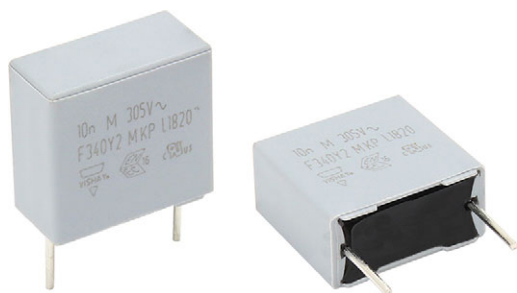


# THB Grade IIIB Class Y2 Interference Suppression Film Capacitor Radial MKP 305 V<sub>AC</sub> - Line Bypass



## FEATURES

- IEC 60384-14: 2013 / AMD1: 2016 grade IIIB certified: 85 °C, 85 % RH, 1000 h at U<sub>RAC</sub>
- AEC-Q200 qualified (rev. D) up to 105 °C
- High temperature capabilities, up to 125 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT

## LINKS TO ADDITIONAL RESOURCES

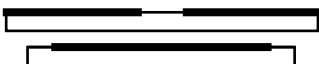


3D Models

## APPLICATIONS

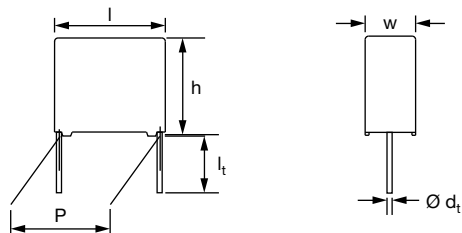
For standard line bypass (between line and ground) Y2 applications.

See also application note: [www.vishay.com/doc?28153](http://www.vishay.com/doc?28153)

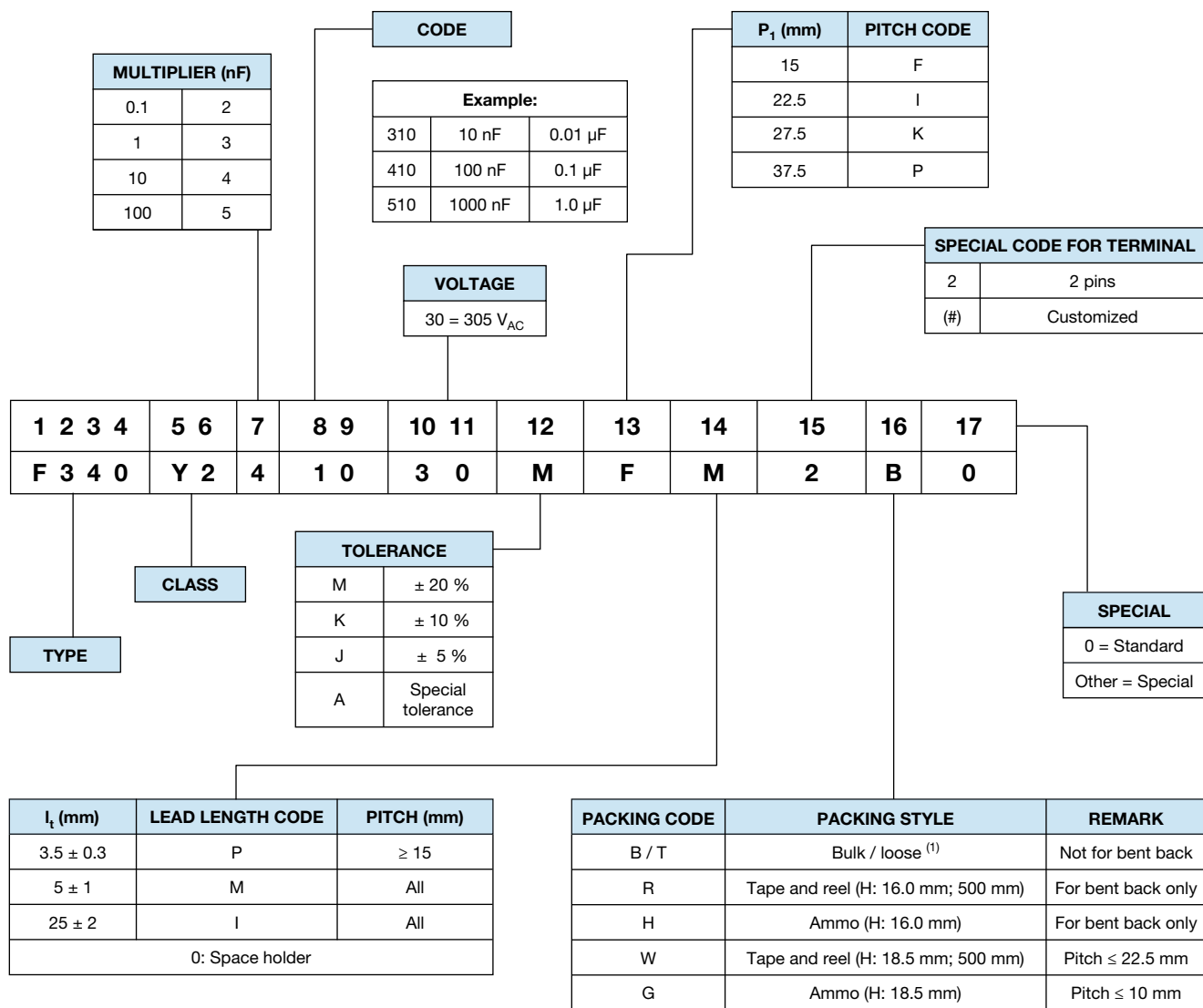
| QUICK REFERENCE DATA                            |                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rated capacitance range                         | 0.01 µF to 1 µF (preferred values according to E6)                                                                                                                                                                                                                                       |
| Capacitance tolerance                           | ± 20 %; ± 10 %; ± 5 % (37.5 mm ± 5 % pitch values on request)                                                                                                                                                                                                                            |
| Climatic testing class according to IEC 60068-1 | 55 / 105 / 56B                                                                                                                                                                                                                                                                           |
| Rated DC voltage                                | 1500 V <sub>DC</sub> at 85 °C<br>1250 V <sub>DC</sub> at 105 °C<br>1000 V <sub>DC</sub> at 125 °C                                                                                                                                                                                        |
| Permissible AC voltage                          | 305 V <sub>AC</sub> ; 50 Hz to 60 Hz                                                                                                                                                                                                                                                     |
| Rated temperature                               | 105 °C                                                                                                                                                                                                                                                                                   |
| Maximum permissible temperature                 | 125 °C for limited time                                                                                                                                                                                                                                                                  |
| Reference standards                             | IEC 60384-14:2013<br>IEC 60384-14:2013 / AMD1:2016<br>EN 60384-14<br>IEC 60065 requires pass. flamm. class B for volume ≥ 1750 mm <sup>3</sup><br>Class C for volume < 1750 mm <sup>3</sup><br>UL 60384-14 (2 <sup>nd</sup> edition)<br>CSA-E60384-1:14 (3 <sup>rd</sup> edition)<br>CQC |
| Dielectric                                      | Polypropylene film                                                                                                                                                                                                                                                                       |
| Electrodes                                      | Metallized                                                                                                                                                                                                                                                                               |
| Construction                                    | Series construction<br>                                                                                                                                                                               |
| Encapsulation                                   | Plastic case, epoxy resin sealed, flame retardant<br>UL-class 94 V-0                                                                                                                                                                                                                     |
| Leads                                           | Tinned wire                                                                                                                                                                                                                                                                              |
| Marking                                         | C-value; tolerance; rated voltage; sub-class; manufacturer's type; code for dielectric material; manufacturer location, manufacturer's logo, year and week; safety approvals                                                                                                             |

### Note

- For more detailed data and test requirements, contact [rfi@vishay.com](mailto:rfi@vishay.com)

**DIMENSIONS** in millimeters

**Notes**

- Standard dimension
- $\varnothing d_t \pm 10\%$  of standard diameter specified

**COMPOSITION OF CATALOG NUMBER**

**Notes**

- For detailed tape specifications refer to packaging information [www.vishay.com/doc?28139](http://www.vishay.com/doc?28139)
- <sup>(1)</sup> Packaging will be bulk for all capacitors with pitch  $\leq 15$  mm and such with long leads ( $> 5$  mm). Capacitors with short leads up to 5 mm and pitch  $> 15$  mm will be in tray and asking code will be "T"



| SPECIFIC REFERENCE DATA                                                                       |                                                                 |                          |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------|
| DESCRIPTION                                                                                   | VALUE                                                           |                          |
| Rated AC voltage ( $U_{RAC}$ )                                                                | 305 V                                                           |                          |
| Permissible DC voltage ( $U_{RDC}$ )                                                          | 1000 V <sub>DC</sub> at 105 °C<br>1500 V <sub>DC</sub> at 85 °C |                          |
| Tangent of loss angle                                                                         | At 1 kHz                                                        | At 10 kHz                |
|                                                                                               | $\leq 10 \times 10^{-4}$                                        | $\leq 20 \times 10^{-4}$ |
| Rated voltage pulse slope ( $dU/dt$ ) <sub>R</sub> at 420 V <sub>DC</sub>                     |                                                                 |                          |
| Pitch = 10 mm                                                                                 | 800 V/ $\mu$ s                                                  |                          |
| Pitch = 15 mm                                                                                 | 600 V/ $\mu$ s                                                  |                          |
| Pitch = 22.5 mm                                                                               | 500 V/ $\mu$ s                                                  |                          |
| Pitch = 27.5 mm                                                                               | 400 V/ $\mu$ s                                                  |                          |
| R between leads, for $C \leq 0.33 \mu$ F at 100 V; 1 min                                      | $> 15\,000\,M\Omega$                                            |                          |
| RC between leads, for $C > 0.33 \mu$ F at 100 V; 1 min                                        | $> 5000\,s$                                                     |                          |
| R between leads and case; 100 V; 1 min                                                        | $> 30\,000\,M\Omega$                                            |                          |
| Withstanding (DC) voltage (cut off current 10 mA) <sup>(1)</sup> ; rise time $\leq 1000\,V/s$ | 3400 V; 1 min                                                   |                          |
| Withstanding (AC) voltage between leads and case                                              | 2100 V; 1 min                                                   |                          |
| Rated temperature                                                                             | 105 °C                                                          |                          |
| Maximum permissible temperature                                                               | 125 °C up to 1000 h                                             |                          |

