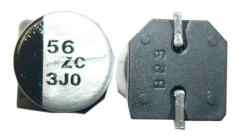
#### **SMT Hybrid Polymer-Aluminum Electrolytic Capacitors**

For filtering, Bypassing and Power Supply Decoupling with Long Life Requirements



Rated for 125°C, type HZC combines the advantages of aluminum electrolytic and aluminum polymer technology. These hybrid capacitors have the ultra-low ESR characteristics of conductive aluminum polymer capacitors packaged in a V-chip, SMT case with high capacitance and voltage ratings that were previously available only in aluminum electrolytic technology. Applications for type 125°C hybrid capacitors include a variety of industrial power conversion, lighting control and automotive applications.

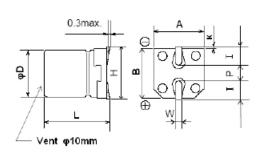
#### **Highlights**

- +125 °C, Up to 4,000 Hours Load Life
- Low Leakage Current
- Very Low ESR and High Ripple Current
- 260 °C reflow soldering
- AEC-Q200 Compliant

#### **Specifications**

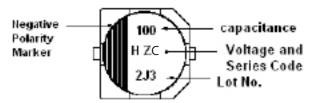
Capacitance Range	10 to 330 μF							
Capacitance Tolerance	±20% @ 120 Hz/+20 °C							
Rated Voltage	25, 35, 50, 63 Vdc							
Leakage Current (at 20°C)	I = .01CV or 3 μA max., whichever is greater after 2 minutes I = leakage current in μAmps C = rated capacitance in μF V = rated DC Working voltage in Volts							
Low Temperature Characteristics (at 120 Hz)	Z(-25 °C)/Z(+20 °C): 2 Z(-55 °C)/Z(+20 °C): 2.5							
Ripple Current Frequency Multiplier	Frequency 120 Hz 1000 Hz	10,000 Hz	100 KHz					
	Correction Factor 0.1 0.3	0.6	1					
RoHS Compliant								

#### **Outline Drawing**



Case Code	D (± 0.5)	L ( ± 0.3)	A (± 0.2)	B ( ± 0.2)	H (max.)	l (ref.)	w	P (ref.)	К
С	5.0	5.8	5.3	5.3	6.5	2.2	0.65 ± 0.1	1.5	0.35 +0.15/-0.20
D	6.3	5.8	6.6	6.6	7.8	2.6	0.65 ± 0.1	1.8	0.35 +0.15/-0.20
Х	6.3	7.7	6.6	6.6	7.8	2.6	0.65 ± 0.1	1.8	0.35 +0.15/-0.20
F	8.0	10.2	8.3	8.3	10.0	3.4	$0.90 \pm 0.2$	3.1	0.70 ± 0.2
G	10.0	10.2	10.3	10.3	12.0	3.5	$0.90 \pm 0.2$	4.6	0.70 ± 0.2

