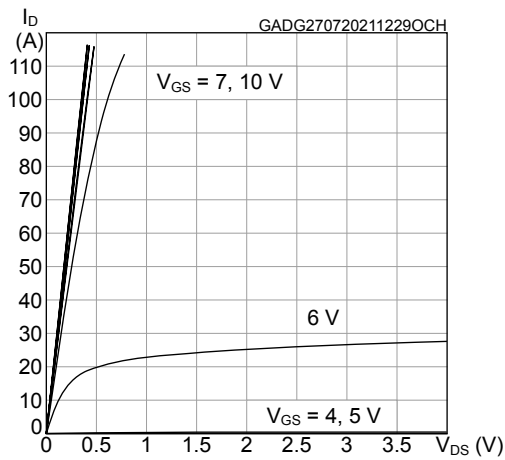
**Figure 1. Safe operating area**



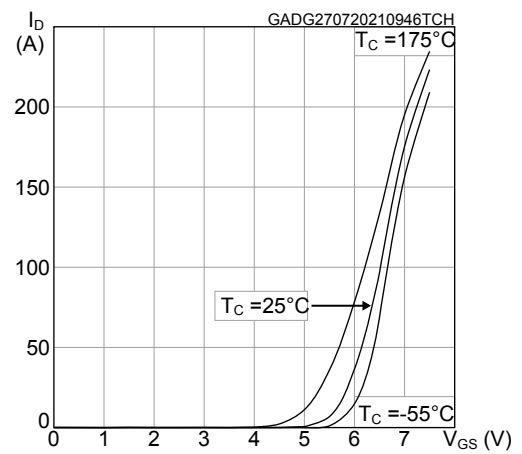
**Figure 2. Thermal impedance**



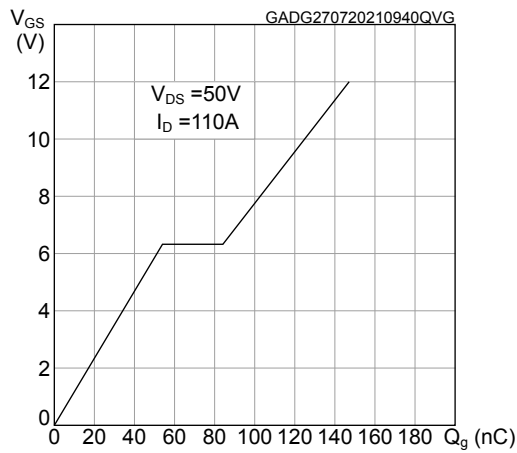
**Figure 3. Typical output characteristics**



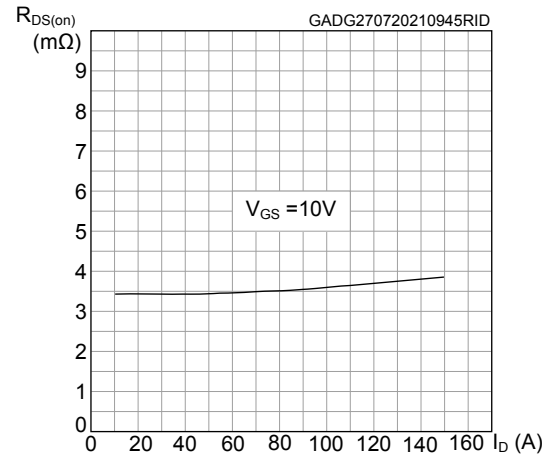
**Figure 4. Typical transfer characteristics**



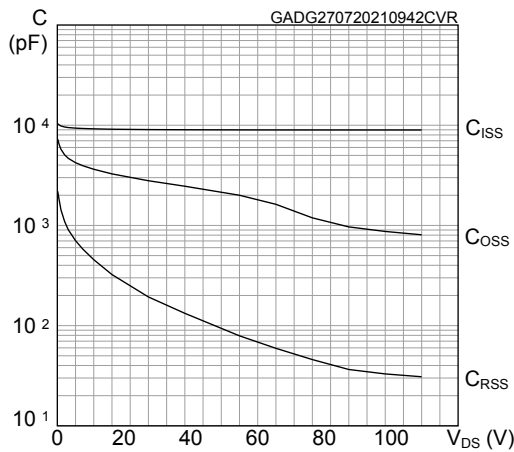
**Figure 5. Typical gate charge characteristics**