**Note**

<sup>(1)</sup> See "Voltage Proof Test for Metalized Film Capacitors": [www.vishay.com/doc?28169](http://www.vishay.com/doc?28169)

| ELECTRICAL DATA AND ORDERING INFORMATION |                                                                               |                                                |                            |                                        |                                     |      |                                      |      |                                          |      |
|------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------|----------------------------|----------------------------------------|-------------------------------------|------|--------------------------------------|------|------------------------------------------|------|
| U <sub>RAC</sub><br>(V)                  | CAP.<br>(μF)                                                                  | DIMENSIONS <sup>(4)</sup><br>w x h x l<br>(mm) | MASS<br>(g) <sup>(3)</sup> | CATALOG NUMBER F340Y2... AND PACKAGING |                                     |      |                                      |      |                                          |      |
|                                          |                                                                               |                                                |                            | LOOSE IN BOX                           |                                     |      |                                      |      | TAPED REEL<br>(500 mm) <sup>(1)(2)</sup> |      |
|                                          |                                                                               |                                                |                            | SHORT LEADS                            |                                     |      | LONG LEADS                           |      |                                          |      |
|                                          |                                                                               |                                                |                            | l <sub>t</sub> = 3.5 mm<br>± 0.3 mm    | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ  | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ  | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm | SPQ  |
| 305                                      | PITCH = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 20 % |                                                |                            |                                        |                                     |      |                                      |      |                                          |      |
|                                          | 0.01                                                                          | 5.0 x 11.0 x 17.5                              | 1.0                        | 31030MFP2B0                            | 31030MFM2B0                         | 1250 | 31030MFI2B0                          | 1000 | 31030MF02W0                              | 1100 |
|                                          | 0.012                                                                         |                                                |                            | 31230MFP2B0                            | 31230MFM2B0                         |      | 31230MFI2B0                          |      | 31230MF02W0                              |      |
|                                          | 0.015                                                                         |                                                |                            | 31530MFP2B0                            | 31530MFM2B0                         |      | 31530MFI2B0                          |      | 31530MF02W0                              |      |
|                                          | 0.018                                                                         |                                                |                            | 31830MFP2B0                            | 31830MFM2B0                         |      | 31830MFI2B0                          |      | 31830MF02W0                              |      |
|                                          | 0.022                                                                         | 6.0 x 12.0 x 17.5                              | 1.4                        | 32230MFP2B0                            | 32230MFM2B0                         | 1000 | 32230MFI2B0                          | 1000 | 32230MF02W0                              | 900  |
|                                          | PITCH = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 % |                                                |                            |                                        |                                     |      |                                      |      |                                          |      |
|                                          | 0.027                                                                         | 7.0 x 13.5 x 17.5                              | 1.8                        | 32730MFP2B0                            | 32730MFM2B0                         | 750  | 32730MFI2B0                          | 500  | 32730MF02W0                              | 800  |
|                                          | 0.033                                                                         |                                                |                            | 33330MFP2B0                            | 33330MFM2B0                         |      | 33330MFI2B0                          |      | 33330MF02W0                              |      |
|                                          | 0.039                                                                         |                                                |                            | 33930MFP2B0                            | 33930MFM2B0                         |      | 33930MFI2B0                          |      | 33930MF02W0                              |      |
|                                          | 0.047                                                                         | 8.5 x 15.0 x 17.5                              | 2.4                        | 34730MFP2B0                            | 34730MFM2B0                         | 750  | 34730MFI2B0                          | 500  | 34730MF02W0                              | 650  |
|                                          | 0.056                                                                         |                                                |                            | 35630MFP2B0                            | 35630MFM2B0                         |      | 35630MFI2B0                          |      | 35630MF02W0                              |      |
|                                          | 0.068                                                                         | 10.0 x 16.5 x 17.5                             | 3.0                        | 36830MFP2B0                            | 36830MFM2B0                         | 500  | 36830MFI2B0                          | 450  | 36830MF02W0                              | 600  |
|                                          | 0.082                                                                         | 10.5 x 17.5 x 18.0                             | 4.5                        | 38230MFP2B0                            | 38230MFM2B0                         | 250  | 38230MFI2B0                          | 400  | -                                        |      |

**Notes**

- SPQ = Standard Packing Quantity
- <sup>(1)</sup> Reel diameter = 356 mm is available on request
- <sup>(2)</sup> H = in-tape height; P<sub>0</sub> = sprocket hole distance; for detailed specifications refer to "Packaging Information"
- <sup>(3)</sup> Weight for short lead product only
- <sup>(4)</sup> For tolerances see chapter "Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances"



