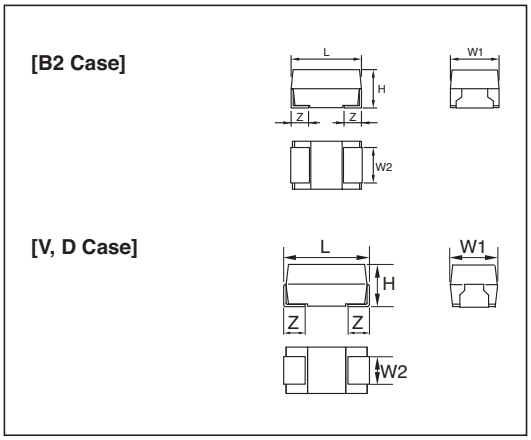
## ■ FEATURE

- ●Lead-free type.  RoHS Compliant.
- ●Extreme low ESR (6mhom) and excellent noise absorption performance.
- ●High capacitance and ultra low ESR based upon on our original Conductive Polymer technology.
- ●Same outer dimension an conventional PS/L series.
- ●Halogen free, Antimony free and Red Phosphorous free resin is applied to the exterior mold resin.

## ■ DIMENSIONS




(Unit: mm)

| Case Code | L | W1 | W2 | H | Z |
|---|---|---|---|---|---|
| B2 | 3.5 ± 0.2 | 2.8 ± 0.2 | 2.2 ± 0.1 | 1.9 ± 0.1 | 0.8 ± 0.2 |
| V | 7.3 ± 0.2 | 4.3 ± 0.2 | 2.4 ± 0.2 | 1.9 ± 0.1 | 1.3 ± 0.2 |
| D | 7.3 ± 0.2 | 4.3 ± 0.2 | 2.4 ± 0.2 | 2.8 ± 0.2 | 1.3 ± 0.2 |

## ■ STANDARD C-V VALUE REFERENCE BY CASE CODE

UR :Rated Voltage

| μF \ UR | | 2.5 | 4 |
|---|---|---|---|
| | | 0E | 0G |
| 220 | 227 | V 9, 7 | V 9 |
| 330 | 337 | B2 9 / V 9, 6 / D 9, 7 | |
| 470 | 477 | V 9, 6 / D 9, 7, 6 | |
| 680 | 687 | D 9, 7, 6 | |

*Numeral: ESR(mΩ)





9653TCAVOL13E1106E1

## ■ PART NUMBER SYSTEM

**[Bulk]**

PSG D 0E 477 M 7

- 7: Special Numbering for ESR (ex.7 means 7 mΩ.)
- M: Capacitance Tolerance (M: ±20%)
- 477: Capacitance (in pF) (First two digits represent significant figures. Third digit specifies number of zero to follow.)
- 0E: DC Rated Voltage in volts
- D: Case code
- PSG: PS/G Series

**[Tape and Reel]**

TE PSGD0E477M7 -12 R

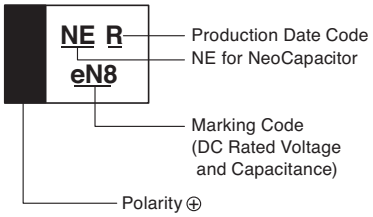
- R: Packing Orientation (R:Cathode on the side of Sproket Hole)
- -12: Tape width (-12: 12 mm)
- PSGD0E477M7: Part number of Bulk
- TE: Tape and Reel (TE:180mm ϕ reel)

TL PSGD0E477M7 -12 R E

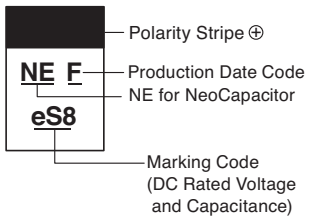
- E: Indicate 330mm ϕ reel
- TL: Tape and Reel (TL:330mm ϕ reel)

## ■ MARKINGS

**[B2 case]**




**[V, D case]**




**[Rated voltage and capacitance]**

UR :Rated Voltage

| μF \ UR | | 2.5 | 4 |
|---|---|---|---|
| | | e | g |
| 220 | J8 | eJ8 | gJ8 |
| 330 | N8 | eN8 | |
| 470 | S8 | eS8 | |
| 680 | W8 | eW8 | |

**[Production date code]**

| Y \ M | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | a | b | c | d | e | f | g | h | j | k | l | m |
| 2012 | n | p | q | r | s | t | u | v | w | x | y | z |
| 2013 | A | B | C | D | E | F | G | H | J | K | L | M |
| 2014 | N | P | Q | R | S | T | U | V | W | X | Y | Z |

NOTE: Production date code will resume beginning in 2015.

