

R6



Bidirectional



Unidirectional

Features

- Peak pulse power:
 - 5000 W (10/1000 μ s)
 - up to 60 kW (8/20 μ s)
- Stand-off voltage range from 12 V to 180 V
- Unidirectional and bidirectional types
- Operating T_j max: 175 °C
- High power capability at T_j max.: up to 3700 W (10/1000 μ s)
- Lead finishing: matte tin plating

Complies with the following standards

- UL94, V0
- J-STD-002, JESD 22-B102 E3 and MIL-STD-750, method 2026
- JESD-201 class 2 whisker test
- UL 497B file number: QVGQ2.E136224
- IEC 61000-4-4 level 4:
 - 4 kV
- IEC 61000-4-2, C = 150 pF, R = 330 Ω exceeds level 4:
 - 30 kV (air discharge)
 - 30 kV (contact discharge)

Description

The BZW50 TVS series is designed to protect sensitive equipment against electrostatic discharges according to IEC 61000-4-2, MIL STD 883 Method 3015, and electrical overstress such as IEC 61000-4-4 and 5. They are used for surges below 5000 W 10/1000 μ s.

This planar technology makes it compatible with high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time.

Product status link

BZW50-12,	BZW50-12B,
BZW50-15,	BZW50-15B,
BZW50-18,	BZW50-18B,
BZW50-22,	BZW50-22B,
BZW50-27,	BZW50-27B,
BZW50-33,	BZW50-33B,
BZW50-39,	BZW50-39B,
BZW50-47,	BZW50-47B,
BZW50-56,	BZW50-56B,
BZW50-68,	BZW50-68B,
BZW50-82,	BZW50-82B,
BZW50-100,	BZW50-100B,
BZW50-120,	BZW50-120B,
BZW50-150,	BZW50-150B,
BZW50-180.	BZW50-180B.

1 Characteristics

Table 1. Absolute maximum ratings ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

Symbol	Parameter	Value	Unit
P_{PP}	Peak pulse power dissipation	5000	W
P	Power dissipation on infinite heatsink	6.5	W
I_{FSM}	Non repetitive surge peak forward current for unidirectional types	500	A
T_{stg}	Storage temperature range	-65 to +175	$^{\circ}\text{C}$
T_{op}	Operating junction temperature range	-55 to +175	$^{\circ}\text{C}$
T_L	Maximum lead temperature for soldering during 10 s at 5 mm from case.	260	$^{\circ}\text{C}$

Figure 1. Electrical characteristics (definitions)

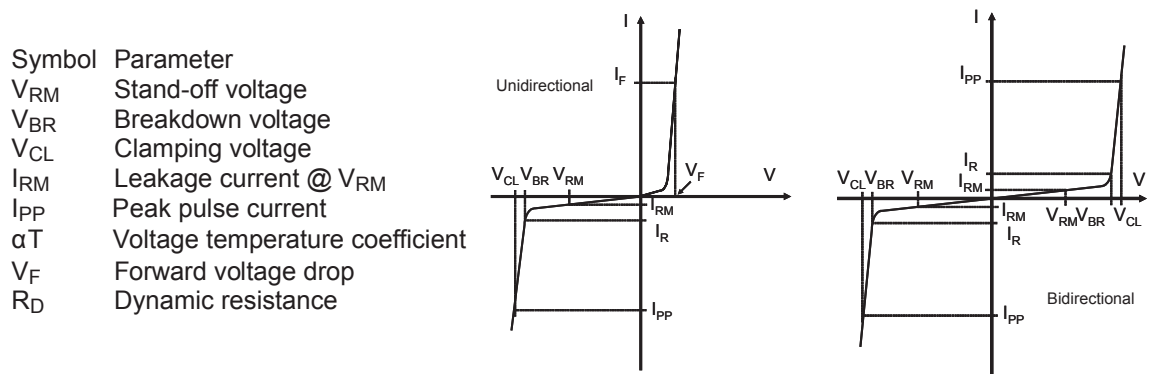


Figure 2. Pulse definition for electrical characteristics

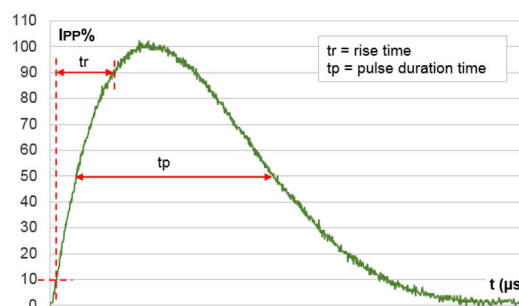


Table 2. Electrical characteristics - parameter values ($T_{amb} = 25\text{ °C}$, unless otherwise specified)