## ELECTRICAL DATA AND ORDERING INFORMATION

| U <sub>RAC</sub><br>(V) | CAP.<br>(μF)                                                                  | DIMENSIONS <sup>(4)</sup><br>w x h x l<br>(mm) | MASS<br>(g) <sup>(3)</sup> | CATALOG NUMBER F340Y2... AND PACKAGING |                                     |             |                                      |      |                                          |      |  |
|-------------------------|-------------------------------------------------------------------------------|------------------------------------------------|----------------------------|----------------------------------------|-------------------------------------|-------------|--------------------------------------|------|------------------------------------------|------|--|
|                         |                                                                               |                                                |                            | LOOSE IN BOX                           |                                     |             |                                      |      | TAPED REEL<br>(500 mm) <sup>(1)(2)</sup> |      |  |
|                         |                                                                               |                                                |                            | SHORT LEADS                            |                                     |             | LONG LEADS                           |      |                                          |      |  |
|                         |                                                                               |                                                |                            | l <sub>t</sub> = 3.5 mm<br>± 0.3 mm    | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ         | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ  | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm | SPQ  |  |
| 305                     | PITCH = 22.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 % |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |  |
|                         | 0.033                                                                         | 6.0 x 15.5 x 26.0                              | 2.4                        | 33330MIP2T0                            | 33330MIM2T0                         | 300         | 33330MII2B0                          | 250  |                                          |      |  |
|                         | 0.039                                                                         |                                                |                            | 33930MIP2T0                            | 33930MIM2T0                         |             | 33930MII2B0                          |      |                                          |      |  |
|                         | 0.047                                                                         |                                                |                            | 34730MIP2T0                            | 34730MIM2T0                         |             | 34730MII2B0                          |      |                                          |      |  |
|                         | 0.056                                                                         | 7.0 x 16.5 x 26.0                              | 2.9                        | 35630MIP2T0                            | 35630MIM2T0                         | 200         | 35630MII2B0                          | 250  |                                          |      |  |
|                         | 0.068                                                                         |                                                |                            | 36830MIP2T0                            | 36830MIM2T0                         |             | 36830MII2B0                          |      |                                          |      |  |
|                         | 0.082                                                                         |                                                |                            | 38230MIP2T0                            | 38230MIM2T0                         |             | 38230MII2B0                          |      |                                          |      |  |
|                         | 0.10                                                                          | 8.5 x 18.0 x 26.0                              | 3.8                        | 41030MIP2T0                            | 41030MIM2T0                         | 200         | 41030MII2B0                          | 250  |                                          |      |  |
|                         | 0.12                                                                          |                                                |                            | 41230MIP2T0                            | 41230MIM2T0                         |             | 41230MII2B0                          |      |                                          |      |  |
|                         | 0.15                                                                          |                                                |                            | 41530MIP2T0                            | 41530MIM2T0                         |             | 41530MII2B0                          |      |                                          |      |  |
|                         | 0.18                                                                          | 10.0 x 19.5 x 26.0                             | 6.8                        | 41830MIP2T0                            | 41830MIM2T0                         | 200         | 41830MII2B0                          | 200  |                                          |      |  |
|                         | 0.22                                                                          |                                                |                            | 42230MIP2T0                            | 42230MIM2T0                         |             | 42230MII2B0                          |      |                                          |      |  |
|                         | 0.27                                                                          |                                                |                            | 42730MIP2T0                            | 42730MIM2T0                         |             | 42730MII2B0                          |      |                                          |      |  |
|                         | 0.33                                                                          | 12.0 x 22.0 x 26.0                             | 7.8                        | 43330MIP2T0                            | 43330MIM2T0                         | 150         | 43330MII2B0                          | 200  |                                          |      |  |
|                         | 0.39                                                                          |                                                |                            | 43930MIP2T0                            | 43930MIM2T0                         |             | 43930MII2B0                          |      |                                          |      |  |
|                         | 0.033                                                                         |                                                |                            | 15.5 x 26.5 x 26.5                     | 14                                  |             | 43330MIP2T0                          |      |                                          |      |  |
|                         | 0.39                                                                          | 43930MIP2T0                                    | 43930MIM2T0                |                                        |                                     | 43930MII2B0 |                                      |      |                                          |      |  |
|                         | PITCH = 27.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 20 % |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |  |
|                         | 0.10                                                                          | 9.0 x 19.0 x 31.0                              | 5.5                        | 41030MKP2T0                            | 41030MKM2T0                         | 100         | 41030MKI2B0                          | 150  |                                          |      |  |
|                         | 0.12                                                                          |                                                |                            | 41230MKP2T0                            | 41230MKM2T0                         |             | 41230MKI2B0                          |      |                                          |      |  |
|                         | 0.15                                                                          |                                                |                            | 41530MKP2T0                            | 41530MKM2T0                         |             | 41530MKI2B0                          |      |                                          |      |  |
|                         | 0.18                                                                          | 11.0 x 21.0 x 31.0                             | 7.4                        | 41830MKP2T0                            | 41830MKM2T0                         | 100         | 41830MKI2B0                          | 125  |                                          |      |  |
|                         | 0.22                                                                          |                                                |                            | 42230MKP2T0                            | 42230MKM2T0                         |             | 42230MKI2B0                          |      |                                          |      |  |
|                         | 0.27                                                                          |                                                |                            | 42730MKP2T0                            | 42730MKM2T0                         |             | 42730MKI2B0                          |      |                                          |      |  |
|                         | 0.33                                                                          | 13.0 x 23.0 x 31.0                             | 9.2                        | 43330MKP2T0                            | 43330MKM2T0                         | 100         | 43330MKI2B0                          | 125  |                                          |      |  |
|                         | 0.39                                                                          |                                                |                            | 43930MKP2T0                            | 43930MKM2T0                         |             | 43930MKI2B0                          |      |                                          |      |  |
|                         | 0.47                                                                          |                                                |                            | 44730MKP2T0                            | 44730MKM2T0                         |             | 44730MKI2B0                          |      |                                          |      |  |
|                         | 0.56                                                                          | 15.0 x 25.0 x 31.0                             | 12.3                       | 45630MKP2T0                            | 45630MKM2T0                         | 100         | 45630MKI2B0                          | 125  |                                          |      |  |
|                         | 0.68                                                                          |                                                |                            | 46830MKP2T0                            | 46830MKM2T0                         |             | 46830MKI2B0                          |      |                                          |      |  |
|                         | 0.82                                                                          |                                                |                            | 48230MKP2T0                            | 48230MKM2T0                         |             | 48230MKI2B0                          |      |                                          |      |  |
|                         | 0.10                                                                          | 18.0 x 28.0 x 31.0                             | 16.1                       | 43930MKP2T0                            | 43930MKM2T0                         | 100         | 43930MKI2B0                          | 100  |                                          |      |  |
|                         | 0.47                                                                          |                                                |                            | 44730MKP2T0                            | 44730MKM2T0                         |             | 44730MKI2B0                          |      |                                          |      |  |
|                         | 0.56                                                                          |                                                |                            | 45630MKP2T0                            | 45630MKM2T0                         |             | 45630MKI2B0                          |      |                                          |      |  |
|                         | 0.68                                                                          | 21.0 x 31.0 x 31.0                             | 20.3                       | 46830MKP2T0                            | 46830MKM2T0                         | 50          | 46830MKI2B0                          | 75   |                                          |      |  |
|                         | 0.82                                                                          |                                                |                            | 48230MKP2T0                            | 48230MKM2T0                         |             | 48230MKI2B0                          |      |                                          |      |  |
|                         | PITCH = 37.5 mm ± 0.5 mm; d <sub>t</sub> = 1.0 mm ± 0.1 mm; C-TOL. = ± 20 %   |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |  |
|                         | 0.47                                                                          | 14.5 x 24.5 x 41.5                             | 15.5                       | 44730MPP2T0                            | 44730MPM2T0                         | 80          | 44730MPI2T0                          | 80   |                                          |      |  |
|                         | 0.68                                                                          | 16.0 x 28.5 x 41.5                             | 19.5                       | 46830MPP2T0                            | 46830MPM2T0                         | 70          | 46830MPI2T0                          | 70   |                                          |      |  |
|                         | 1.0                                                                           | 18.0 x 32.5 x 41.5                             | 25                         | 51030MPP2T0                            | 51030MPM2T0                         | 60          | 51030MPI2T0                          | 60   |                                          |      |  |
|                         | PITCH = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 10 % |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |  |
|                         | 0.010                                                                         | 5.0 x 11.0 x 17.5                              | 1.0                        | 31030KFP2B0                            | 31030KFM2B0                         | 1250        | 31030KFI2B0                          | 1000 | 31030KF02W0                              | 1100 |  |
|                         | 0.012                                                                         |                                                |                            | 31230KFP2B0                            | 31230KFM2B0                         |             | 31230KFI2B0                          |      | 31230KF02W0                              |      |  |
|                         | 0.015                                                                         |                                                |                            | 31530KFP2B0                            | 31530KFM2B0                         |             | 31530KFI2B0                          |      | 31530KF02W0                              |      |  |
|                         | 0.018                                                                         |                                                |                            | 31830KFP2B0                            | 31830KFM2B0                         |             | 31830KFI2B0                          |      | 31830KF02W0                              |      |  |
|                         | 0.022                                                                         | 6.0 x 12.0 x 17.5                              | 1.4                        | 32230KFP2B0                            | 32230KFM2B0                         | 1000        | 32230KFI2B0                          | 1000 | 32230KF02W0                              | 900  |  |
|                         | PITCH = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 % |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |  |
|                         | 0.027                                                                         | 7.0 x 13.5 x 17.5                              | 1.8                        | 32730KFP2B0                            | 32730KFM2B0                         | 750         | 32730KFI2B0                          | 500  | 32730KF02W0                              | 800  |  |
|                         | 0.033                                                                         |                                                |                            | 33330KFP2B0                            | 33330KFM2B0                         |             | 33330KFI2B0                          |      | 33330KF02W0                              |      |  |
|                         | 0.039                                                                         |                                                |                            | 33930KFP2B0                            | 33930KFM2B0                         |             | 33930KFI2B0                          |      | 33930KF02W0                              |      |  |
|                         | 0.047                                                                         | 8.5 x 15.0 x 17.5                              | 2.4                        | 34730KFP2B0                            | 34730KFM2B0                         | 750         | 34730KFI2B0                          | 500  | 34730KF02W0                              | 650  |  |
| 0.056                   | 35630KFP2B0                                                                   |                                                |                            | 35630KFM2B0                            | 35630KFI2B0                         |             | 35630KF02W0                          |      |                                          |      |  |
| 0.068                   | 36830KFP2B0                                                                   |                                                |                            | 36830KFM2B0                            | 36830KFI2B0                         |             | 36830KF02W0                          |      |                                          |      |  |
| 0.082                   | 10.0 x 16.5 x 17.5                                                            | 3.0                                            | 36830KFP2B0                | 36830KFM2B0                            | 500                                 | 36830KFI2B0 | 450                                  | -    | -                                        |      |  |
| 0.082                   | 11.0 x 18.5 x 18.0                                                            | 4.5                                            | 38230KFP2B0                | 38230KFM2B0                            | 250                                 | 38230KFI2B0 | 400                                  | -    | -                                        |      |  |

## Notes

- SPQ = Standard Packing Quantity
- (1) Reel diameter = 356 mm is available on request
- (2) H = in-tape height; P<sub>0</sub> = sprocket hole distance; for detailed specifications refer to "Packaging Information"
- (3) Weight for short lead product only
- (4) For tolerances see chapter "Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances"