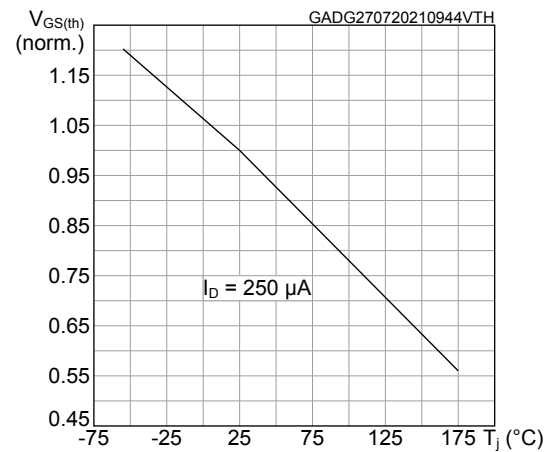
**Figure 6. Typical drain-source on-resistance**



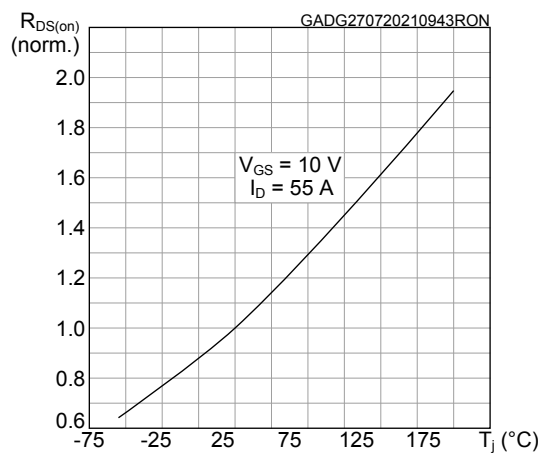
**Figure 7. Typical capacitance characteristics**



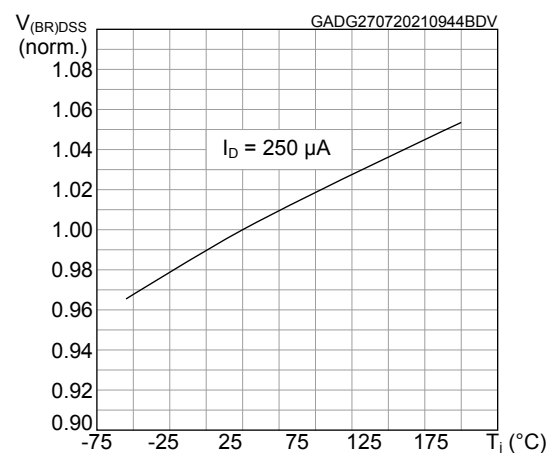
**Figure 8. Normalized gate threshold voltage vs temperature**



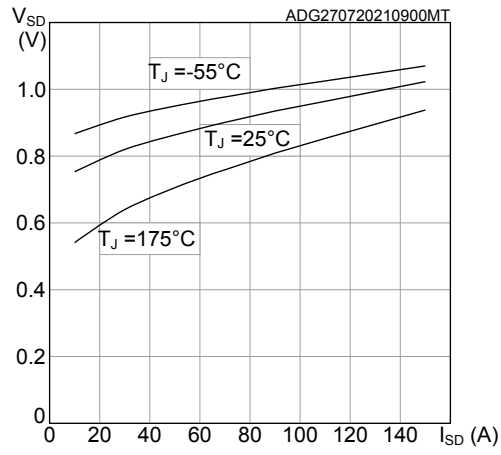
**Figure 9. Normalized on-resistance vs temperature**