Type	I_{RM} max at V_{RM}		V_{BR} at $I_{BR}^{(1)}$		10 / 1000 μs			8 / 20 μs			αT
					$V_{CL}^{(2)(3)}$	$I_{PP}^{(4)}$	R_D	$V_{CL}^{(2)(3)}$	$I_{PP}^{(4)}$	R_D	
	25 °C		Min.		Max.		Max.	Max.		Max.	Max.
	μA	V	V	mA	V	A	Ω	V	A	Ω	$10^{-4}/^{\circ}C$
BZW50-12/B	5	12	13.3	1	22	227	0.032	28	2143	0.006	8.4
BZW50-15/B	5	15	16.6	1	26.9	186	0.046	35	1714	0.010	8.8
BZW50-18/B	5	18	20	1	32.2	155	0.065	41.5	1446	0.013	9.2
BZW50-22/B	5	22	24.4	1	39.4	127	0.098	51	1177	0.020	9.6
BZW50-27/B	5	27	30	1	48.3	103	0.147	62	968	0.030	9.8
BZW50-33/B	5	33	36.6	1	59	85	0.218	76	789	0.045	10
BZW50-39/B	5	39	43.3	1	69.4	72	0.299	90	667	0.063	10.1
BZW50-47/B	5	47	52	1	83.2	60.1	0.428	108	556	0.091	10.3
BZW50-56/B	5	56	62.2	1	99.6	50	0.617	129	465	0.130	10.4
BZW50-68/B	5	68	75.6	1	121	41	0.913	157	382	0.192	10.5
BZW50-82/B	5	82	91	1	145	34	1.31	189	317	0.279	10.6
BZW50-100/B	5	100	111	1	179	28	2.01	228	263	0.400	10.7
BZW50-120/B	5	120	133	1	215	23	2.96	274	219	0.580	10.8
BZW50-150/B	5	150	166	1	269	19	4.50	343	175	0.912	10.8
BZW50-180/B	5	180	200	1	322	16	6.31	410	146	1.294	10.8

1. To calculate V_{BR} versus T_j : V_{BR} at $T_j = V_{BR}$ at $25\text{ °C} \times (1 + \alpha T \times (T_j - 25))$
2. To calculate V_{CL} versus T_j : V_{CL} at $T_j = V_{CL}$ at $25\text{ °C} \times (1 + \alpha T \times (T_j - 25))$
3. To calculate V_{CL} max versus $I_{PPappli}$: V_{CL} max = $V_{CL} - R_D \times (I_{PP} - I_{PPappli})$ where $I_{PPappli}$ is the surge current in the application.
4. Surge capability given for both directions for unidirectional and bidirectional devices