## ELECTRICAL DATA AND ORDERING INFORMATION

| U <sub>RAC</sub><br>(V) | CAP.<br>(μF)                                                                  | DIMENSIONS <sup>(4)</sup><br>w x h x l<br>(mm) | MASS<br>(g) <sup>(3)</sup> | CATALOG NUMBER F340Y2... AND PACKAGING |                                     |             |                                      |      |                                          |      |   |   |  |
|-------------------------|-------------------------------------------------------------------------------|------------------------------------------------|----------------------------|----------------------------------------|-------------------------------------|-------------|--------------------------------------|------|------------------------------------------|------|---|---|--|
|                         |                                                                               |                                                |                            | LOOSE IN BOX                           |                                     |             |                                      |      | TAPED REEL<br>(500 mm) <sup>(1)(2)</sup> |      |   |   |  |
|                         |                                                                               |                                                |                            | SHORT LEADS                            |                                     |             | LONG LEADS                           |      |                                          |      |   |   |  |
|                         |                                                                               |                                                |                            | l <sub>t</sub> = 3.5 mm<br>± 0.3 mm    | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ         | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ  | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm | SPQ  |   |   |  |
| 305                     | PITCH = 22.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 % |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |   |   |  |
|                         | 0.033                                                                         | 6.0 x 15.5 x 26.0                              | 2.4                        | 33330KIP2T0                            | 33330KIM2T0                         | 300         | 33330KII2B0                          | 250  | -                                        | -    |   |   |  |
|                         | 0.039                                                                         |                                                |                            | 33930KIP2T0                            | 33930KIM2T0                         |             | 33930KII2B0                          |      |                                          |      |   |   |  |
|                         | 0.047                                                                         |                                                |                            | 34730KIP2T0                            | 34730KIM2T0                         |             | 34730KII2B0                          |      |                                          |      |   |   |  |
|                         | 0.056                                                                         | 7.0 x 16.5 x 26.0                              | 2.9                        | 35630KIP2T0                            | 35630KIM2T0                         | 200         | 35630KII2B0                          | 250  |                                          |      |   |   |  |
|                         | 0.068                                                                         | 8.5 x 18.0 x 26.0                              | 3.8                        | 36830KIP2T0                            | 36830KIM2T0                         | 200         | 36830KII2B0                          | 250  |                                          |      |   |   |  |
|                         | 0.082                                                                         |                                                |                            | 38230KIP2T0                            | 38230KIM2T0                         |             | 38230KII2B0                          |      |                                          |      |   |   |  |
|                         | 0.10                                                                          |                                                |                            | 41030KIP2T0                            | 41030KIM2T0                         |             | 41030KII2B0                          |      |                                          |      |   |   |  |
|                         | 0.12                                                                          | 10.0 x 19.5 x 26.0                             | 6.8                        | 41230KIP2T0                            | 41230KIM2T0                         | 200         | 41230KII2B0                          | 200  |                                          |      |   |   |  |
|                         | 0.15                                                                          | 12.0 x 22.0 x 26.0                             | 7.8                        | 41530KIP2T0                            | 41530KIM2T0                         | 150         | 41530KII2B0                          | 200  |                                          |      |   |   |  |
|                         | 0.18                                                                          |                                                |                            | 41830KIP2T0                            | 41830KIM2T0                         |             | 41830KII2B0                          |      |                                          |      |   |   |  |
|                         | 0.22                                                                          | 12.5 x 22.5 x 26.5                             | 11.0                       | 42230KIP2T0                            | 42230KIM2T0                         | 140         | 42230KII2B0                          | 200  |                                          |      |   |   |  |
|                         | 0.27                                                                          | 15.5 x 26.5 x 26.5                             | 14.0                       | 42730KIP2T0                            | 42730KIM2T0                         | 110         | 42730KII2B0                          | 275  |                                          |      |   |   |  |
|                         | 0.33                                                                          |                                                |                            | 43330KIP2T0                            | 43330KIM2T0                         |             | 43330KII2B0                          |      |                                          |      |   |   |  |
|                         | PITCH = 27.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 10 % |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |   |   |  |
|                         | 0.10                                                                          | 9.0 x 19.0 x 31.0                              | 5.5                        | 41030KKP2T0                            | 41030KKM2T0                         | 100         | 41030KKI2B0                          | 150  |                                          |      | - | - |  |
|                         | 0.12                                                                          |                                                |                            | 41230KKP2T0                            | 41230KKM2T0                         |             | 41230KKI2B0                          |      |                                          |      |   |   |  |
|                         | 0.15                                                                          | 11.0 x 21.0 x 31.0                             | 7.4                        | 41530KKP2T0                            | 41530KKM2T0                         | 100         | 41530KKI2B0                          | 125  |                                          |      |   |   |  |
|                         | 0.18                                                                          |                                                |                            | 41830KKP2T0                            | 41830KKM2T0                         |             | 41830KKI2B0                          |      |                                          |      |   |   |  |
|                         | 0.22                                                                          | 13.0 x 23.0 x 31.0                             | 9.2                        | 42230KKP2T0                            | 42230KKM2T0                         | 100         | 42230KKI2B0                          | 125  |                                          |      |   |   |  |
|                         | 0.27                                                                          | 15.0 x 25.0 x 31.0                             | 12.3                       | 42730KKP2T0                            | 42730KKM2T0                         | 100         | 42730KKI2B0                          | 125  |                                          |      |   |   |  |
|                         | 0.33                                                                          | 18.0 x 28.0 x 31.0                             | 16.1                       | 43330KKP2T0                            | 43330KKM2T0                         | 100         | 43330KKI2B0                          | 100  |                                          |      |   |   |  |
|                         | 0.39                                                                          |                                                |                            | 43930KKP2T0                            | 43930KKM2T0                         |             | 43930KKI2B0                          |      |                                          |      |   |   |  |
|                         | 0.47                                                                          | 21.0 x 31.0 x 31.0                             | 20.3                       | 44730KKP2T0                            | 44730KKM2T0                         | 50          | 44730KKI2B0                          | 75   |                                          |      |   |   |  |
|                         | 0.56                                                                          |                                                |                            | 45630KKP2T0                            | 45630KKM2T0                         |             | 45630KKI2B0                          |      |                                          |      |   |   |  |
|                         | 0.68                                                                          | 20.0 x 35.0 x 31.0                             | 17.5                       | 46830KKP2T0                            | 46830KKM2T0                         | 50          | 46830KKI2B0                          | 75   |                                          |      |   |   |  |
|                         | PITCH = 37.5 mm ± 0.5 mm; d <sub>t</sub> = 1.0 mm ± 0.1 mm; C-TOL. = ± 10 %   |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |   |   |  |
|                         | 0.47                                                                          | 14.5 x 24.5 x 41.5                             | 14.8                       | 44730KPP2T0                            | 44730KPM2T0                         | 80          | 44730KPI2T0                          | 80   | -                                        | -    |   |   |  |
|                         | 0.56                                                                          | 16.0 x 28.5 x 41.5                             | 19.5                       | 45630KPP2T0                            | 45630KPM2T0                         | 70          | 45630KPI2T0                          | 70   |                                          |      |   |   |  |
|                         | 0.68                                                                          |                                                | 18.5                       | 46830KPP2T0                            | 46830KPM2T0                         | 70          | 46830KPI2T0                          | 70   |                                          |      |   |   |  |
|                         | 0.82                                                                          | 18.0 x 32.5 x 41.5                             | 26                         | 48230KPP2T0                            | 48230KPM2T0                         | 60          | 48230KPI2T0                          | 60   |                                          |      |   |   |  |
|                         | 1.0                                                                           | 18.5 x 35.5 x 43.0                             | 30                         | 51030KPP2T0                            | 51030KPM2T0                         | 105         | 51030KPI2T0                          | 105  |                                          |      |   |   |  |
|                         | PITCH = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.60 mm ± 0.06 mm; C-TOL. = ± 5 %  |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |   |   |  |
|                         | 0.010                                                                         | 5.0 x 11.0 x 17.5                              | 1.0                        | 31030JFP2B0                            | 31030JFM2B0                         | 1250        | 31030JFI2B0                          | 1000 | 31030JF02W0                              | 1100 |   |   |  |
|                         | 0.012                                                                         |                                                |                            | 31230JFP2B0                            | 31230JFM2B0                         |             | 31230JFI2B0                          |      | 31230JF02W0                              |      |   |   |  |
|                         | 0.015                                                                         |                                                |                            | 31530JFP2B0                            | 31530JFM2B0                         |             | 31530JFI2B0                          |      | 31530JF02W0                              |      |   |   |  |
|                         | 0.018                                                                         | 6.0 x 12.0 x 17.5                              | 1.4                        | 31830JFP2B0                            | 31830JFM2B0                         | 1000        | 31830JFI2B0                          | 1000 | 31830JF02W0                              | 900  |   |   |  |
|                         | 0.022                                                                         |                                                |                            | 32230JFP2B0                            | 32230JFM2B0                         |             | 32230JFI2B0                          |      | 32230JF02W0                              |      |   |   |  |
|                         | PITCH = 15.0 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 %  |                                                |                            |                                        |                                     |             |                                      |      |                                          |      |   |   |  |
|                         | 0.027                                                                         | 7.0 x 13.5 x 17.5                              | 1.8                        | 32730JFP2B0                            | 32730JFM2B0                         | 750         | 32730JFI2B0                          | 500  | 32730JF02W0                              | 800  |   |   |  |
|                         | 0.033                                                                         |                                                |                            | 33330JFP2B0                            | 33330JFM2B0                         |             | 33330JFI2B0                          |      | 33330JF02W0                              |      |   |   |  |
|                         | 0.039                                                                         | 8.5 x 15.0 x 17.5                              | 2.4                        | 33930JFP2B0                            | 33930JFM2B0                         | 750         | 33930JFI2B0                          | 500  | 33930JF02W0                              | 650  |   |   |  |
|                         | 0.047                                                                         |                                                |                            | 34730JFP2B0                            | 34730JFM2B0                         |             | 34730JFI2B0                          |      | 34730JF02W0                              |      |   |   |  |
|                         | 0.056                                                                         | 10.0 x 16.5 x 17.5                             | 3.0                        | 35630JFP2B0                            | 35630JFM2B0                         | 500         | 35630JFI2B0                          | 450  | 35630JF02W0                              | 600  |   |   |  |
|                         | 0.068                                                                         |                                                |                            | 36830JFP2B0                            | 36830JFM2B0                         |             | 36830JFI2B0                          |      | 36830JF02W0                              |      |   |   |  |
| 0.082                   | 11.0 x 18.5 x 18.0                                                            | 5.5                                            | 38230JFP2B0                | 38230JFM2B0                            | 225                                 | 38230JFI2B0 | 350                                  | -    | -                                        |      |   |   |  |

## Notes

- SPQ = Standard Packing Quantity
- (1) Reel diameter = 356 mm is available on request
- (2) H = in-tape height; P<sub>0</sub> = sprocket hole distance; for detailed specifications refer to "Packaging Information"
- (3) Weight for short lead product only
- (4) For tolerances see chapter "Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances"