### **Capacitor Markings**

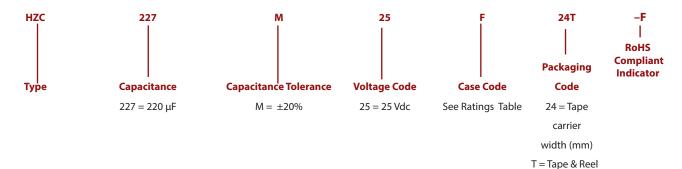


Lot, Number: Year, Line, Month

Voltage Code	Voltage Vdc
E	25
V	35
Н	50
J	63

mm

# SMT Hybrid Polymer-Aluminum Electrolytic Capacitors Part Numbering System



#### **Ratings**

Capacitance (μF)	Voltage Rating (Vdc)	CDE Part Number	MAX DCL (μA)	MAX DF @ 120 Hz/20°C	MAX E.S.R. @ 100kHz/+20°C (ohms)	MAX Ripple Current @ 100kHz/+125°C (A rms)	D (mm)	L (mm)	Case Code	QTY/reel
				25 Vdc ( 32 Vdc	Surge )					
33	25	HZC336M025C12T-F	8.2	0.14	0.080	0.55	5.0	5.8	С	1000
56	25	HZC566M025D16T-F	14.0	0.14	0.050	0.90	6.3	5.8	D	1000
100	25	HZC107M025X16T-F	25.0	0.14	0.030	1.40	6.3	7.7	Χ	900
220	25	HZC227M025F24T-F	55.0	0.14	0.027	1.60	8.0	10.2	F	500
330	25	HZC337M025G24T-F	82.5	0.14	0.020	2.00	10.0	10.2	G	500
	35 Vdc ( 44 Vdc Surge )									
22	35	HZC226M035C12T-F	7.7	0.12	0.100	0.55	5.0	5.8	С	1000
47	35	HZC476M035D16T-F	16.4	0.12	0.060	0.90	6.3	5.8	D	1000
68	35	HZC686M035X16T-F	23.8	0.12	0.035	1.40	6.3	7.7	Χ	900
150	35	HZC157M035F24T-F	52.5	0.12	0.027	1.60	8.0	10.2	F	500
270	35	HZC277M035G24T-F	94.5	0.12	0.020	2.00	10.0	10.2	G	500
				50 Vdc ( 63 Vdc	Surge )					
10	50	HZC106M050C12T-F	5.0	0.10	0.120	0.50	5.0	5.8	С	1000
22	50	HZC226M050D16T-F	11.0	0.10	0.080	0.75	6.3	5.8	D	1000
33	50	HZC336M050X16T-F	16.5	0.10	0.040	1.10	6.3	7.7	Χ	900
68	50	HZC686M050F24T-F	34.0	0.10	0.030	1.25	8.0	10.2	F	500
100	50	HZC107M050G24T-F	50.0	0.10	0.028	1.60	10.0	10.2	G	500
63 Vdc ( 79 Vdc Surge )										
10	63	HZC106M063D16T-F	6.3	0.08	0.120	0.70	6.3	5.8	D	1000
22	63	HZC226M063X16T-F	13.8	0.08	0.080	0.90	6.3	7.7	Χ	900
33	63	HZC336M063F24T-F	20.7	0.08	0.040	1.10	8.0	10.2	F	500
56	63	HZC566M063G24T-F	35.2	0.08	0.030	1.40	10.0	10.2	G	500

## SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

#### **Load Life Test**

Apply the maximum rated voltage for 4,000 hrs at +125 °C with full rated ripple current the test measure the capacitance, DF, DCL and ESR at +20 °C. Also measure the ESR at -100kHz.			
ΔC at 120Hz	Capacitance will be within ±30% of the initial measured value		
<b>DF at 120 Hz</b> DF will be ≤ 200% of the initial specified value			
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value		
ESR at 100kHz/+20 °C	ESR will be ≤ 200% of the initial specified value		
Max. ESR at 100kHz/-40 °C after Load Life test	Case Code C : 2.0 $\Omega$ ; Case Code D : 1.4 $\Omega$ ; Case Code X : 0.8 $\Omega$ ; Case Code F : 0.4 $\Omega$ ; Case Code G : 0.3 $\Omega$		

#### **Shelf Life Test**

Test	Subject the capacitor to 1000 hrs at +125 °C without voltage. After the test, return the capacitor to room temperature for two hours and then apply rated voltage for 30 minutes. The after test measurements for capacitance, DF, DCL and ESR at +20 °C will meet the following.
ΔC at 120 Hz	Capacitance will be within ±30% of the initial measured value
DF at 120 Hz	DF will be ≤ 200% of the initial specified value
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value
ESR at 100Khz/+20 °C	ESR will be ≤ 200% of the initial specified value