1.1 Characteristics (curves)

Figure 3. Maximum peak power dissipation versus initial junction temperature

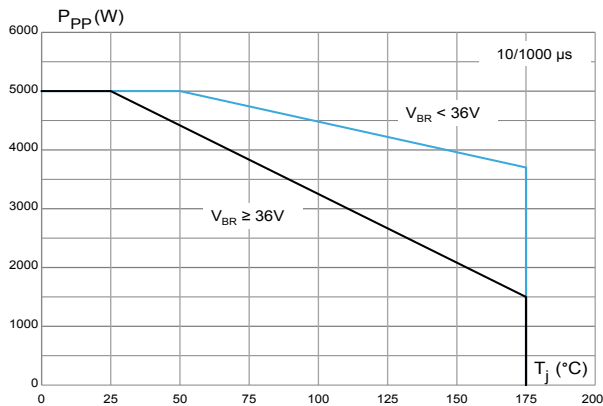


Figure 4. Maximum peak pulse power versus exponential pulse duration

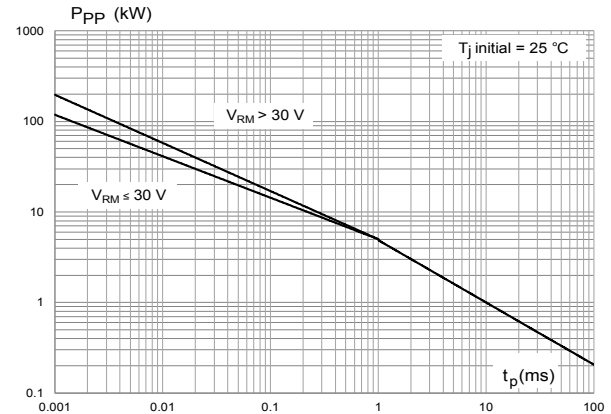


Figure 5. Maximum peak pulse current versus clamping voltage

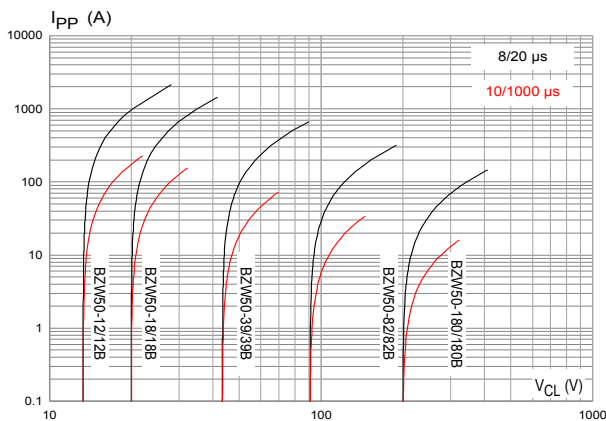


Figure 6. Dynamic resistance versus pulse duration

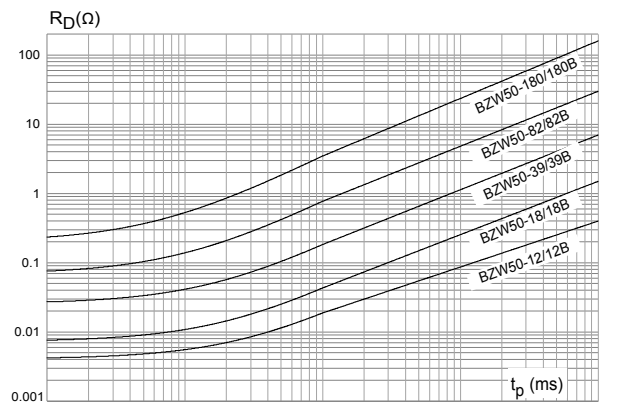


Figure 7. Junction capacitance versus reverse applied voltage (unidirectional type)

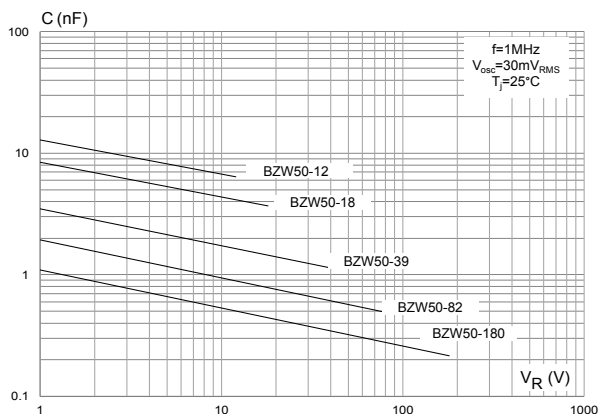


Figure 8. Junction capacitance versus applied voltage (bidirectional type)