**ELECTRICAL DATA AND ORDERING INFORMATION**

| U <sub>RAC</sub><br>(V) | CAP.<br>(μF)                                                                 | DIMENSIONS <sup>(4)</sup><br>w x h x l<br>(mm) | MASS<br>(g) <sup>(3)</sup> | CATALOG NUMBER F340Y2... AND PACKAGING |                                     |     |                                      |     |                                          |     |   |   |  |
|-------------------------|------------------------------------------------------------------------------|------------------------------------------------|----------------------------|----------------------------------------|-------------------------------------|-----|--------------------------------------|-----|------------------------------------------|-----|---|---|--|
|                         |                                                                              |                                                |                            | LOOSE IN BOX                           |                                     |     |                                      |     | TAPED REEL<br>(500 mm) <sup>(1)(2)</sup> |     |   |   |  |
|                         |                                                                              |                                                |                            | SHORT LEADS                            |                                     |     | LONG LEADS                           |     |                                          |     |   |   |  |
|                         |                                                                              |                                                |                            | l <sub>t</sub> = 3.5 mm<br>± 0.3 mm    | l <sub>t</sub> = 5.0 mm<br>± 1.0 mm | SPQ | l <sub>t</sub> = 25.0 mm<br>± 2.0 mm | SPQ | H = 18.5 mm;<br>P <sub>0</sub> = 12.7 mm | SPQ |   |   |  |
| 305                     | PITCH = 22.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 % |                                                |                            |                                        |                                     |     |                                      |     |                                          |     |   |   |  |
|                         | 0.033                                                                        | 6.0 x 15.5 x 26.0                              | 2.4                        | 33330JIP2T0                            | 33330JIM2T0                         | 300 | 33330JII2B0                          | 250 | -                                        | -   |   |   |  |
|                         | 0.039                                                                        |                                                |                            | 33930JIP2T0                            | 33930JIM2T0                         |     | 33930JII2B0                          |     |                                          |     |   |   |  |
|                         | 0.047                                                                        | 7.0 x 16.5 x 26.0                              | 2.9                        | 34730JIP2T0                            | 34730JIM2T0                         | 200 | 34730JII2B0                          | 250 |                                          |     |   |   |  |
|                         | 0.056                                                                        |                                                |                            | 35630JIP2T0                            | 35630JIM2T0                         |     | 35630JII2B0                          |     |                                          |     |   |   |  |
|                         | 0.068                                                                        | 8.5 x 18.0 x 26.0                              | 3.8                        | 36830JIP2T0                            | 36830JIM2T0                         | 200 | 36830JII2B0                          | 250 |                                          |     |   |   |  |
|                         | 0.082                                                                        |                                                |                            | 38230JIP2T0                            | 38230JIM2T0                         |     | 38230JII2B0                          |     |                                          |     |   |   |  |
|                         | 0.10                                                                         | 10.0 x 19.5 x 26.0                             | 6.8                        | 41030JIP2T0                            | 41030JIM2T0                         | 200 | 41030JII2B0                          | 200 |                                          |     |   |   |  |
|                         | 0.12                                                                         |                                                |                            | 41230JIP2T0                            | 41230JIM2T0                         |     | 41230JII2B0                          |     |                                          |     |   |   |  |
|                         | 0.15                                                                         | 12.0 x 22.0 x 26.0                             | 7.8                        | 41530JIP2T0                            | 41530JIM2T0                         | 150 | 41530JII2B0                          | 200 |                                          |     |   |   |  |
|                         | 0.18                                                                         |                                                |                            | 41830JIP2T0                            | 41830JIM2T0                         |     | 41830JII2B0                          |     |                                          |     |   |   |  |
|                         | 0.22                                                                         | 12.5 x 22.5 x 26.5                             | 8.4                        | 42230JIP2T0                            | 42230JIM2T0                         | 140 | 42230JII2B0                          | 200 |                                          |     |   |   |  |
|                         | 0.27                                                                         | 15.5 x 26.5 x 26.5                             | 14                         | 42730JIP2T0                            | 42730JIM2T0                         | 110 | 42730JII2B0                          | 275 |                                          |     |   |   |  |
|                         | 0.33                                                                         |                                                |                            | 43330JIP2T0                            | 43330JIM2T0                         |     | 43330JII2B0                          |     |                                          |     |   |   |  |
|                         | PITCH = 27.5 mm ± 0.4 mm; d <sub>t</sub> = 0.80 mm ± 0.08 mm; C-TOL. = ± 5 % |                                                |                            |                                        |                                     |     |                                      |     |                                          |     |   |   |  |
|                         | 0.10                                                                         | 9.0 x 19.0 x 31.0                              | 5.5                        | 41030JKP2T0                            | 41030JKM2T0                         | 100 | 41030JKI2B0                          | 150 |                                          |     | - | - |  |
|                         | 0.12                                                                         |                                                |                            | 41230JKP2T0                            | 41230JKM2T0                         |     | 41230JKI2B0                          |     |                                          |     |   |   |  |
|                         | 0.15                                                                         | 11.0 x 21.0 x 31.0                             | 7.4                        | 41530JKP2T0                            | 41530JKM2T0                         | 100 | 41530JKI2B0                          | 125 |                                          |     |   |   |  |
|                         | 0.18                                                                         |                                                |                            | 41830JKP2T0                            | 41830JKM2T0                         |     | 41830JKI2B0                          |     |                                          |     |   |   |  |
|                         | 0.22                                                                         | 13.0 x 23.0 x 31.0                             | 9.2                        | 42230JKP2T0                            | 42230JKM2T0                         | 100 | 42230JKI2B0                          | 125 |                                          |     |   |   |  |
|                         | 0.27                                                                         | 15.0 x 25.0 x 31.0                             | 12.3                       | 42730JKP2T0                            | 42730JKM2T0                         | 100 | 42730JKI2B0                          | 125 |                                          |     |   |   |  |
|                         | 0.33                                                                         | 18.0 x 28.0 x 31.0                             | 16.1                       | 43330JKP2T0                            | 43330JKM2T0                         | 100 | 43330JKI2B0                          | 100 |                                          |     |   |   |  |
|                         | 0.39                                                                         |                                                |                            | 43930JKP2T0                            | 43930JKM2T0                         |     | 43930JKI2B0                          |     |                                          |     |   |   |  |
|                         | 0.47                                                                         | 21.0 x 31.0 x 31.0                             | 20.3                       | 44730JKP2T0                            | 44730JKM2T0                         | 50  | 44730JKI2B0                          | 75  |                                          |     |   |   |  |
|                         | 0.56                                                                         |                                                |                            | 45630JKP2T0                            | 45630JKM2T0                         |     | 45630JKI2B0                          |     |                                          |     |   |   |  |
|                         | 0.68                                                                         | 20.0 x 35.0 x 31.0                             | 17.5                       | 46830JKP2T0                            | 46830JKM2T0                         | 50  | 46830JKI2B0                          | 75  |                                          |     |   |   |  |

**Notes**

- SPQ = Standard Packing Quantity
- (1) Reel diameter = 356 mm is available on request
- (2) H = in-tape height; P<sub>0</sub> = sprocket hole distance; for detailed specifications refer to "Packaging Information"
- (3) Weight for short lead product only
- (4) For tolerances see chapter "Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances"

**APPROVALS**

| SAFETY APPROVALS Y2                                                                                                                                                                                                                                                                                                                                                 | VOLTAGE             | VALUE        | FILE NUMBERS          | LINK                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|-----------------------|------------------------------------------------------------------------|
| EN 60384-14 (ENEC)<br>(= IEC 60384-14 ed-4 (2013))                                                                                                                                                                                                                                                                                                                  | 305 V <sub>AC</sub> | 1 nF to 1 μF | ENEC16/FI/19/10007/M1 | <a href="http://www.vishay.com/doc?28253">www.vishay.com/doc?28253</a> |
| UL 60384-14 (2 <sup>nd</sup> edition)                                                                                                                                                                                                                                                                                                                               | 305 V <sub>AC</sub> | 1 nF to 1 μF | E354331               | <a href="http://www.vishay.com/doc?28256">www.vishay.com/doc?28256</a> |
| CSA-E60384-1:14 (3 <sup>rd</sup> edition)                                                                                                                                                                                                                                                                                                                           | 305 V <sub>AC</sub> | 1 nF to 1 μF | E354331               | <a href="http://www.vishay.com/doc?28256">www.vishay.com/doc?28256</a> |
| CQC                                                                                                                                                                                                                                                                                                                                                                 | 305 V <sub>AC</sub> | 1 nF to 1 μF | L-15001128762         | <a href="http://www.vishay.com/doc?28251">www.vishay.com/doc?28251</a> |
|                                                                                                                                                                                                                                                                                                                                                                     |                     |              | F-15001128766         | <a href="http://www.vishay.com/doc?28252">www.vishay.com/doc?28252</a> |
| CB-test certificate                                                                                                                                                                                                                                                                                                                                                 | 305 V <sub>AC</sub> | 1 nF to 1 μF | FI-39833/M1           | <a href="http://www.vishay.com/doc?28254">www.vishay.com/doc?28254</a> |
| The ENEC-approval together with the CB-certificate replace all national marks of the following countries (they have already signed the ENEC-agreement): Austria; Belgium; Czech Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway; Portugal; Slovenian; Spain; Sweden, Switzerland, and United Kingdom. |                     |              |                       |                                                                        |
|                                                                                                          |                     |              |                       |                                                                        |

## MOUNTING

### Normal Use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting in printed-circuit boards by means of automatic insertion machines.