## ■ PERFORMANCE CHARACTERISTICS

**Test Conditions : Conform to IEC 60384-1**

| ITEM | | PERFORMANCE | | | TEST CONDITION |
|---|---|---|---|---|---|
| Operating temperature | | -55°C to +105°C | | | Derated voltage at 85°C at more |
| Rated voltage (V.dc) | | 2.5V | 4V | | at 85°C |
| Derated voltage (V.dc) | | 2V | 3.3V | | at 105°C |
| Surge voltage (V.dc) | | 3.3V | 5.2V | | at 85°C |
| Capacitance | | 220 μF to 680 μF | | | at 120 Hz |
| Capacitance tolerance | | ±20% | | | |
| DC Leakage Current (L.C) | | 0.1C • V(μA) or 3μA, whichever is greater | | | Voltage:<br>Rated voltage for 5min. |
| Dissipation Factor | | Refer to Standard Ratings | | | at 120 Hz |
| Equivalent Series Resistance | | Refer to Standard Ratings | | | at 100 kHz or 300 kHz<br>refer to STANDARD RATINGS |
| | | Capacitance change | DF(%) | L.C | |
| Surge voltage test | | Refer to Standard Ratings | Lower than initial specification | Lower than initial specification | Temperature : 85±2°C<br>Applied voltage : Surge voltage<br>Series resistance : 33 ohm<br>Duration of surge : 30±5 sec<br>Time between surge : 5.5min.<br>Number of cycle : 1000 |
| Characteristic at high and low temperature | -55°C | from 0 to -20% | Lower than initial specification | ——— | Step 1: 25±2°C<br>Step 2: -55 $^{0}_{-3}$ °C<br>Step 3: 25±2°C<br>Step 4: 105 $^{0}_{-3}$ °C |
| | +105°C | from 0 to +50% | Lower than 1.5 times initial specification | Lower than 10 times initial specification | |
| Rapid change of temperature | | Refer to Standard Ratings | Lower than initial specification | Lower than initial specification | Parts shall be temperature cycled over a temperature range of -55 to +105°C, five times continuously as follow.<br>Step 1: -55 $^{0}_{-3}$ °C, 30±3min.<br>Step 2: room temp. , 10 to 15min.<br>Step 3: 105 $^{0}_{-3}$ °C, 30±3min.<br>Step 4: room temp, 10 to 15min. |
| Resistance to Soldering heat | | Refer to Standard Ratings | Lower than 1.3 times initial specification | Lower than initial specification | Reflow soldering mehod 240°C, 10 sec.Max. *1 |
| Damp heat | | from +30% to -20% | Lower than 1.5 times initial specification | Lower than initial specification | at 40°C<br>at 90 to 95% RH<br>500 hour |
| Endurance I | | Refer to Standard Ratings | Lower than 1.5 times initial specification | Lower than initial specification | at 85°C<br>at rated voltage<br>1000 hour |
| Endurance II | | Refer to Standard Ratings | Lower than 3 times initial specification | Lower than initial specification | at 105°C<br>at Derated voltage<br>1000 hour |
| Failure Rate | | λ0 = 1% / 1000 hour | | | at 85°C: rated voltage<br>at 105°C: derated voltage<br>1000 hour |
| Terminal Strength | | Visual:<br>There shall be no evidence of mechanical damage | | | Strength : 4.9N<br>Time : 10±0.5sec.<br>(two directions) |
| Permissible ripple current | | Refer to Ratings Table | | | at 100 kHz or 300 kHz<br>refer to STANDARD RATINGS |
| Others | | Conform to IEC60384-1 | | | Conform to IEC60384-1 |

*1: Refer to the page 52 “NOTES ON USING NeoCapacitor/2. Mounting/(1) Reflow soldering/(b) Temperature and time”

