

Metallized Polyester Capacitors (MKT)

Series/Type: **B32559**

The following products presented in this data sheet are being withdrawn.

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C8822M489		2020-05-29	2020-09-30	2020-12-31
B32559C8822M389		2020-05-29	2020-09-30	2020-12-31
B32559C8822M289		2020-05-29	2020-09-30	2020-12-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C8822M189		2020-05-29	2020-09-30	2020-12-31
B32559C8822M001		2020-05-29	2020-09-30	2020-12-31
B32559C8822M000		2020-05-29	2020-09-30	2020-12-31
B32559C8822K489		2020-05-29	2020-09-30	2020-12-31
B32559C8822K389		2020-05-29	2020-09-30	2020-12-31
B32559C8822K289		2020-05-29	2020-09-30	2020-12-31
B32559C8822K189		2020-05-29	2020-09-30	2020-12-31
B32559C8822K001		2020-05-29	2020-09-30	2020-12-31
B32559C8822K000		2020-05-29	2020-09-30	2020-12-31
B32559C8822J489		2020-05-29	2020-09-30	2020-12-31
B32559C8822J389		2020-05-29	2020-09-30	2020-12-31
B32559C8822J289		2020-05-29	2020-09-30	2020-12-31
B32559C8822J189		2020-05-29	2020-09-30	2020-12-31
B32559C8822J001		2020-05-29	2020-09-30	2020-12-31
B32559C8822J000		2020-05-29	2020-09-30	2020-12-31
B32559C8682M489		2020-05-29	2020-09-30	2020-12-31
B32559C8682M389		2020-05-29	2020-09-30	2020-12-31
B32559C8682M289		2020-05-29	2020-09-30	2020-12-31
B32559C8682M189		2020-05-29	2020-09-30	2020-12-31
B32559C8682M001		2020-05-29	2020-09-30	2020-12-31
B32559C8682M000		2020-05-29	2020-09-30	2020-12-31
B32559C8682K489		2020-05-29	2020-09-30	2020-12-31
B32559C8682K389		2020-05-29	2020-09-30	2020-12-31
B32559C8682K289		2020-05-29	2020-09-30	2020-12-31
B32559C8682K189		2020-05-29	2020-09-30	2020-12-31
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B32559C8682J389		2020-05-29	2020-09-30	2020-12-31
B32559C8682J289		2020-05-29	2020-09-30	2020-12-31
B32559C8682J189		2020-05-29	2020-09-30	2020-12-31
B32559C8682J001		2020-05-29	2020-09-30	2020-12-31
B32559C8682J000		2020-05-29	2020-09-30	2020-12-31
B32559C8472M489		2020-05-29	2020-09-30	2020-12-31
B32559C8472M389		2020-05-29	2020-09-30	2020-12-31
B32559C8472M289		2020-05-29	2020-09-30	2020-12-31
B32559C8472M189		2020-05-29	2020-09-30	2020-12-31
B32559C8472M001		2020-05-29	2020-09-30	2020-12-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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B32559C8472K389		2020-05-29	2020-09-30	2020-12-31
B32559C8472K289		2020-05-29	2020-09-30	2020-12-31
B32559C8472K189		2020-05-29	2020-09-30	2020-12-31
B32559C8472K001		2020-05-29	2020-09-30	2020-12-31
B32559C8472K000		2020-05-29	2020-09-30	2020-12-31
B32559C8472J489		2020-05-29	2020-09-30	2020-12-31
B32559C8472J389		2020-05-29	2020-09-30	2020-12-31
B32559C8472J289		2020-05-29	2020-09-30	2020-12-31
B32559C8472J189		2020-05-29	2020-09-30	2020-12-31
B32559C8472J001		2020-05-29	2020-09-30	2020-12-31
B32559C8472J000		2020-05-29	2020-09-30	2020-12-31
B32559C8332M489		2020-05-29	2020-09-30	2020-12-31
B32559C8332M389		2020-05-29	2020-09-30	2020-12-31
B32559C8332M289		2020-05-29	2020-09-30	2020-12-31
B32559C8332M189		2020-05-29	2020-09-30	2020-12-31
B32559C8332M001		2020-05-29	2020-09-30	2020-12-31
B32559C8332M000		2020-05-29	2020-09-30	2020-12-31
B32559C8332K489		2020-05-29	2020-09-30	2020-12-31
B32559C8332K389		2020-05-29	2020-09-30	2020-12-31
B32559C8332K289		2020-05-29	2020-09-30	2020-12-31
B32559C8332K189		2020-05-29	2020-09-30	2020-12-31
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B32559C8332J389		2020-05-29	2020-09-30	2020-12-31
B32559C8332J289		2020-05-29	2020-09-30	2020-12-31
B32559C8332J189		2020-05-29	2020-09-30	2020-12-31
B32559C8332J001		2020-05-29	2020-09-30	2020-12-31
B32559C8332J000		2020-05-29	2020-09-30	2020-12-31
B32559C8272M489		2020-05-29	2020-09-30	2020-12-31
B32559C8272M389		2020-05-29	2020-09-30	2020-12-31
B32559C8272M289		2020-05-29	2020-09-30	2020-12-31
B32559C8272M189		2020-05-29	2020-09-30	2020-12-31
B32559C8272M001		2020-05-29	2020-09-30	2020-12-31
B32559C8272M000		2020-05-29	2020-09-30	2020-12-31