For detailed tape specifications refer to packaging information [www.vishay.com/docs?28139](http://www.vishay.com/docs?28139)

### Specific Method of Mounting to Withstand Vibration and Shock

In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board:

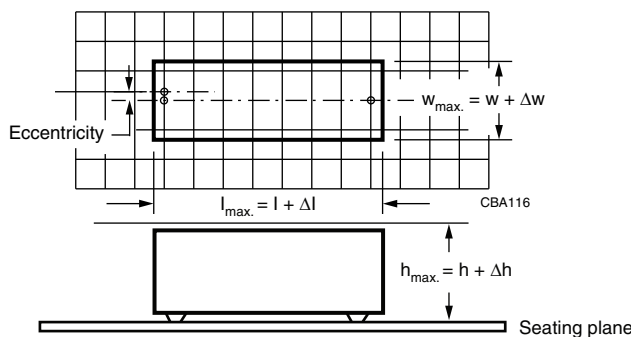
- For original pitch  $\leq 15$  mm the capacitors shall be mechanically fixed by the leads
- For larger pitches the capacitors shall be mounted in the same way and the body clamped

### Space Requirements for Printed-Circuit Board Applications and Dimension Tolerances

For the maximum product dimensions and maximum space requirements for length ( $l_{max.}$ ), width ( $w_{max.}$ ) and height ( $h_{max.}$ ) following tolerances must be taken in account in the envelopment of the components as shown in the drawings below.

- For products with pitch  $\leq 15$  mm,  $\Delta w = \Delta l = 0.3$  mm, and  $\Delta h = 0.1$  mm
- For products with  $15 \text{ mm} < \text{pitch} \leq 27.5$  mm,  $\Delta w = \Delta l = 0.5$  mm, and  $\Delta h = 0.1$  mm
- For products with pitch = 37.5 mm,  $\Delta w = \Delta l = 0.7$  mm, and  $\Delta h = 0.5$  mm

Eccentricity defined as in drawing. The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.



For the minimum product dimensions for length ( $l_{min.}$ ), width ( $w_{min.}$ ), and height ( $h_{min.}$ ) following tolerances of the components are valid:

$l_{min.} = l - \Delta l$ ,  $w_{min.} = w - \Delta w$ , and  $h_{min.} = h - \Delta h$  following

- For products with pitch  $\leq 10$  mm,  $\Delta l = 0.3$  mm, and  $\Delta w = \Delta h = 0.3$  mm
- For products with pitch = 15 mm,  $\Delta l = 0.5$  mm, and  $\Delta w = \Delta h = 0.5$  mm
- For products with  $15 \text{ mm} < \text{pitch} \leq 27.5$  mm,  $\Delta l = 1.0$  mm, and  $\Delta w = \Delta h = 0.5$  mm
- For products with pitch = 37.5 mm,  $\Delta l = 1.0$  mm, and  $\Delta w = \Delta h = 1.0$  mm

## SOLDERING CONDITIONS

For general soldering conditions and wave soldering profile we refer to the document "Soldering Guidelines for Film Capacitors": [www.vishay.com/doc?28171](http://www.vishay.com/doc?28171)

## STORAGE TEMPERATURE

$T_{stg} = -25$  °C to  $+35$  °C with RH maximum 75 % without condensation

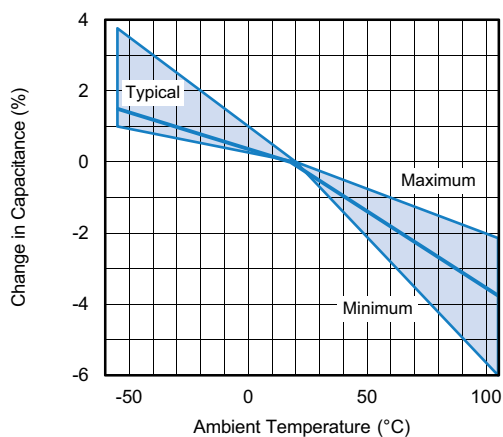
## RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

Unless otherwise specified, all electrical values apply to an ambient temperature of  $23$  °C  $\pm 1$  °C, an atmospheric pressure of 86 kPa to 106 kPa and a relative humidity of  $50$  %  $\pm 2$  %.

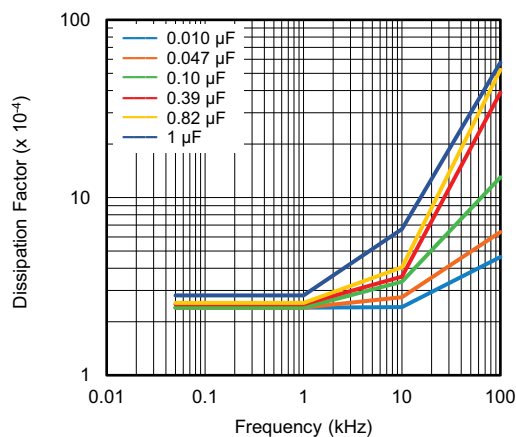
For reference testing, a conditioning period shall be applied over  $96 \text{ h} \pm 4 \text{ h}$  by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.



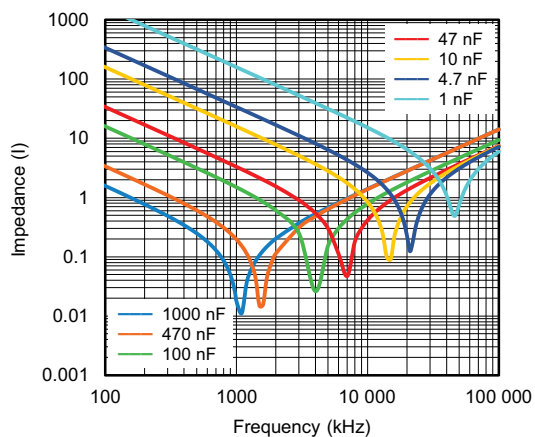
## CHARACTERISTICS



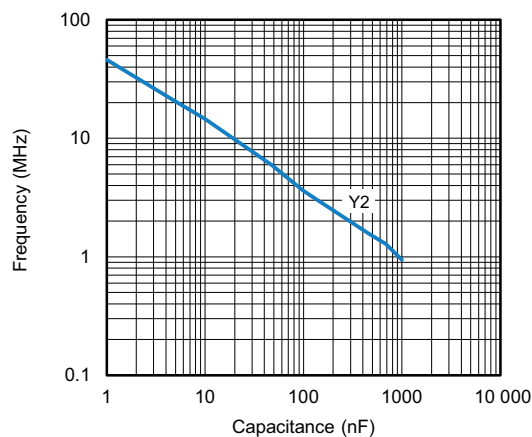
Capacitance as a function of ambient temperature (typical curve)



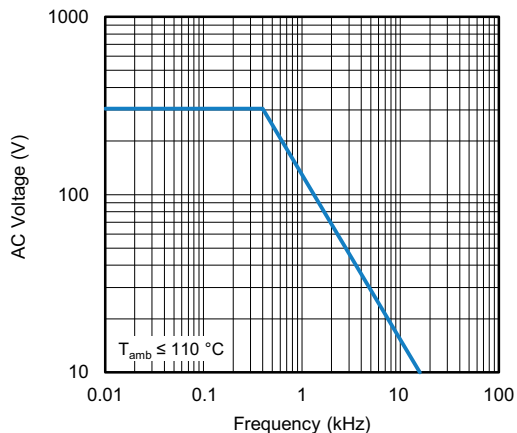
Tangent of loss angle as a function of frequency (typical curve)



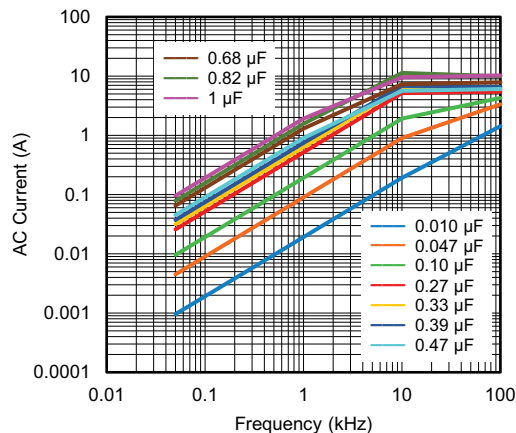
Impedance as a function of frequency (typical curve)



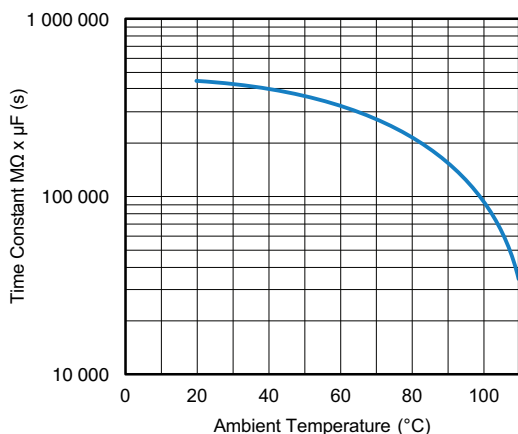
Resonant frequency as a function of capacitance (typical curve)



Max. RMS voltage as a function of frequency



Max. RMS current as a function of frequency



Insulation resistance as a function of ambient temperature  
(typical curve)