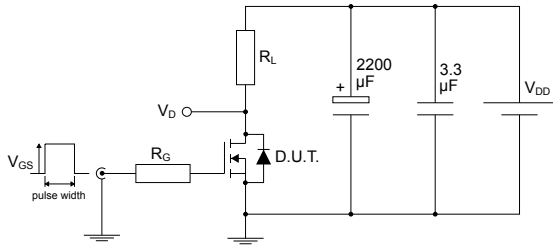
**Figure 10. Normalized  $V_{(BR)DSS}$  vs temperature**



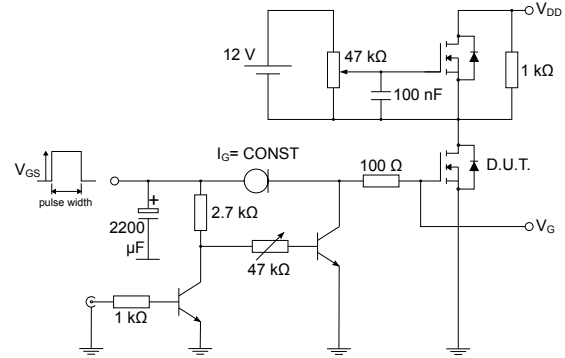
**Figure 11. Source-drain diode forward characteristics**



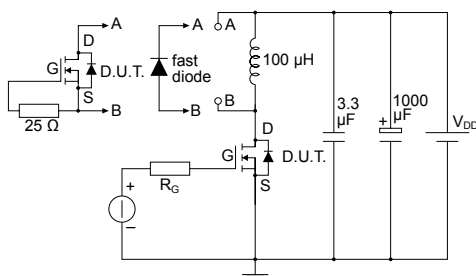
### 3 Test circuits

**Figure 12. Test circuit for resistive load switching times**


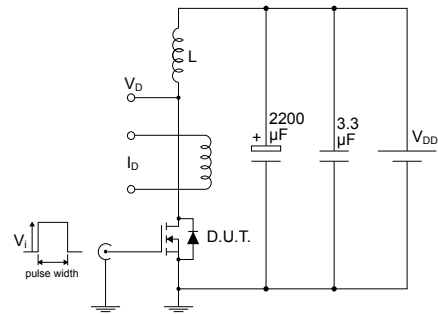
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**Figure 13. Test circuit for gate charge behavior**


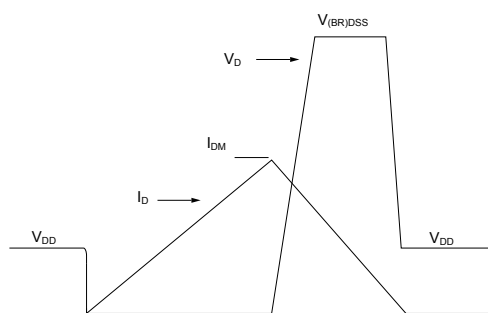
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**Figure 14. Test circuit for inductive load switching and diode recovery times**


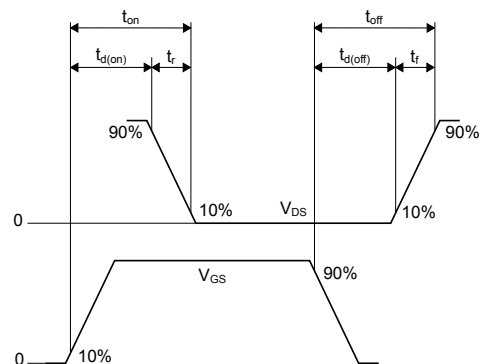
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**Figure 15. Unclamped inductive load test circuit**


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**Figure 16. Unclamped inductive waveform**


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**Figure 17. Switching time waveform**