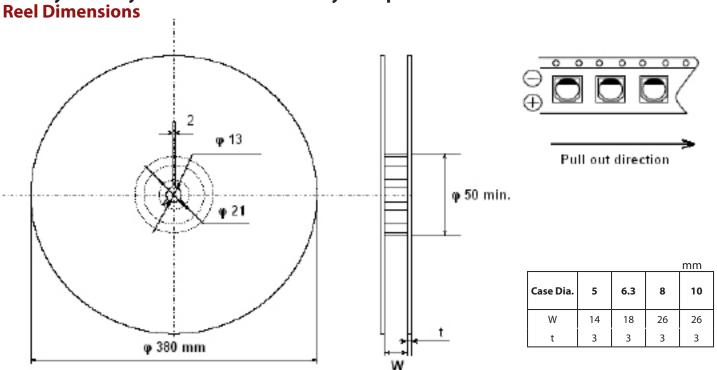
#### **Moisture Resistance Test**

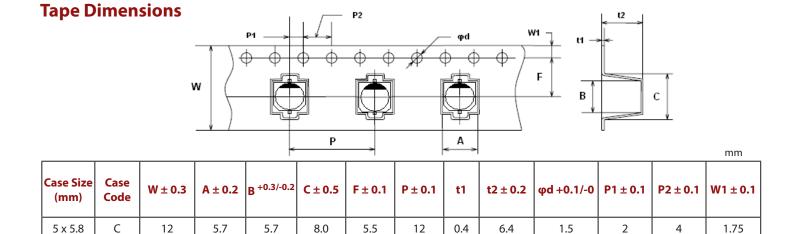
Subject the capacitor to 2000 hrs at +85 °C/85%RH with rated voltage. After the test, return to room temperature and humidity for two hours. The after test measurements capacitance, DF, DCL and ESR at +20 °C will meet the following.				
ΔC at 120 Hz	Capacitance will be within ±30% of the initial measured value			
<b>DF at 120 Hz</b> DF will be ≤ 200% of the initial specified value				
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value			
ESR at 100Khz/+20 °C	ESR will be ≤ 200% of the initial specified value			

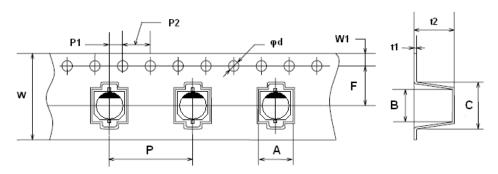
### **Temperature Cycle Test**

	Subject the capacitor to 1000 cycles of temperature change from -55 $^{\circ}$ C to +125 $^{\circ}$ C using the following sequence and durations.							
	Step	Temperature	Time at Temperature					
	1	-55 °C	30 minutes					
Test	2	+20 ℃	3 minutes max					
	3	+125 °C	30 minutes					
	4	+20 ℃	3 minutes max					
	After the test, return the capacitor to +20°C for one to two hours before measurement. The after test measurements for capacitance, DF, and DCL at +20 °C will meet the following;							
ΔC at 120 Hz	Capacitance will be within ±20%	of the initial measured value						
DF at 120 Hz	DF will be ≤ 200% of the initial specified value							
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value							
Appearance	No significant change in appearance							

# SMT Hybrid Polymer-Aluminum Electrolytic Capacitors



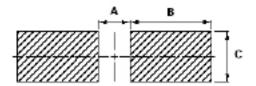




													mm		
Case Size (mm)	Case Code	W ± 0.3	A ± 0.2	B +0.3/-0.2	C ± 0.5	F ± 0.1	P ± 0.1	t1	t2 ± 0.2	φd +0.1/-0	P1 ± 0.1	P2 ± 0.1	W1 ± 0.1		
6.3 x 5.8	D	16	7	7	9.0	7.5	12	0.4	6.4						
6.3 x 7.7	Х	16	10	/	/		7.5	12	0.4	8.4	1.5		4	1.75	
8 x 10.2	F	24	8.7	8.7	12.5	11.5	16	0.4	11	1.5	2	4	1./5		
10 x 10.2	G	24	10.7	10.7	14.5	11.5	10	0.4	0.4	0.4	''				

#### **SMT Hybrid Polymer-Aluminum Electrolytic Capacitors**

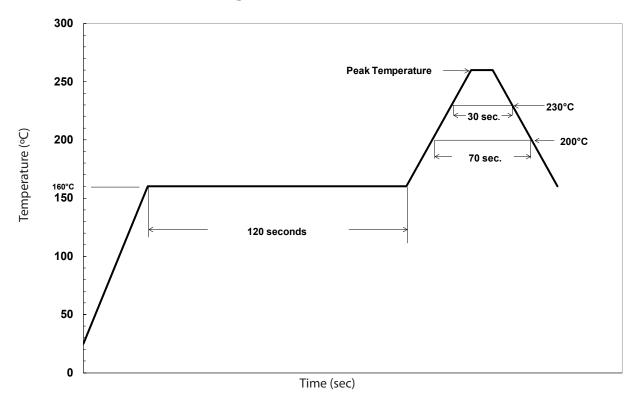
**Recommended Land Dimensions** 



Case Code	D (mm)	A	В	С
С	5	1.5	2.8	1.6
D	6.3	1.8	3.2	1.6
Х	6.3	1.8	3.2	1.6
F	8	3.1	4.0	2.0
G	10	4.6	4.1	2.0