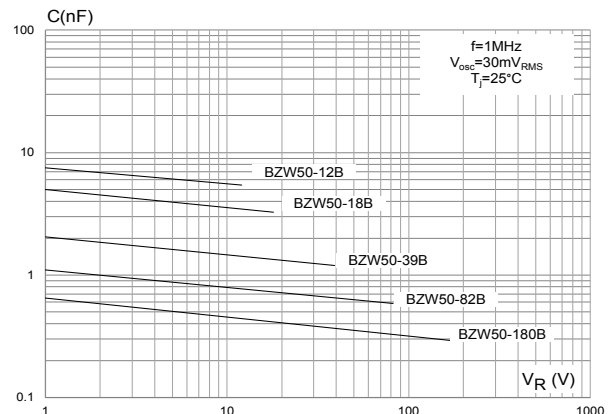


Figure 9. Leakage current versus junction temperature

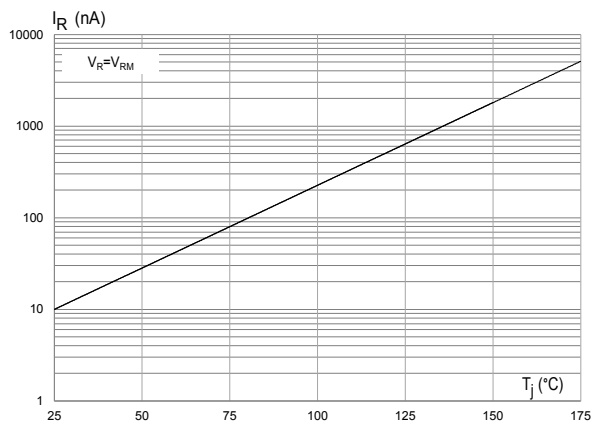


Figure 10. Peak forward voltage drop versus peak forward current

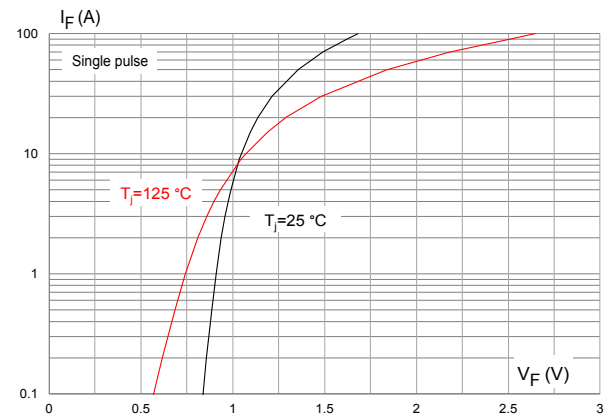


Figure 11. Thermal impedance junction to ambient versus pulse duration

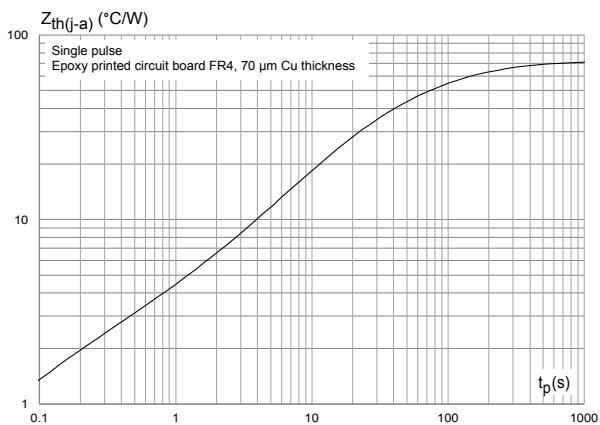
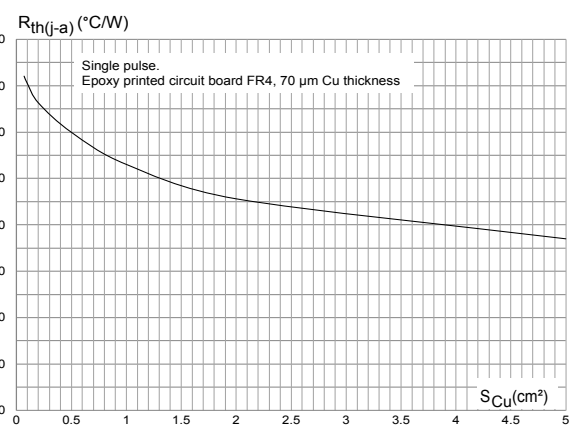


Figure 12. Thermal resistance junction to ambient versus copper area under each lead