AM01473v1

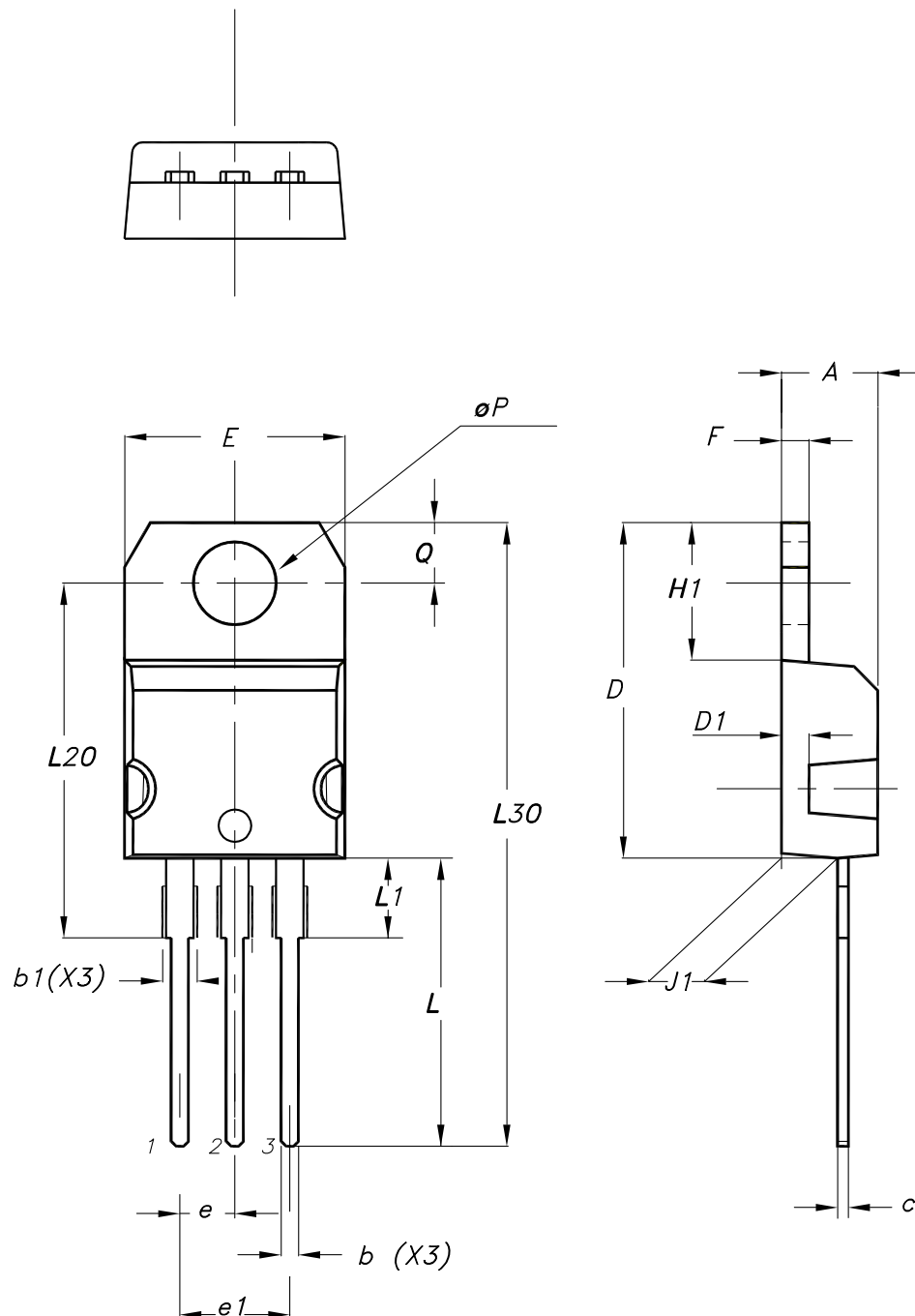


## 4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 4.1 TO-220 type A package information

Figure 18. TO-220 type A package outline



0015988\_typeA\_Rev\_23

**Table 7. TO-220 type A package mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.55
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10.00		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13.00		14.00
L1	3.50		3.93
L20		16.40	
L30		28.90	
øP	3.75		3.85
Q	2.65		2.95
Slug flatness		0.03	0.10

## Revision history

**Table 8. Document revision history**

Date	Version	Changes
27-Jul-2021	1	First release
16-Mar-2023	2	Updated title in cover page

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