B32559C8272K489		2020-05-29	2020-09-30	2020-12-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C8272K389		2020-05-29	2020-09-30	2020-12-31
B32559C8272K289		2020-05-29	2020-09-30	2020-12-31
B32559C8272K189		2020-05-29	2020-09-30	2020-12-31
B32559C8272K001		2020-05-29	2020-09-30	2020-12-31
B32559C8272K000		2020-05-29	2020-09-30	2020-12-31
B32559C8272J489		2020-05-29	2020-09-30	2020-12-31
B32559C8272J389		2020-05-29	2020-09-30	2020-12-31
B32559C8272J289		2020-05-29	2020-09-30	2020-12-31
B32559C8272J189		2020-05-29	2020-09-30	2020-12-31
B32559C8272J001		2020-05-29	2020-09-30	2020-12-31
B32559C8272J000		2020-05-29	2020-09-30	2020-12-31
B32559C8222M489		2020-05-29	2020-09-30	2020-12-31
B32559C8222M389		2020-05-29	2020-09-30	2020-12-31
B32559C8222M289		2020-05-29	2020-09-30	2020-12-31
B32559C8222M189		2020-05-29	2020-09-30	2020-12-31
B32559C8222M001		2020-05-29	2020-09-30	2020-12-31
B32559C8222M000		2020-05-29	2020-09-30	2020-12-31
B32559C8222K489		2020-05-29	2020-09-30	2020-12-31
B32559C8222K389		2020-05-29	2020-09-30	2020-12-31
B32559C8222K289		2020-05-29	2020-09-30	2020-12-31
B32559C8222K189		2020-05-29	2020-09-30	2020-12-31
B32559C8222K001		2020-05-29	2020-09-30	2020-12-31
B32559C8222K000		2020-05-29	2020-09-30	2020-12-31
B32559C8222J489		2020-05-29	2020-09-30	2020-12-31
B32559C8222J389		2020-05-29	2020-09-30	2020-12-31
B32559C8222J289		2020-05-29	2020-09-30	2020-12-31
B32559C8222J189		2020-05-29	2020-09-30	2020-12-31
B32559C8222J001		2020-05-29	2020-09-30	2020-12-31
B32559C8222J000		2020-05-29	2020-09-30	2020-12-31
B32559C8152M489		2020-05-29	2020-09-30	2020-12-31
B32559C8152M389		2020-05-29	2020-09-30	2020-12-31
B32559C8152M289		2020-05-29	2020-09-30	2020-12-31
B32559C8152M189		2020-05-29	2020-09-30	2020-12-31
B32559C8152M001		2020-05-29	2020-09-30	2020-12-31
B32559C8152M000		2020-05-29	2020-09-30	2020-12-31
B32559C8152K489		2020-05-29	2020-09-30	2020-12-31
B32559C8152K389		2020-05-29	2020-09-30	2020-12-31
B32559C8152K289		2020-05-29	2020-09-30	2020-12-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C8152K189		2020-05-29	2020-09-30	2020-12-31
B32559C8152K001		2020-05-29	2020-09-30	2020-12-31
B32559C8152K000		2020-05-29	2020-09-30	2020-12-31
B32559C8152J489		2020-05-29	2020-09-30	2020-12-31
B32559C8152J389		2020-05-29	2020-09-30	2020-12-31
B32559C8152J289		2020-05-29	2020-09-30	2020-12-31
B32559C8152J189		2020-05-29	2020-09-30	2020-12-31
B32559C8152J001		2020-05-29	2020-09-30	2020-12-31
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B32559C8103M489		2020-05-29	2020-09-30	2020-12-31
B32559C8103M389		2020-05-29	2020-09-30	2020-12-31
B32559C8103M289		2020-05-29	2020-09-30	2020-12-31
B32559C8103M189		2020-05-29	2020-09-30	2020-12-31
B32559C8103M001		2020-05-29	2020-09-30	2020-12-31
B32559C8103M000		2020-05-29	2020-09-30	2020-12-31
B32559C8103K489		2020-05-29	2020-09-30	2020-12-31
B32559C8103K389		2020-05-29	2020-09-30	2020-12-31
B32559C8103K289		2020-05-29	2020-09-30	2020-12-31
B32559C8103K189		2020-05-29	2020-09-30	2020-12-31
B32559C8103K001		2020-05-29	2020-09-30	2020-12-31
B32559C8103K000		2020-05-29	2020-09-30	2020-12-31
B32559C8103J489		2020-05-29	2020-09-30	2020-12-31
B32559C8103J389		2020-05-29	2020-09-30	2020-12-31
B32559C8103J289		2020-05-29	2020-09-30	2020-12-31
B32559C8103J189		2020-05-29	2020-09-30	2020-12-31
B32559C8103J001		2020-05-29	2020-09-30	2020-12-31
B32559C8103J000		2020-05-29	2020-09-30	2020-12-31
B32559C8102M489		2017-06-09	2017-09-15	2017-12-15
B32559C8102M389		2017-06-09	2017-09-15	2017-12-15
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B32559C8102M189		2017-06-09	2017-09-15	2017-12-15
B32559C8102M001		2017-06-09	2017-09-15	2017-12-15
B32559C8102M000		2017-06-09	2017-09-15	2017-12-15
B32559C8102K489		2017-06-09	2017-09-15	2017-12-15
B32559C8102K389		2017-06-09	2017-09-15	2017-12-15
B32559C8102K289		2017-06-09	2017-09-15	2017-12-15
B32559C8102K189		2017-06-09	2017-09-15	2017-12-15
B32559C8102K001		2017-06-09	2017-09-15	2017-12-15