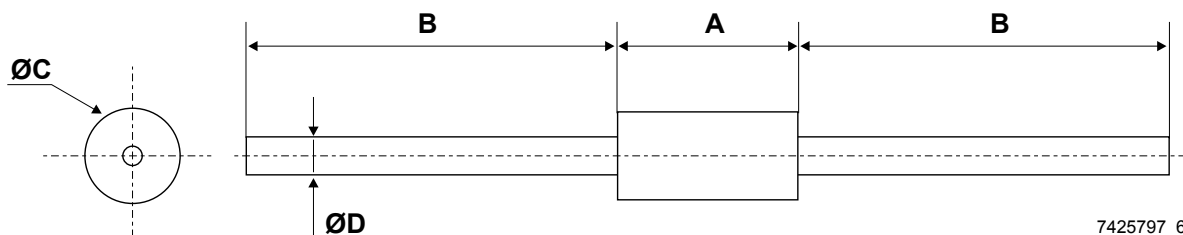


2 Package information

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. ECOPACK is an ST trademark.

2.1 R6 package information

Figure 13. R6 package outline



7425797_6

Table 3. R6 mechanical data

Ref.	Dimensions					
	mm			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	8.60	8.85	9.10	0.338	0.348	0.359
B	25.40			1.000		
C	8.60	8.85	9.10	0.338	0.348	0.359
D	1.20	1.25	1.30	0.047	0.049	0.052

1. Inches given for reference only

Figure 14. Marking layout

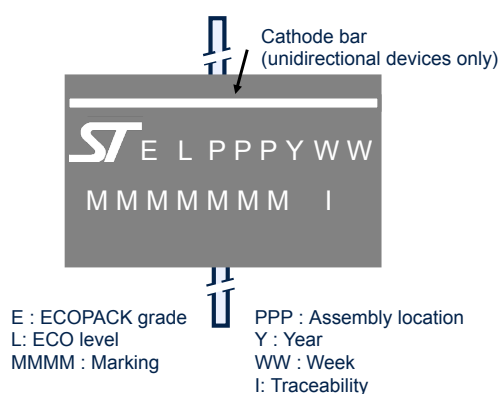


Figure 15. Tape and reel orientation

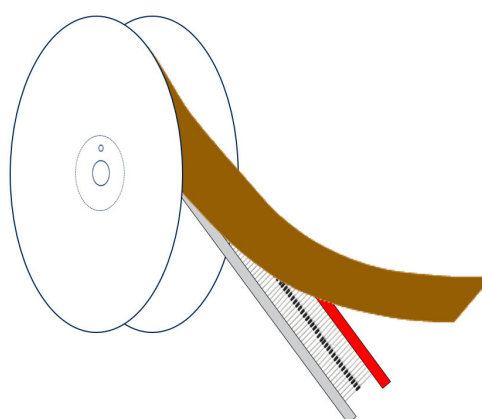


Figure 16. Reel dimension values (mm)

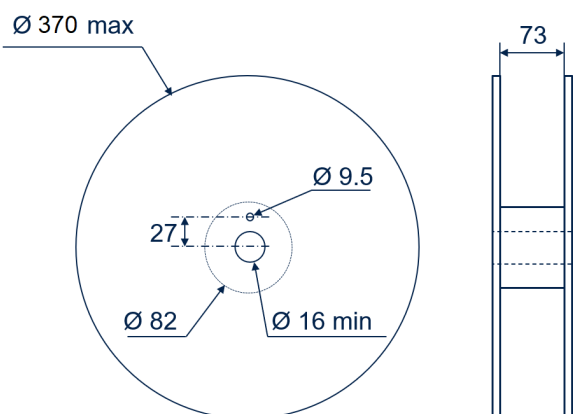


Figure 17. Inner box dimension values (mm)

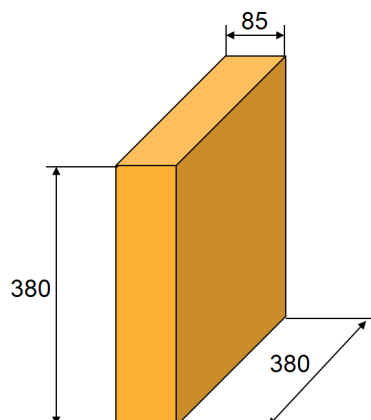


Figure 18. Ammopack dimension values (mm)