Reference : Derated voltage (85 to 105°C)

$$[U_T] = [U_R] - \frac{[U_R] - [U_C]}{20} (T-85)$$

[$U_T$] : Derated voltage at operating temperature
[$U_R$] : Rated voltage
[$U_C$] : Derated voltage at 105°C
T : Operating temperature

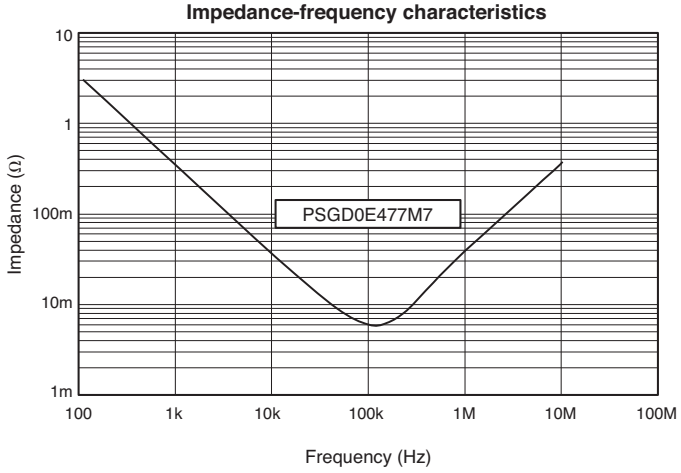
## ■ STANDARD RATINGS

| Rated Voltage (V) | Capacitance (μF) | Case Code | Part Number (Bulk) | Leakage Current (μA) Max | DF (%) Max | ESR (mΩ) Max *1 | Permissible Ripple Current (mA rms.) Max *1 | DF (%) Max | | Capacitance Change | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | -55°C | +105°C | at Surge Voltage at Resistance to Soldering Heat | at Endurance |
| 2.5 | 330 | B2 | PSGB20E337M9 | 82.5 | 8 | 9 ● | 3073 ● | 8 | 12 | ±20% | ±20% |
| | 220 | V | PSGV0E227M9 | 55 | 10 | 9 ● | 3726 ● | 10 | 15 | ±20% | ±20% |
| | 220 | V | PSGV0E227M7 | 55 | 10 | 7 ● | 4226 ● | 10 | 15 | ±20% | ±20% |
| | 330 | V | PSGV0E337M9 | 82.5 | 10 | 9 ● | 3726 ● | 10 | 15 | ±20% | ±20% |
| | 330 | V | PSGV0E337M6 | 82.5 | 10 | 6 ● | 4564 ● | 10 | 15 | ±20% | ±20% |
| | 330 | D | PSGD0E337M9 | 82.5 | 10 | 9 | 4082 | 10 | 15 | ±20% | ±20% |
| | 330 | D | PSGD0E337M7 | 82.5 | 10 | 7 | 4629 | 10 | 15 | ±20% | ±20% |
| | 470 | V | PSGV0E477M9 | 117.5 | 10 | 9 ● | 3726 ● | 10 | 15 | ±20% | ±20% |
| | 470 | V | PSGV0E477M6 | 117.5 | 10 | 6 ● | 4564 ● | 10 | 15 | ±20% | ±20% |
| | 470 | D | PSGD0E477M9 | 117.5 | 10 | 9 | 4082 | 10 | 15 | ±20% | ±20% |
| | 470 | D | PSGD0E477M7 | 117.5 | 10 | 7 | 4629 | 10 | 15 | ±20% | ±20% |
| | 470 | D | PSGD0E477M6 | 117.5 | 10 | 6 | 5000 | 10 | 15 | ±20% | ±20% |
| | 680 | D | PSGD0E687M9 | 170 | 10 | 9 | 4082 | 10 | 15 | ±20% | ±20% |
| | 680 | D | PSGD0E687M7 | 170 | 10 | 7 | 4629 | 10 | 15 | ±20% | ±20% |
| | 680 | D | PSGD0E687M6 | 170 | 10 | 6 | 5000 | 10 | 15 | ±20% | ±20% |
| 4 | 220 | V | PSGV0G227M9 | 88 | 10 | 9 ● | 3726 ● | 10 | 15 | ±20% | ±20% |

*1: Measure frequency
●: 300kHz, none: 100 kHz

## ■ FREQUENCY CHARACTERISTICS (reference)

**Impedance-frequency characteristics**




**ESR-frequency characteristics**