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C8102K000		2017-06-09	2017-09-15	2017-12-15
B32559C8102J489		2017-06-09	2017-09-15	2017-12-15
B32559C8102J389		2017-06-09	2017-09-15	2017-12-15
B32559C8102J289		2017-06-09	2017-09-15	2017-12-15
B32559C8102J189		2017-06-09	2017-09-15	2017-12-15
B32559C8102J001		2017-06-09	2017-09-15	2017-12-15
B32559C8102J000		2017-06-09	2017-09-15	2017-12-15
B32559C6822M489		2020-05-29	2020-09-30	2020-12-31
B32559C6822M389		2020-05-29	2020-09-30	2020-12-31
B32559C6822M289		2020-05-29	2020-09-30	2020-12-31
B32559C6822M189		2020-05-29	2020-09-30	2020-12-31
B32559C6822M001		2020-05-29	2020-09-30	2020-12-31
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B32559C6822K489		2020-05-29	2020-09-30	2020-12-31
B32559C6822K389		2020-05-29	2020-09-30	2020-12-31
B32559C6822K289		2020-05-29	2020-09-30	2020-12-31
B32559C6822K189		2020-05-29	2020-09-30	2020-12-31
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B32559C6822K000		2020-05-29	2020-09-30	2020-12-31
B32559C6822J489		2020-05-29	2020-09-30	2020-12-31
B32559C6822J389		2020-05-29	2020-09-30	2020-12-31
B32559C6822J289		2020-05-29	2020-09-30	2020-12-31
B32559C6822J189		2020-05-29	2020-09-30	2020-12-31
B32559C6822J001		2020-05-29	2020-09-30	2020-12-31
B32559C6822J000		2020-05-29	2020-09-30	2020-12-31
B32559C6683M489		2020-05-29	2020-09-30	2020-12-31
B32559C6683M389		2020-05-29	2020-09-30	2020-12-31
B32559C6683M289		2020-05-29	2020-09-30	2020-12-31
B32559C6683M189		2020-05-29	2020-09-30	2020-12-31
B32559C6683M001		2020-05-29	2020-09-30	2020-12-31
B32559C6683M000		2020-05-29	2020-09-30	2020-12-31
B32559C6683K489		2020-05-29	2020-09-30	2020-12-31
B32559C6683K389		2020-05-29	2020-09-30	2020-12-31
B32559C6683K289		2020-05-29	2020-09-30	2020-12-31
B32559C6683K189		2020-05-29	2020-09-30	2020-12-31
B32559C6683K001		2020-05-29	2020-09-30	2020-12-31
B32559C6683K000		2020-05-29	2020-09-30	2020-12-31
B32559C6683J489		2020-05-29	2020-09-30	2020-12-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C6683J389		2020-05-29	2020-09-30	2020-12-31
B32559C6683J289		2020-05-29	2020-09-30	2020-12-31
B32559C6683J189		2020-05-29	2020-09-30	2020-12-31
B32559C6683J001		2020-05-29	2020-09-30	2020-12-31
B32559C6683J000		2020-05-29	2020-09-30	2020-12-31
B32559C6682M489		2020-05-29	2020-09-30	2020-12-31
B32559C6682M389		2020-05-29	2020-09-30	2020-12-31
B32559C6682M289		2020-05-29	2020-09-30	2020-12-31
B32559C6682M189		2020-05-29	2020-09-30	2020-12-31
B32559C6682M001		2020-05-29	2020-09-30	2020-12-31
B32559C6682M000		2020-05-29	2020-09-30	2020-12-31
B32559C6682K489		2020-05-29	2020-09-30	2020-12-31
B32559C6682K389		2020-05-29	2020-09-30	2020-12-31
B32559C6682K289		2020-05-29	2020-09-30	2020-12-31
B32559C6682K189		2020-05-29	2020-09-30	2020-12-31
B32559C6682K001		2020-05-29	2020-09-30	2020-12-31
B32559C6682K000		2020-05-29	2020-09-30	2020-12-31
B32559C6682J489		2020-05-29	2020-09-30	2020-12-31
B32559C6682J389		2020-05-29	2020-09-30	2020-12-31
B32559C6682J289		2020-05-29	2020-09-30	2020-12-31
B32559C6682J189		2020-05-29	2020-09-30	2020-12-31
B32559C6682J001		2020-05-29	2020-09-30	2020-12-31
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B32559C6563M489		2020-05-29	2020-09-30	2020-12-31
B32559C6563M389		2020-05-29	2020-09-30	2020-12-31
B32559C6563M289		2020-05-29	2020-09-30	2020-12-31
B32559C6563M189		2020-05-29	2020-09-30	2020-12-31
B32559C6563M001		2020-05-29	2020-09-30	2020-12-31
B32559C6563M000		2020-05-29	2020-09-30	2020-12-31
B32559C6563K489		2020-05-29	2020-09-30	2020-12-31
B32559C6563K389		2020-05-29	2020-09-30	2020-12-31
B32559C6563K289		2020-05-29	2020-09-30	2020-12-31
B32559C6563K189		2020-05-29	2020-09-30	2020-12-31
B32559C6563K001		2020-05-29	2020-09-30	2020-12-31
B32559C6563K000		2020-05-29	2020-09-30	2020-12-31
B32559C6563J489		2020-05-29	2020-09-30	2020-12-31
B32559C6563J389		2020-05-29	2020-09-30	2020-12-31
B32559C6563J289		2020-05-29	2020-09-30	2020-12-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C6563J189		2020-05-29	2020-09-30	2020-12-31
B32559C6563J001		2020-05-29	2020-09-30	2020-12-31
B32559C6563J000		2020-05-29	2020-09-30	2020-12-31
B32559C6473M489		2020-05-29	2020-09-30	2020-12-31
B32559C6473M389		2020-05-29	2020-09-30	2020-12-31
B32559C6473M289		2020-05-29	2020-09-30	2020-12-31
B32559C6473M189		2020-05-29	2020-09-30	2020-12-31
B32559C6473M001		2020-05-29	2020-09-30	2020-12-31
B32559C6473M000		2020-05-29	2020-09-30	2020-12-31
B32559C6473K489		2020-05-29	2020-09-30	2020-12-31
B32559C6473K389		2020-05-29	2020-09-30	2020-12-31
B32559C6473K289		2020-05-29	2020-09-30	2020-12-31
B32559C6473K189		2020-05-29	2020-09-30	2020-12-31
B32559C6473K001		2020-05-29	2020-09-30	2020-12-31
B32559C6473K000		2020-05-29	2020-09-30	2020-12-31
B32559C6473J489		2020-05-29	2020-09-30	2020-12-31
B32559C6473J389		2020-05-29	2020-09-30	2020-12-31
B32559C6473J289		2020-05-29	2020-09-30	2020-12-31
B32559C6473J189		2020-05-29	2020-09-30	2020-12-31
B32559C6473J001		2020-05-29	2020-09-30	2020-12-31
B32559C6473J000		2020-05-29	2020-09-30	2020-12-31
B32559C6333M489		2020-05-29	2020-09-30	2020-12-31
B32559C6333M389		2020-05-29	2020-09-30	2020-12-31
B32559C6333M289		2020-05-29	2020-09-30	2020-12-31
B32559C6333M189		2020-05-29	2020-09-30	2020-12-31
B32559C6333M001		2020-05-29	2020-09-30	2020-12-31
B32559C6333M000		2020-05-29	2020-09-30	2020-12-31
B32559C6333K489		2020-05-29	2020-09-30	2020-12-31
B32559C6333K389		2020-05-29	2020-09-30	2020-12-31
B32559C6333K289		2020-05-29	2020-09-30	2020-12-31
B32559C6333K189		2020-05-29	2020-09-30	2020-12-31
B32559C6333K001		2020-05-29	2020-09-30	2020-12-31
B32559C6333K000		2020-05-29	2020-09-30	2020-12-31
B32559C6333J489		2020-05-29	2020-09-30	2020-12-31
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B32559C6333J289		2020-05-29	2020-09-30	2020-12-31
B32559C6333J189		2020-05-29	2020-09-30	2020-12-31
B32559C6333J001		2020-05-29	2020-09-30	2020-12-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B32559C6333J000		2020-05-29	2020-09-30	2020-12-31
B32559C6273M489		2020-05-29	2020-09-30	2020-12-31
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B32559C6273M289		2020-05-29	2020-09-30	2020-12-31
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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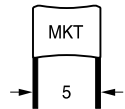
Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
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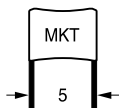
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B32559C0105M001		2020-05-29	2020-09-30	2020-12-31
B32559C0105M000		2020-05-29	2020-09-30	2020-12-31
B32559C0105K489		2020-05-29	2020-09-30	2020-12-31
B32559C0105K389		2020-05-29	2020-09-30	2020-12-31
B32559C0105K289		2020-05-29	2020-09-30	2020-12-31
B32559C0105K189		2020-05-29	2020-09-30	2020-12-31
B32559C0105K001		2020-05-29	2020-09-30	2020-12-31
B32559C0105K000		2020-05-29	2020-09-30	2020-12-31
B32559C0105J489		2020-05-29	2020-09-30	2020-12-31
B32559C0105J389		2020-05-29	2020-09-30	2020-12-31
B32559C0105J289		2020-05-29	2020-09-30	2020-12-31
B32559C0105J189		2020-05-29	2020-09-30	2020-12-31
B32559C0105J001		2020-05-29	2020-09-30	2020-12-31
B32559C0105J000		2020-05-29	2020-09-30	2020-12-31