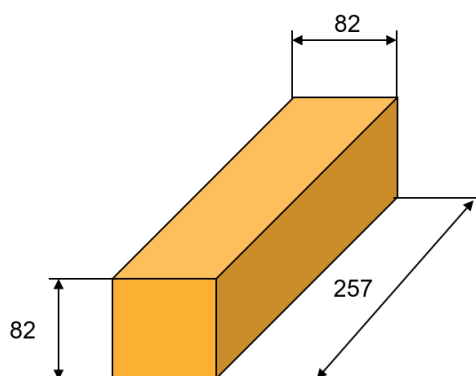
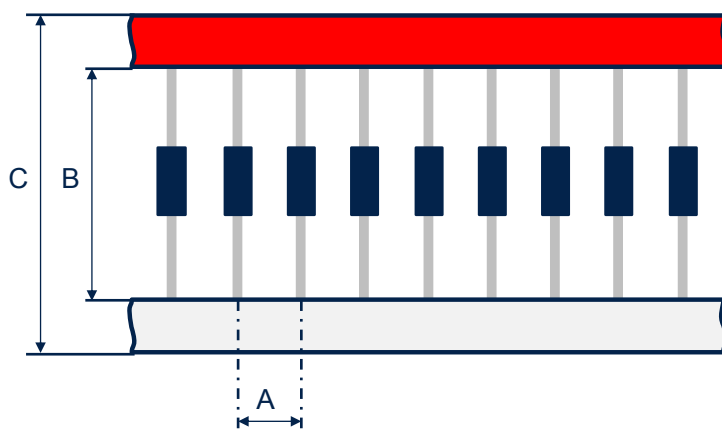


Figure 19. Tape outline



Dimensions are not to scale

Unidirectional components are oriented with red tape on the cathode and white tape on the anode.

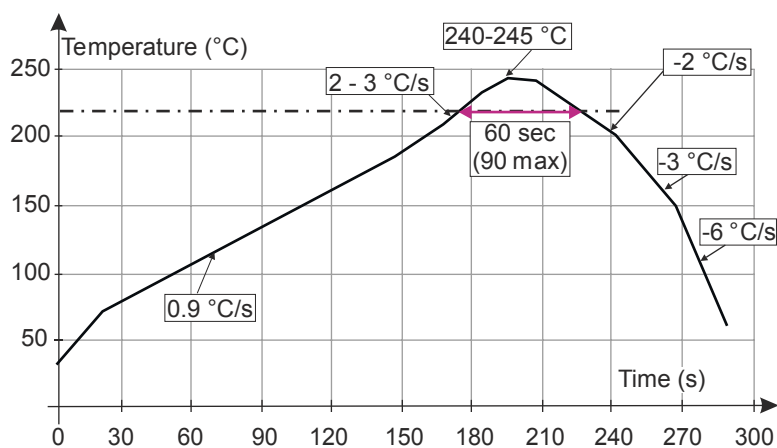
Bidirectional components have red tape on both sides.

Table 4. Tape dimension values

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
A	9.5	10	10.5
B	51	53	55
C	62	65	68

2.2 Reflow profile

Figure 20. ST ECOPACK recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

For wave soldering profile refer to AN5088 chapter 1.5.

- [AN5088](#): Rectifiers thermal management, handling and mounting recommendations.

3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BZW50-xxRL/BZW50-xxBRL ⁽¹⁾	Equal to order code (without RL suffix)	R6	2.05 g	1000	Reel
BZW50xx/B	Equal to order code			100	Ammopack

1. Where xx corresponds to V_{RM} and blank or B indicates unidirectional or bidirectional version.

Revision history

Table 6. Document revision history

Date	Revision	Changes
Feb-2003	4	Last update.
14-Dec-2012	5	Updated ECOPACK statement.
25-May-2018	6	Updated title description. Updated Figure 2. Pulse definition for electrical characteristics and Figure 12. Ordering information scheme.
06-Mar-2023	7	Added packing information.
30-Jan-2026	8	Updated Section Complies with the following standards , and Figure 13 .

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