## APPLICATION NOTES

- For Y2 electromagnetic interference suppression in standard line bypass applications (50 Hz / 60 Hz) with a maximum of 305 V<sub>AC</sub> rated voltage including fluctuation of the mains. It is recommended to use these components in a mains with maximum nominal voltage of 240 V<sub>AC</sub>. Higher continuous applied voltages will shorten the life time
- For series impedance applications we refer to the application note: [www.vishay.com/doc?28153](http://www.vishay.com/doc?28153)
- To ensure withstanding high humidity requirements in the application it is recommended not to damage the epoxy adhesion at the leads. Therefore the leads may not be damaged or bent before soldering
- For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact: [rfi@vishay.com](mailto:rfi@vishay.com)
- These capacitors are not intended for continuous pulse applications. For these situations, capacitors of the AC and pulse programs must be used
- The maximum ambient temperature must not exceed 105 °C
- Rated voltage pulse slope:  
if the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 420 V<sub>DC</sub> and divided by the applied voltage

## INSPECTION REQUIREMENTS

### General Notes

Sub-clause numbers of tests and performance requirements refer to the “Sectional Specification, Publication IEC 60384-14 ed-3 and Specific Reference Data”.

| INSPECTION REQUIREMENTS                      |                                                                             |                                                               |
|----------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                   | CONDITIONS                                                                  | PERFORMANCE REQUIREMENTS                                      |
| SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1 |                                                                             |                                                               |
| 4.1 Dimensions (detail)                      |                                                                             | As specified in chapters “General Data” of this specification |
| Initial measurements                         | Capacitance<br>Tangent of loss angle:<br>for C ≤ 1 μF at 10 kHz             |                                                               |
| 4.3 Robustness of terminations               | Tensile: load 10 N; 10 s<br>Bending: load 5 N; 4 x 90°                      |                                                               |
| 4.4 Resistance to soldering heat             | No pre-drying<br>Method: 1A<br>Solder bath: 280 °C ± 5 °C<br>Duration: 10 s |                                                               |



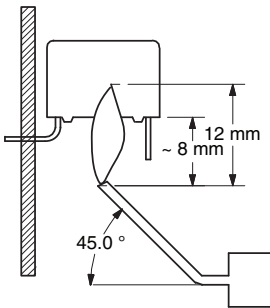
| INSPECTION REQUIREMENTS                                   |                                                                                                                                                                                                                            |                                                                                                            |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                                | CONDITIONS                                                                                                                                                                                                                 | PERFORMANCE REQUIREMENTS                                                                                   |
| <b>SUB-GROUP C1A PART OF SAMPLE OF SUB-GROUP C1</b>       |                                                                                                                                                                                                                            |                                                                                                            |
| 4.19 Component solvent resistance                         | Isopropylalcohol at room temperature<br>Method: 2<br>Immersion time: 5 min ± 0.5 min<br>Recovery time: min. 1 h, max. 2 h                                                                                                  |                                                                                                            |
| 4.4.2 Final measurements                                  | Visual examination                                                                                                                                                                                                         | No visible damage<br>Legible marking                                                                       |
|                                                           | Capacitance                                                                                                                                                                                                                | $ \Delta C/C  \leq 5\%$ of the value measured initially                                                    |
|                                                           | Tangent of loss angle                                                                                                                                                                                                      | Increase of $\tan \delta$ :<br>$\leq 0.008$ for: $C \leq 1 \mu F$<br>Compared to values measured initially |
|                                                           | Insulation resistance                                                                                                                                                                                                      | As specified in section "Insulation Resistance" of this specification                                      |
| <b>SUB-GROUP C1B OTHER PART OF SAMPLE OF SUB-GROUP C1</b> |                                                                                                                                                                                                                            |                                                                                                            |
| Initial measurements                                      | Capacitance<br>Tangent of loss angle:<br>for $C \leq 1 \mu F$ at 10 kHz                                                                                                                                                    |                                                                                                            |
| 4.20 Solvent resistance of the marking                    | Isopropyl alcohol at room temperature<br>Method: 1<br>Rubbing material: cotton wool<br>Immersion time: 5 min ± 0.5 min                                                                                                     | No visible damage<br>Legible marking                                                                       |
| 4.6 Rapid change of temperature                           | $\theta A = -55^\circ C$<br>$\theta B = +105^\circ C$<br>5 cycles<br>Duration $t = 30$ min                                                                                                                                 |                                                                                                            |
| 4.6.1 Inspection                                          | Visual examination                                                                                                                                                                                                         | No visible damage                                                                                          |
| 4.7 Vibration                                             | Mounting: see section "Mounting" of this specification<br>Procedure B4:<br>frequency range: 10 Hz to 55 Hz<br>Amplitude: 0.75 mm or<br>Acceleration $98 \text{ m/s}^2$<br>(whichever is less severe)<br>Total duration 6 h |                                                                                                            |
| 4.7.2 Final inspection                                    | Visual examination                                                                                                                                                                                                         | No visible damage                                                                                          |
| 4.9 Shock                                                 | Mounting: see section "Mounting" for more information<br>Pulse shape: half sine<br>Acceleration: $490 \text{ m/s}^2$<br>Duration of pulse: 11 ms                                                                           |                                                                                                            |
| 4.9.2 Final measurements                                  | Visual examination                                                                                                                                                                                                         | No visible damage                                                                                          |
|                                                           | Capacitance                                                                                                                                                                                                                | $ \Delta C/C  \leq 5\%$ of the value measured initially                                                    |
|                                                           | Tangent of loss angle                                                                                                                                                                                                      | Increase of $\tan \delta$ :<br>$\leq 0.008$ for: $C \leq 1 \mu F$<br>Compared to values measured initially |
|                                                           | Insulation resistance                                                                                                                                                                                                      | As specified in section "Insulation Resistance" of this specification                                      |



| <b>INSPECTION REQUIREMENTS</b>                                             |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SUB-CLAUSE NUMBER AND TEST</b>                                          | <b>CONDITIONS</b>                                                                                                                                                         | <b>PERFORMANCE REQUIREMENTS</b>                                                                                                                                                                                                                                                                                                                                              |
| <b>SUB-GROUP C1 COMBINED SAMPLE OF SPECIMENS OF SUB-GROUPS C1A AND C1B</b> |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.11 Climatic sequence                                                     |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.11.1 Initial measurements                                                | Capacitance<br>Measured in 4.4.2 and 4.9.2<br>Tangent of loss angle:<br>measured initially in C1A and C1B                                                                 |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.11.2 Dry heat                                                            | Temperature: 105 °C                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.11.3 Damp heat cyclic<br>Test Db<br>First cycle                          | Duration: 16 h                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.11.4 Cold                                                                | Temperature: -55 °C                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.11.5 Damp heat cyclic<br>Test Db<br>remaining cycles                     | Duration: 2 h                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.11.6 Final measurements                                                  | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Voltage proof<br>2250 V <sub>DC</sub> ; 1 min between terminations<br><br>Insulation resistance | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.11.1.<br><br>Increase of $\tan \delta$ :<br>$\leq 0.008$ for $C \leq 1\ \mu\text{F}$<br>Compared to values measured in 4.11.1<br><br>No permanent breakdown or flash-over<br><br>$\geq 50\%$ of values specified in section<br>“Insulation Resistance” of this specification  |
| <b>SUB-GROUP C2</b>                                                        |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.12 Damp heat steady state                                                | 56 days, 40 °C, 90 % to 95 % RH,<br>no load                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.12.1 Initial measurements                                                | Capacitance<br>Tangent of loss angle at 1 kHz                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                              |
| 4.12.3 Final measurements                                                  | Visual examination<br><br>Capacitance<br><br>Tangent of loss angle<br><br>Voltage proof<br>2250 V <sub>DC</sub> ; 1 min between terminations<br><br>Insulation resistance | No visible damage<br>Legible marking<br><br>$ \Delta C/C  \leq 5\%$ of the value measured in 4.12.1.<br><br>Increase of $\tan \delta$ :<br>$\leq 0.008$ for $C \leq 1\ \mu\text{F}$<br>Compared to values measured in 4.12.1.<br><br>No permanent breakdown or flash-over<br><br>$\geq 50\%$ of values specified in section<br>“Insulation Resistance” of this specification |