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Overview of available types

Lead spacing	5.0 mm				
Type	B32559C				
Lead configuration	straight / crimped				
Page	4				
V_R (V DC)	63	100	250	400	630
V_{RMS} (V AC)	40	63	160	200	400
C_R (μF)					
0.0010					
0.0015					
0.0022					
0.0027					
0.0033					
0.0047					
0.0068					
0.0082					
0.010					
0.012					
0.015					
0.022					
0.027					
0.033					
0.047					
0.056					
0.068					
0.10					
0.12					
0.15					
0.22					
0.33					
0.47					
0.68					
1.0					



B32559C

Compact design (stacked)

Ordering codes and packing units

V_R	V_{RMS} $f \leq 60 \text{ Hz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
V DC	V AC	μF					
63	40	0.22	$3.0 \times 6.5 \times 7.0$	B32559C0224+***	11200	9600	10000
		0.33	$3.0 \times 6.5 \times 7.0$	B32559C0334+***	12000	10400	10000
		0.47	$3.5 \times 7.0 \times 7.0$	B32559C0474+***	12000	10400	10000
		0.68	$3.5 \times 8.5 \times 7.0$	B32559C0684+***	9200	7600	8000
		1.0	$4.0 \times 10.5 \times 7.0$	B32559C0105+***	9200	7600	8000
100	63	0.033	$3.0 \times 6.5 \times 7.0$	B32559C1333+***	12000	10400	12000
		0.047	$3.0 \times 6.5 \times 7.0$	B32559C1473+***	12800	11200	12000
		0.056	$3.0 \times 7.0 \times 7.0$	B32559C1563+***	12000	10400	12000
		0.068	$3.0 \times 7.0 \times 7.0$	B32559C1683+***	12800	11200	12000
		0.10	$3.0 \times 7.0 \times 7.0$	B32559C1104+***	12800	11200	12000
		0.12	$3.0 \times 7.0 \times 7.0$	B32559C1124+***	12800	11200	12000
		0.15	$3.0 \times 7.0 \times 7.0$	B32559C1154+***	12800	11200	12000
		0.22	$3.5 \times 8.5 \times 7.0$	B32559C1224+***	11600	10000	12000
		0.33	$3.5 \times 8.5 \times 7.0$	B32559C1334+***	11600	10000	12000
		0.47	$3.5 \times 9.0 \times 7.0$	B32559C1474+***	10000	8400	10000
250	160	0.022	$3.0 \times 7.0 \times 7.0$	B32559C3223+***	12800	11200	12000
		0.027	$3.0 \times 7.0 \times 7.0$	B32559C3273+***	12800	11200	12000
		0.033	$3.0 \times 7.0 \times 7.0$	B32559C3333+***	12000	10400	12000
		0.047	$3.0 \times 7.0 \times 7.0$	B32559C3473+***	12800	11200	12000
		0.056	$3.0 \times 7.0 \times 7.0$	B32559C3563+***	10800	9200	1000
		0.068	$3.5 \times 7.0 \times 7.0$	B32559C3683+***	10800	9200	1000
		0.10	$3.5 \times 9.0 \times 7.0$	B32559C3104+***	12000	10400	8000
		0.12	$4.5 \times 9.0 \times 7.0$	B32559C3124+***	7200	5800	8000
		0.15	$4.5 \times 10.0 \times 7.0$	B32559C3154+***	7200	5600	8000

MOQ = Minimum Order Quantity, consisting of 4 packing units.

Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:

M = $\pm 20\%$

K = $\pm 10\%$

J = $\pm 5\%$

*** = Packaging code:

489 = Ammo pack straight

389 = Reel straight

289 = Ammo pack crimped

189 = Reel crimped

000 = Untaped crimped (lead length 6 – 1 mm)

001 = Untaped (lead length 6 – 1 mm)

Ordering codes and packing units

V_R	V_{RMS} $f \leq 60 \text{ Hz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
V DC	V AC	μF					
400	200	0.0068	$3.0 \times 7.0 \times 7.0$	B32559C6682+***	12800	11200	12000
		0.0082	$3.0 \times 7.0 \times 7.0$	B32559C6822+***	12800	11200	12000
		0.010	$3.0 \times 7.5 \times 7.0$	B32559C6103+***	12800	11200	12000
		0.012	$3.0 \times 7.5 \times 7.0$	B32559C6123+***	12000	10400	12000
		0.015	$3.0 \times 7.5 \times 7.0$	B32559C6153+***	11200	9600	12000
		0.022	$3.0 \times 8.0 \times 7.0$	B32559C6223+***	12800	11200	12000
		0.027	$3.0 \times 8.0 \times 7.0$	B32559C6273+***	10800	9200	11200
		0.033	$3.5 \times 8.0 \times 7.0$	B32559C6333+***	9200	7600	10000
		0.047	$3.5 \times 9.5 \times 7.0$	B32559C6473+***	9200	7600	8000
		0.056	$4.0 \times 10.0 \times 7.0$	B32559C6563+***	8000	6400	6000
		0.068	$5.0 \times 10.0 \times 7.0$	B32559C6683+***	7200	5600	7200
		0.10	$5.5 \times 12.5 \times 7.0$	B32559C6104+***	6000	4400	7200
		0.12	$5.5 \times 13.0 \times 7.0$	B32559C6124+***	6000	4400	4800
630	400	0.0010	$3.0 \times 7.0 \times 7.0$	B32559C8102+***	12800	11200	12000
		0.0015	$3.0 \times 7.0 \times 7.0$	B32559C8152+***	12800	11200	12000
		0.0022	$3.0 \times 8.0 \times 7.0$	B32559C8222+***	12800	11200	12000
		0.0027	$3.0 \times 8.0 \times 7.0$	B32559C8272+***	12800	11200	12000
		0.0033	$3.5 \times 8.0 \times 7.0$	B32559C8332+***	10000	8400	8000
		0.0047	$3.5 \times 8.0 \times 7.0$	B32559C8472+***	12000	10400	8000
		0.0068	$3.5 \times 10.5 \times 7.0$	B32559C8682+***	12000	10400	8000
		0.0082	$3.5 \times 10.5 \times 7.0$	B32559C8822+***	12000	10400	8000
		0.010	$4.0 \times 10.5 \times 7.0$	B32559C8103+***	9200	7600	8800

MOQ = Minimum Order Quantity, consisting of 4 packing units.

Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:

M = $\pm 20\%$

K = $\pm 10\%$

J = $\pm 5\%$

*** = Packaging code:

489 = Ammo pack straight

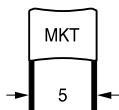
389 = Reel straight

289 = Ammo pack crimped

189 = Reel crimped

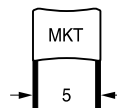
000 = Untaped crimped (lead length 6 – 1 mm)

001 = Untaped (lead length 6 – 1 mm)


B32559C
Compact design (stacked)

Technical data

Operating temperature range	Max. operating temperature $T_{op,max}$		+125 °C
	Upper category temperature T_{max}		+125 °C
	Lower category temperature T_{min}		−55 °C
	Rated temperature T_R		+85 °C
Dissipation factor $\tan \delta$ (in 10^{-3}) at 20 °C (upper limit values)	at	$C_R \leq 0.1 \mu F$	$0.1 \mu F < C_R \leq 1 \mu F$
	1 kHz	8	10
	10 kHz	15	20
	100 kHz	30	—
Insulation resistance R_{ins} or time constant $\tau = C_R \cdot R_{ins}$ at 20 °C, rel. humidity $\leq 65\%$ (minimum as-delivered values)	V_R	$C_R \leq 0.33 \mu F$	$C_R > 0.33 \mu F$
	≤ 100 V DC	3750 M Ω	1250 s
	≥ 250 V DC	7500 M Ω	2500 s
DC test voltage	1.4 · V_R , 2 s		
Category voltage V_C (continuous operation with V_{DC} or V_{AC} at $f \leq 60$ Hz)	T_A (°C)	DC voltage derating	AC voltage derating
	$T_A \leq 85$	$V_C = V_R$	$V_{C,RMS} = V_{RMS}$
	$85 < T_A \leq 125$	$V_C = V_R \cdot (165 - T_A)/80$	$V_{C,RMS} = V_{RMS} \cdot (165 - T_A)/80$
Operating voltage V_{op} for short operating periods (V_{DC} or V_{AC} at $f \leq 60$ Hz)	T_A (°C)	DC voltage (max. hours)	AC voltage (max. hours)
	$T_A \leq 100$	$V_{op} = 1.25 \cdot V_C$ (2000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (2000 h)
	$100 < T_A \leq 125$	$V_{op} = 1.25 \cdot V_C$ (1000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (1000 h)
Damp heat test	56 days/40 °C/93% relative humidity		
Limit values after damp heat test	Capacitance change $ \Delta C/C $	$\leq 5\%$	
	Dissipation factor change $\Delta \tan \delta$	$\leq 5 \cdot 10^{-3}$ (at 1 kHz)	
	Insulation resistance R_{ins}	$\geq 50\%$ of minimum	
	or time constant $\tau = C_R \cdot R_{ins}$	as-delivered values	
Reliability:			
Failure rate λ	1 fit ($\leq 1 \cdot 10^{-9}$ /h) at 0.5 · V_R , 40 °C		
Service life t_{SL}	200 000 h at 1.0 · V_R , 85 °C		
	For conversion to other operating conditions and temperatures, refer to chapter "Quality, 2 Reliability".		
Failure criteria:			
Total failure	Short circuit or open circuit		
Failure due to variation of parameters	Capacitance change $ \Delta C/C $	> 10%	
	Dissipation factor $\tan \delta$	> 2 · upper limit value	
	Insulation resistance R_{ins}	< 150 M Ω ($C_R \leq 0.33 \mu F$)	
	or time constant $\tau = C_R \cdot R_{ins}$	< 50 s ($C_R > 0.33 \mu F$)	
Soldering conditions	Maximum solder bath temperature	260 °C	
	Maximum soldering time	4 s	



Pulse handling capability

"dV/dt" represents the maximum permissible voltage change per unit of time for non-sinusoidal voltages, expressed in V/ μ s.

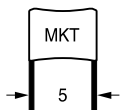
"k₀" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in V²/ μ s.

Note:

The values of dV/dt and k₀ provided below must not be exceeded in order to avoid damaging the capacitor.

dV/dt and k₀ values

V _R (V DC)	V _{RMS} (V AC)	dV/dt in V/ μ s	k ₀ in V ² / μ s
63	40	250	30 000
100	63	300	60 000
250	160	400	200 000
400	200	600	500 000
630	400	800	1 000 000

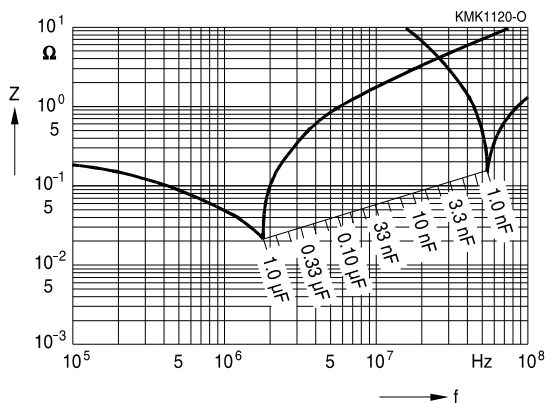


B32559C

Compact design (stacked)

Impedance Z versus frequency f

(typical values)

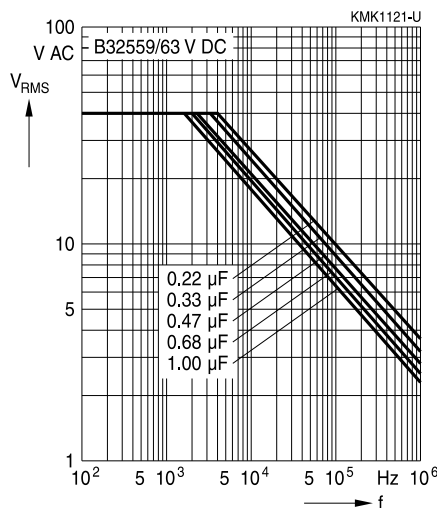


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55^\circ\text{C}$)

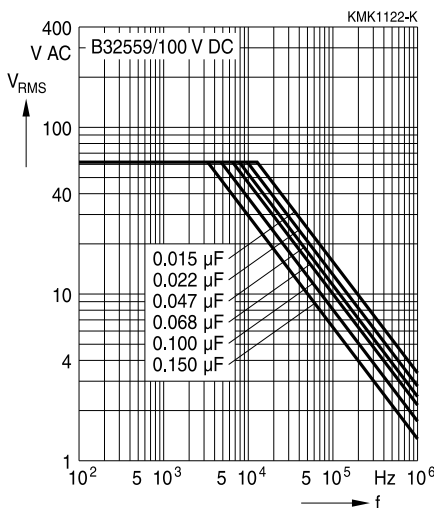
For $T_A > 55^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 5 mm

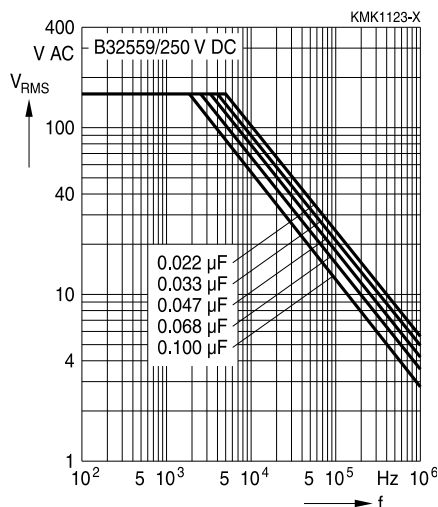
63 V DC/40 V AC



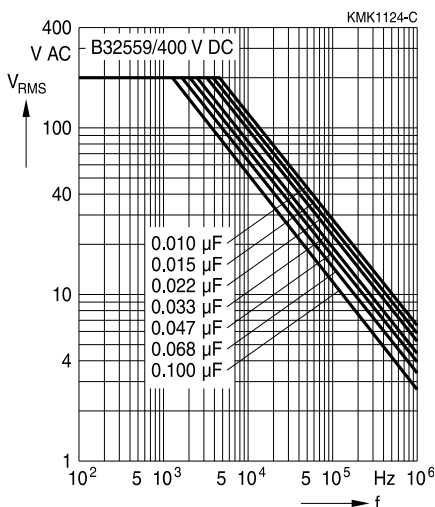
100 V DC/63 V AC

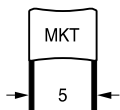


250 V DC/160 V AC



400 V DC/200 V AC





B32559C

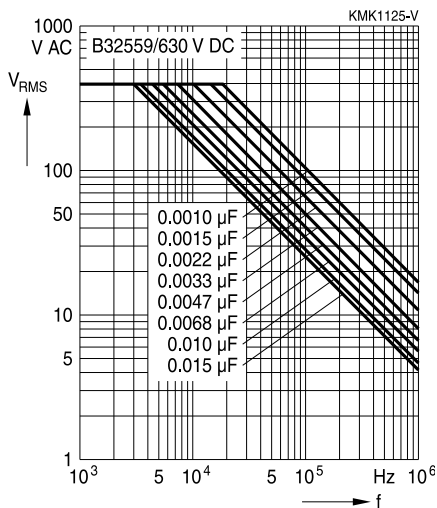
Compact design (stacked)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55^\circ\text{C}$)

For $T_A > 55^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 5 mm

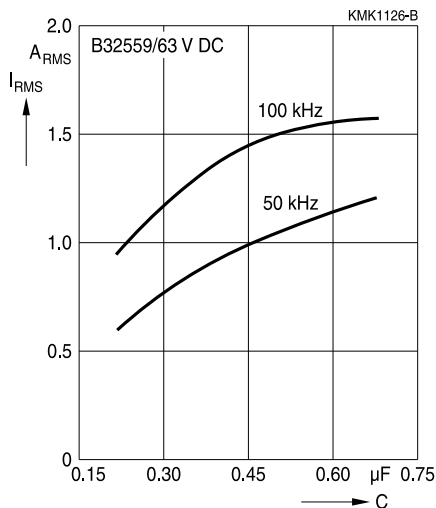
630 V DC/400 V AC



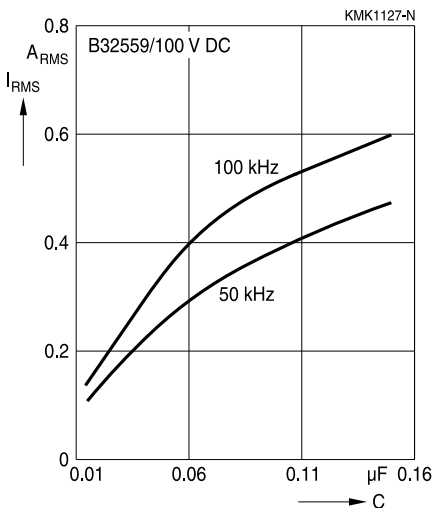
Permissible AC current I_{RMS} versus frequency f

Lead spacing 5 mm

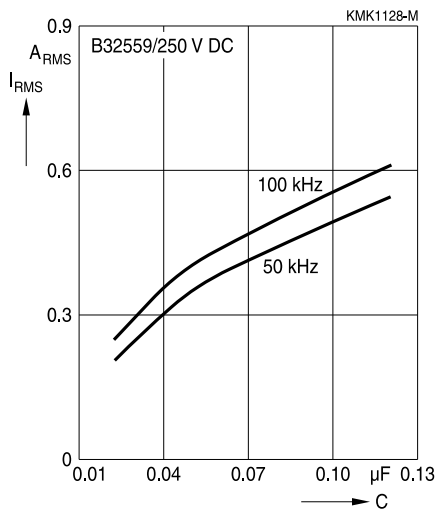
63 V DC/40 V AC



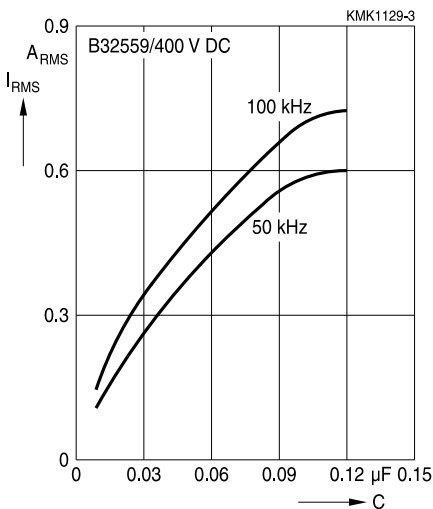
100 V DC/63 V AC

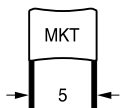


250 V DC/160 V AC



400 V DC/200 V AC





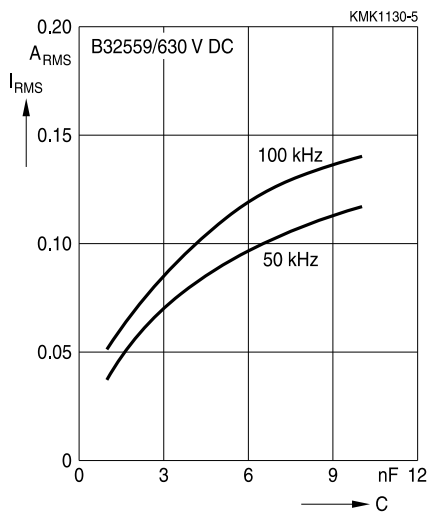
B32559C

Compact design (stacked)

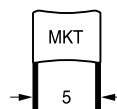
Permissible AC current I_{RMS} versus frequency f

Lead spacing 5 mm

630 V DC/400 V AC



B32559C
Compact design (stacked)



Mounting guidelines

1 Soldering

1.1 Solderability of leads

The solderability of terminal leads is tested to IEC 60068-2-20, test Ta, method 1.

Before a solderability test is carried out, terminals are subjected to accelerated ageing (to IEC 60068-2-2, test Ba: 4 h exposure to dry heat at 155 °C). Since the ageing temperature is far higher than the upper category temperature of the capacitors, the terminal wires should be cut off from the capacitor before the ageing procedure to prevent the solderability being impaired by the products of any capacitor decomposition that might occur.

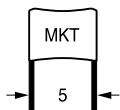
Solder bath temperature	235 ±5 °C
Soldering time	2.0 ±0.5 s
Immersion depth	2.0 +0/−0.5 mm from capacitor body or seating plane
Evaluation criteria:	
Visual inspection	Wetting of wire surface by new solder ≥90%, free-flowing solder

1.2 Resistance to soldering heat

Resistance to soldering heat is tested to IEC 60068-2-20, test Tb, method 1A.