| <b>INSPECTION REQUIREMENTS</b>         |                                                                                                                                                                   |                                                                                                  |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>SUB-CLAUSE NUMBER AND TEST</b>      | <b>CONDITIONS</b>                                                                                                                                                 | <b>PERFORMANCE REQUIREMENTS</b>                                                                  |
| <b>SUB-GROUP C2A</b>                   |                                                                                                                                                                   |                                                                                                  |
| 4.12A Damp heat steady state with load | RH: 85 %, temp.: 85 °C, load: 305 V <sub>AC</sub><br>Duration: 1000 h                                                                                             |                                                                                                  |
| 4.12.1A Initial measurements           | Capacitance<br>Tangent of loss angle:<br>for C ≤ 1 µF at 10 kHz                                                                                                   |                                                                                                  |
| 4.12.3A Final measurements             | Visual examination                                                                                                                                                | No visible damage<br>Legible marking                                                             |
|                                        | Capacitance                                                                                                                                                       | $ \Delta C/C  \leq 10\%$ of the value measured in 4.12.1A.                                       |
|                                        | Tangent of loss angle                                                                                                                                             | Increase of tan δ:<br>≤ 0.0240 for C ≤ 1 µF at 10 kHz<br>Compared to values measured in 4.12.1A. |
|                                        | Insulation resistance                                                                                                                                             | ≥ 50 % of values specified in section "Insulation Resistance" of this specification              |
| <b>SUB-GROUP C3</b>                    |                                                                                                                                                                   |                                                                                                  |
| 4.13.1 Initial measurements            | Capacitance<br>Tangent of loss angle:<br>for C ≤ 1 µF at 10 kHz                                                                                                   |                                                                                                  |
| 4.13 Impulse voltage                   | 3 successive impulses, full wave, peak voltage:<br>Y2: 5 kV for C ≤ 1 µF<br>Max. 24 pulses                                                                        | No self healing breakdowns or flash-over                                                         |
| 4.14 Endurance                         | Duration: 1000 h<br>1.7 x U <sub>RAC</sub> at 105 °C<br>Once in every hour the voltage is increased to 1000 V <sub>RMS</sub> for 0.1 s via resistor of 47 Ω ± 5 % |                                                                                                  |
| 4.14.7 Final measurements              | Visual examination                                                                                                                                                | No visible damage<br>Legible marking                                                             |
|                                        | Capacitance                                                                                                                                                       | $ \Delta C/C  \leq 10\%$ compared to values measured in 4.13.1.                                  |
|                                        | Tangent of loss angle                                                                                                                                             | Increase of tan δ:<br>≤ 0.008 for C ≤ 1 µF<br>Compared to values measured in 4.13.1              |
|                                        | Voltage proof<br>2250 V <sub>DC</sub> ; 1 min between terminations<br>2110 V <sub>AC</sub> ; 1 min between terminations and case                                  | No permanent breakdown or flash-over                                                             |
|                                        | Insulation resistance                                                                                                                                             | ≥ 50 % of values specified in section "Insulation Resistance" of this specification              |

| INSPECTION REQUIREMENTS                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|----------------|---|------|-----------------|---|------|-----------|------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SUB-CLAUSE NUMBER AND TEST                                                                                          | CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                               |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| <b>SUB-GROUP C4</b>                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 4.15 Charge and discharge                                                                                           | 10 000 cycles<br>Charged to 420 V <sub>DC</sub><br>Discharge resistance:<br>$R = \frac{420 V_{DC}}{1.5 \times C (du/dt)}$                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 4.15.1 Initial measurements                                                                                         | Capacitance<br>Tangent of loss angle:<br>for C ≤ 1 µF at 10 kHz<br>for C > 1 µF at 1 kHz                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 4.15.3 Final measurements                                                                                           | Capacitance<br><br>Tangent of loss angle<br><br>Insulation resistance                                                                                                                                                                                                                                                                                                                                                                                                     | $ \Delta C/C  \leq 10\%$ compared to values measured in 4.15.1.<br><br>Increase of tan δ:<br>≤ 0.008 for: C ≤ 1 µF<br>Compared to values measured in 4.15.1<br><br>≥ 50 % of values specified in section "Insulation Resistance" of this specification |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| <b>SUB-GROUP C5</b>                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 4.16 Radio frequency characteristic                                                                                 | Resonance frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ≥ 0.9 times the value as specified in section "Resonant Frequency" of this specification                                                                                                                                                               |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| <b>SUB-GROUP C6</b>                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 4.17 Passive flammability<br>Class B for volume > 1750 mm <sup>3</sup><br>Class C for volume ≤ 1750 mm <sup>3</sup> | Bore of gas jet: Ø 0.5 mm<br>Fuel: butane<br>Test duration for actual volume V in mm <sup>3</sup> :<br><table> <tr> <td></td><td>Class B</td><td>Class C</td></tr> <tr> <td>250 &lt; V ≤ 500:</td><td>-</td><td>10 s</td></tr> <tr> <td>500 &lt; V ≤ 1750:</td><td>-</td><td>20 s</td></tr> <tr> <td>V &gt; 1750:</td><td>60 s</td><td>-</td></tr> </table> One flame application:<br> |                                                                                                                                                                                                                                                        | Class B | Class C | 250 < V ≤ 500: | - | 10 s | 500 < V ≤ 1750: | - | 20 s | V > 1750: | 60 s | - | After removing test flame from capacitor, the capacitor must not continue to burn for more than 10 s (class B) and more than 30 s (class C). No burning particle must drop from the sample. |
|                                                                                                                     | Class B                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Class C                                                                                                                                                                                                                                                |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 250 < V ≤ 500:                                                                                                      | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10 s                                                                                                                                                                                                                                                   |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 500 < V ≤ 1750:                                                                                                     | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 20 s                                                                                                                                                                                                                                                   |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| V > 1750:                                                                                                           | 60 s                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                                                                                                                                                                                                                                      |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| <b>SUB-GROUP C7</b>                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |
| 4.18 Active flammability                                                                                            | 20 cycles of 5 kV discharges on the test capacitor connected to U <sub>RAC</sub>                                                                                                                                                                                                                                                                                                                                                                                          | The cheese cloth around the capacitors shall not burn with a flame.<br>No electrical measurements are required.                                                                                                                                        |         |         |                |   |      |                 |   |      |           |      |   |                                                                                                                                                                                             |

**AUTOMOTIVE AEC-Q200, REVISION D QUALIFICATION**

| STRESS                                 | REVISION | CONDITION                                                                                                                                           | SAMPLE SIZE | PERFORMANCE REQUIREMENTS                                                                                                                                                                                                                |
|----------------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. High temperature exposure (storage) | D        | Temp.: 105 °C; unpowered<br>250 h / 500 h / 1000 h                                                                                                  | 77          | $ \Delta C/C  \leq 5\%$<br>Increase of $\tan \delta$ :<br>$\leq 0.008$ for $C \leq 1\ \mu\text{F}$ at 10 kHz<br>Increase of $\tan \delta$ :<br>$\leq 0.005$ for $C > 1\ \mu\text{F}$ at 1 kHz<br>$IR > 50\%$ of initial specified value |
| 2. Temperature cycling                 | D        | Total no. of cycles: 1000 cycles<br>Lower temp.: -55 °C<br>Upper temp.: +105 °C<br>30 min dwell time at each temperature<br>Transition time < 1 min | 77          | $ \Delta C/C  \leq 5\%$<br>Increase of $\tan \delta$ : $\leq 0.008$ for $C \leq 1\ \mu\text{F}$ at 10 kHz<br>$IR > 50\%$ of initial specified value                                                                                     |
| 3. Moisture resistance                 |          | No. of cycle: 10 cycles<br>$t = 24\ \text{h/cycle}$                                                                                                 | 77          | $ \Delta C/C  \leq 5\%$<br>Increase of $\tan \delta$ : $\leq 0.008$ for $C \leq 1\ \mu\text{F}$ at 10 kHz<br>$IR > 50\%$ of initial specified value                                                                                     |
| 4. Biased humidity AC                  | D        | Temp.: 40 °C; RH: 93 %; $U_{\text{RAC}}$<br>250 h / 500 h / 1000 h                                                                                  | 77          | $ \Delta C/C  \leq 10\%$<br>Increase of $\tan \delta$ : $\leq 0.008$ for $C \leq 1\ \mu\text{F}$ at 10 kHz<br>$IR > 50\%$ of initial specified value                                                                                    |
| 5. Operational life AC                 | D        | Temp. = 105 °C; $U_{\text{RAC}}$ 1000 h                                                                                                             | 77          | $ \Delta C/C  \leq 10\%$<br>Increase of $\tan \delta$ : $\leq 0.008$ for $C \leq 1\ \mu\text{F}$ at 10 kHz<br>$IR > 50\%$ of initial specified value                                                                                    |
| 6. Terminal strength (lead)            | D        | Test leaded device lead integrity only.<br>- A (pull-test): 2.27 kg (10 s)<br>- C (wire-lead bend test): 227 g (3 x 3 s)                            | 30          | No visual damage                                                                                                                                                                                                                        |
| 7. Resistance to solvents              | D        | MIL-STD-202 method 215.<br>- Also aqueous chemical<br>- OKEM clean or equivalent.<br>Do not use banned solvents.                                    | 5           | No visual damage<br>Legible marking                                                                                                                                                                                                     |
| 8. Mechanical shock                    | D        | 100 g's ; 6 ms<br>half-sine; 3.75 m/s                                                                                                               | 30          | No visual damage                                                                                                                                                                                                                        |
| 9. Vibration                           | D        | 5 g's for 20 min<br>12 cycles x 3 directions<br>10 Hz to 2000 Hz                                                                                    | 30          | No visual damage                                                                                                                                                                                                                        |
| 10. Resistance to soldering heat       | D        | Temp.: 280 °C; time: 10 s<br>solder within 1.5 mm of device body                                                                                    | 30          | $ \Delta C/C  \leq 5\%$<br>Increase of $\tan \delta$ : $\leq 0.008$ for $C \leq 1\ \mu\text{F}$ at 10 kHz<br>$IR > 50\%$ of initial specified value                                                                                     |
| 11. Solderability                      | D        | Leaded: method A at 235 °C,<br>category 3 (245 °C / 3 s)                                                                                            | 15          | Good tinning as evidence by free flowing of the solder with wetting of terminations > 95 %                                                                                                                                              |
| 12. Electrical characterization        |          | -                                                                                                                                                   | 30          | -                                                                                                                                                                                                                                       |
| 13. Flammability                       |          | One flame application<br>Class B                                                                                                                    | 15          | V-0 or V-1 are acceptable.<br>Class B or C according IEC is also acceptable                                                                                                                                                             |



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