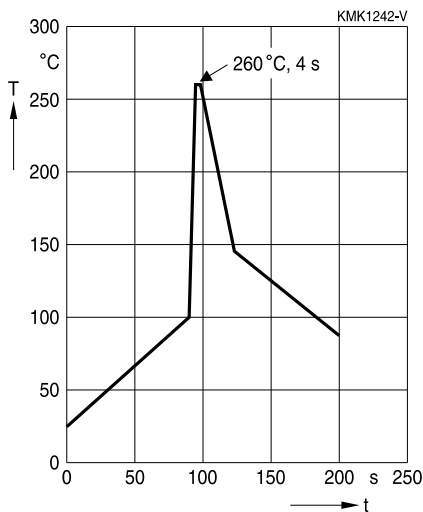
Conditions:

Series	Solder bath temperature	Soldering time
MKT boxed (except 2.5 × 6.5 × 7.2 mm) coated uncoated (lead spacing > 10 mm)	260 ±5 °C	10 ±1 s
MFP		
MKP (lead spacing > 7.5 mm)		
MKT boxed (case 2.5 × 6.5 × 7.2 mm)		5 ±1 s
MKP (lead spacing ≤ 7.5 mm)		< 4 s
MKT uncoated (lead spacing ≤ 10 mm) insulated (B32559)		recommended soldering profile for MKT uncoated (lead spacing ≤ 10 mm) and insulated (B32559)

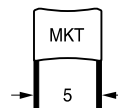


B32559C

Compact design (stacked)



Immersion depth	2.0 +0/−0.5 mm from capacitor body or seating plane
Shield	Heat-absorbing board, (1.5 ±0.5) mm thick, between capacitor body and liquid solder
Evaluation criteria:	
Visual inspection	No visible damage
$\Delta C/C_0$	2% for MKT/MKP/MFP 5% for EMI suppression capacitors
$\tan \delta$	As specified in sectional specification



1.3 General notes on soldering

Permissible heat exposure loads on film capacitors are primarily characterized by the upper category temperature T_{max} . Long exposure to temperatures above this type-related temperature limit can lead to changes in the plastic dielectric and thus change irreversibly a capacitor's electrical characteristics. For short exposures (as in practical soldering processes) the heat load (and thus the possible effects on a capacitor) will also depend on other factors like:

- Pre-heating temperature and time
- Forced cooling immediately after soldering
- Terminal characteristics:
diameter, length, thermal resistance, special configurations (e.g. crimping)
- Height of capacitor above solder bath
- Shadowing by neighboring components
- Additional heating due to heat dissipation by neighboring components
- Use of solder-resist coatings

The overheating associated with some of these factors can usually be reduced by suitable countermeasures. For example, if a pre-heating step cannot be avoided, an additional or reinforced cooling process may possibly have to be included.

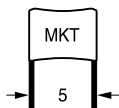
EPCOS recommends the following conditions:

- Pre-heating with a maximum temperature of 110 °C
- Temperature inside the capacitor should not exceed the following limits:
 - MKP/MFP 110 °C
 - MKT 160 °C
- When SMD components are used together with leaded ones, the leaded film capacitors should not pass into the SMD adhesive curing oven. The leaded components should be assembled after the SMD curing step.
- Leaded film capacitors are not suitable for reflow soldering.

Uncoated capacitors

For uncoated MKT capacitors with lead spacings ≤ 10 mm (B32560/B32561) the following measures are recommended:

- pre-heating to not more than 110 °C in the preheater phase
- rapid cooling after soldering


B32559C
Compact design (stacked)

2 Cleaning

To determine whether the following solvents, often used to remove flux residues and other substances, are suitable for the capacitors described, refer to the table below:

Type	Ethanol, isopropanol, n-propanol	n-propanol-water mixtures, water with surface tension-reducing tensides (neutral)	Solvent from table A (see next page)	Solvent from table B (see next page)
MKT (uncoated)	Suitable	Unsuitable	In part suitable	Unsuitable
MKT, MKP, MFP (coated/boxed)		Suitable	Suitable	

Even when suitable solvents are used, a reversible change of the electrical characteristics may occur in uncoated capacitors immediately after they are washed. Thus it is always recommended to dry the components (e.g. 4 h at 70 °C) before they are subjected to subsequent electrical testing.

Table A

Manufacturers' designations for trifluoro-trichloro-ethane-based cleaning solvents (selection)

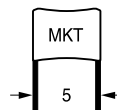
Trifluoro-trichloro-ethane	Mixtures of trifluoro-trichloro-ethane with ethanol and isopropanol	Manufacturer
Freon TF	Freon TE 35; Freon TP 35; Freon TES	Du Pont
Frigen 113 TR	Frigen 113 TR-E; Frigen 113 TR-P; Frigen TR-E 35	Hoechst
Arklone P	Arklone A; Arklone L; Arklone K	ICI
Kaltron 113 MDR	Kaltron 113 MDA; Kaltron 113 MDI; Kaltron 113 MDI 35	Kali-Chemie
Flugene 113	Flugene 113 E; Flugene 113 IPA	Rhone-Progil

Table B (worldwide banned substances)

Manufacturers' designations for unsuitable cleaning solvents (selection)

Mixtures of chlorinated hydrocarbons and ketones with fluorated hydrocarbons	Manufacturer
Freon TMC; Freon TA; Freon TC	Du Pont
Arklone E	ICI
Kaltron 113 MDD; Kaltron 113 MDK	Kali-Chemie
Flugene 113 CM	Rhone-Progil

B32559C
Compact design (stacked)



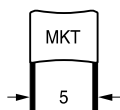
3 Embedding of capacitors in finished assemblies

In many applications, finished circuit assemblies are embedded in plastic resins. In this case, both chemical and thermal influences of the embedding ("potting") and curing processes must be taken into account.

Our experience has shown that the following potting materials can be recommended: non-flexible epoxy resins with acid-anhydride hardeners; chemically inert, non-conducting fillers; maximum curing temperature of 100 °C.

Caution:

Consult us first if you wish to embed uncoated types!



B32559C

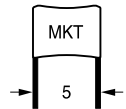
Compact design (stacked)

Cautions and warnings

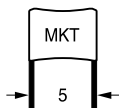
- Do not exceed the upper category temperature (UCT).
- Do not apply any mechanical stress to the capacitor terminals.
- Avoid any compressive, tensile or flexural stress.
- Do not move the capacitor after it has been soldered to the PC board.
- Do not pick up the PC board by the soldered capacitor.
- Do not place the capacitor on a PC board whose PTH hole spacing differs from the specified lead spacing.
- Do not exceed the specified time or temperature limits during soldering.
- Avoid external energy inputs, such as fire or electricity.
- Avoid overload of the capacitors.

The table below summarizes the safety instructions that must always be observed. A detailed description can be found in the relevant sections of the chapters "General technical information" and "Mounting guidelines".

Topic	Safety information	Reference chapter "General technical information"
Storage conditions	Make sure that capacitors are stored within the specified range of time, temperature and humidity conditions.	4.5 "Storage conditions"
Flammability	Avoid external energy, such as fire or electricity (passive flammability), avoid overload of the capacitors (active flammability) and consider the flammability of materials.	5.3 "Flammability"
Resistance to vibration	Do not exceed the tested ability to withstand vibration. The capacitors are tested to IEC 60068-2-6. EPCOS offers film capacitors specially designed for operation under more severe vibration regimes such as those found in automotive applications. Consult our catalog "Film Capacitors for Automotive Electronics".	5.2 "Resistance to vibration"



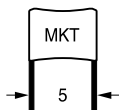
Topic	Safety information	Reference chapter "Mounting guidelines"
Soldering	Do not exceed the specified time or temperature limits during soldering.	1 "Soldering"
Cleaning	Use only suitable solvents for cleaning capacitors.	2 "Cleaning"
Embedding of capacitors in finished assemblies	When embedding finished circuit assemblies in plastic resins, chemical and thermal influences must be taken into account. Caution: Consult us first, if you also wish to embed other uncoated component types!	3 "Embedding of capacitors in finished assemblies"


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Symbols and terms

Symbol	English	German
α	Heat transfer coefficient	Wärmeübergangszahl
α_C	Temperature coefficient of capacitance	Temperaturkoeffizient der Kapazität
A	Capacitor surface area	Kondensatoroberfläche
β_C	Humidity coefficient of capacitance	Feuchtekoeffizient der Kapazität
C	Capacitance	Kapazität
C_R	Rated capacitance	Nennkapazität
ΔC	Absolute capacitance change	Absolute Kapazitätsänderung
$\Delta C/C$	Relative capacitance change (relative deviation of actual value)	Relative Kapazitätsänderung (relative Abweichung vom Ist-Wert)
$\Delta C/C_R$	Capacitance tolerance (relative deviation from rated capacitance)	Kapazitätstoleranz (relative Abweichung vom Nennwert)
dt	Time differential	Differentielle Zeit
Δt	Time interval	Zeitintervall
ΔT	Absolute temperature change (self-heating)	Absolute Temperaturänderung (Selbsterwärmung)
$\Delta \tan \delta$	Absolute change of dissipation factor	Absolute Änderung des Verlustfaktors
ΔV	Absolute voltage change	Absolute Spannungsänderung
dV/dt	Time differential of voltage function (rate of voltage rise)	Differentielle Spannungsänderung (Spannungsflankensteilheit)
$\Delta V/\Delta t$	Voltage change per time interval	Spannungsänderung pro Zeitintervall
E	Activation energy for diffusion	Aktivierungsenergie zur Diffusion
ESL	Self-inductance	Eigeninduktivität
ESR	Equivalent series resistance	Ersatz-Serienwiderstand
f	Frequency	Frequenz
f_1	Frequency limit for reducing permissible AC voltage due to thermal limits	Grenzfrequenz für thermisch bedingte Reduzierung der zulässigen Wechselspannung
f_2	Frequency limit for reducing permissible AC voltage due to current limit	Grenzfrequenz für strombedingte Reduzierung der zulässigen Wechselspannung
f_r	Resonant frequency	Resonanzfrequenz
F_D	Thermal acceleration factor for diffusion	Therm. Beschleunigungsfaktor zur Diffusion
F_T	Derating factor	Deratingfaktor
i	Current (peak)	Stromspitze
I_C	Category current (max. continuous current)	Kategoriestrom (max. Dauerstrom)

Symbol	English	German
I_{RMS}	(Sinusoidal) alternating current, root-mean-square value	(Sinusförmiger) Wechselstrom
i_z	Capacitance drift	Inkonstanz der Kapazität
k_0	Pulse characteristic	Impulskennwert
L_S	Series inductance	Serieninduktivität
λ	Failure rate	Ausfallrate
λ_0	Constant failure rate during useful service life	Konstante Ausfallrate in der Nutzungsphase
λ_{test}	Failure rate, determined by tests	Experimentell ermittelte Ausfallrate
P_{diss}	Dissipated power	Abgegebene Verlustleistung
P_{gen}	Generated power	Erzeugte Verlustleistung
Q	Heat energy	Wärmeenergie
ρ	Density of water vapor in air	Dichte von Wasserdampf in Luft
R	Universal molar constant for gases	Allg. Molarkonstante für Gas
R	Ohmic resistance of discharge circuit	Ohmscher Widerstand des Entladekreises
R_i	Internal resistance	Innenwiderstand
R_{ins}	Insulation resistance	Isolationswiderstand
R_P	Parallel resistance	Parallelwiderstand
R_S	Series resistance	Serienwiderstand
S	severity (humidity test)	Schärfegrad (Feuchtestest)
t	Time	Zeit
T	Temperature	Temperatur
τ	Time constant	Zeitkonstante
$\tan \delta$	Dissipation factor	Verlustfaktor
$\tan \delta_D$	Dielectric component of dissipation factor	Dielektrischer Anteil des Verlustfaktors
$\tan \delta_P$	Parallel component of dissipation factor	Parallelanteil des Verlustfaktors
$\tan \delta_S$	Series component of dissipation factor	Serienanteil des Verlustfaktors
T_A	Ambient temperature	Umgebungstemperatur
T_{max}	Upper category temperature	Obere Kategorietemperatur
T_{min}	Lower category temperature	Untere Kategorietemperatur
t_{OL}	Operating life at operating temperature and voltage	Betriebszeit bei Betriebstemperatur und -spannung
T_{op}	Operating temperature	Betriebstemperatur
T_R	Rated temperature	Nenntemperatur
T_{ref}	Reference temperature	Referenztemperatur
t_{SL}	Reference service life	Referenz-Lebensdauer
V_{AC}	AC voltage	Wechselspannung


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Symbol	English	German
V_C	Category voltage	Kategoriespannung
$V_{C,RMS}$	Category AC voltage	(Sinusförmige) Kategorie-Wechselspannung
V_{CD}	Corona-discharge onset voltage	Teilentlade-Einsatzspannung
V_{ch}	Charging voltage	Ladespannung
V_{DC}	DC voltage	Gleichspannung
V_{FB}	Fly-back capacitor voltage	Spannung (Flyback)
V_i	Input voltage	Eingangsspannung
V_o	Output voltage	Ausgangssspannung
V_{op}	Operating voltage	Betriebsspannung
V_p	Peak pulse voltage	Impuls-Spitzenspannung
V_{pp}	Peak-to-peak voltage Impedance	Spannungshub
V_R	Rated voltage	Nennspannung
$\hat{V}_R$	Amplitude of rated AC voltage	Amplitude der Nenn-Wechselspannung
V_{RMS}	(Sinusoidal) alternating voltage, root-mean-square value	(Sinusförmige) Wechselspannung
V_{SC}	S-correction voltage	Spannung bei Anwendung "S-correction"
V_{sn}	Snubber capacitor voltage	Spannung bei Anwendung "Beschaltung"
Z	Impedance	Scheinwiderstand
e	Lead spacing	Rastermaß

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The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule we are either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
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