mm

#### **Recommended Reflow Soldering**

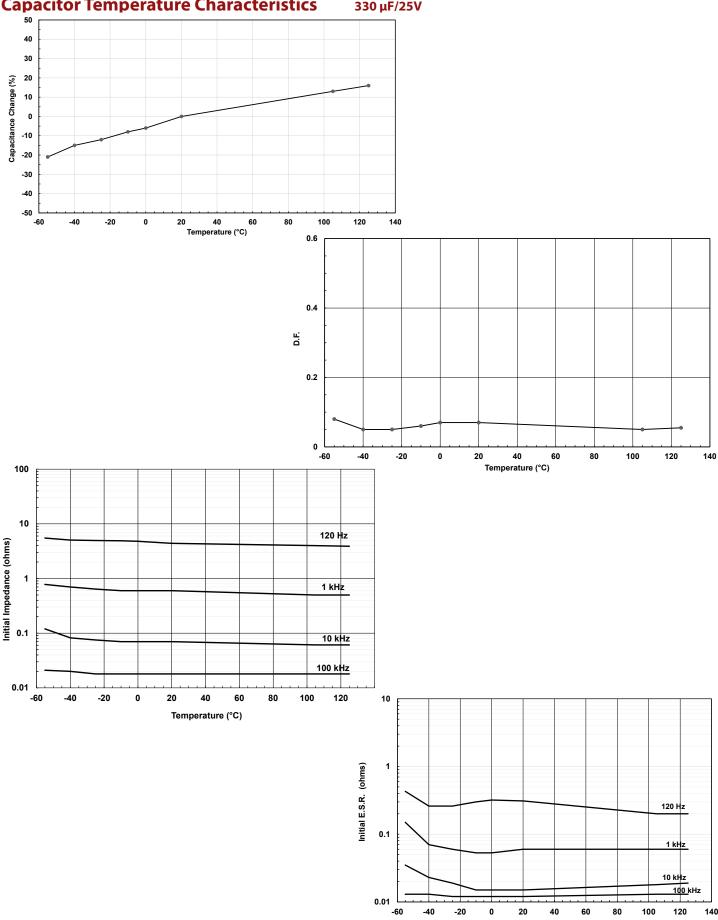


Case Code	Case Dia. (mm)	Peak Temperature	Time at or above 250 °C	Time at or above 230 °C	Time at or above 217°C	Time at or above 200°C	Number of Reflow Processes
С	5						
D	6.3						2
Х	6.3	260°C	5 seconds	30 seconds	40 seconds	70 seconds	
F	8						1
G	10						1

#### Notes:

- 1. For 5mm and 6.3 mm case dia., if the peak temperature does not exceed 255 °C the time at or above 250 °C can increase to 10 seconds.
- 2. The capacitors in the 8m and 10 mm case dia. can withstand 2 reflow processes, if the peak temperature does not exceed 245 °C and the time at or above 240 °C does not exceed 10 seconds.
- 3. The 2nd reflow process should be performed after the capacitors have returned to room temperature.
- 4. Temperature should be measured with a thermal couple placed on the top surface of the capacitor.
- 5. After reflow soldering, the leakage current, D.F., and e.s.r., will meet the initial specifications, and the capacitance will be within ±10% of the initial measured value when measured at room conditions.





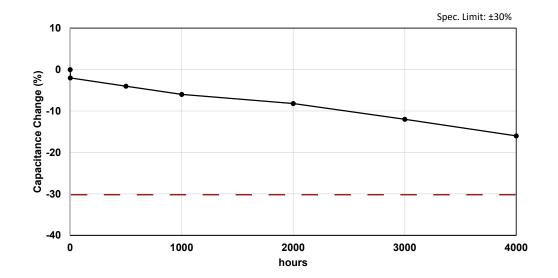
Temperature (°C)

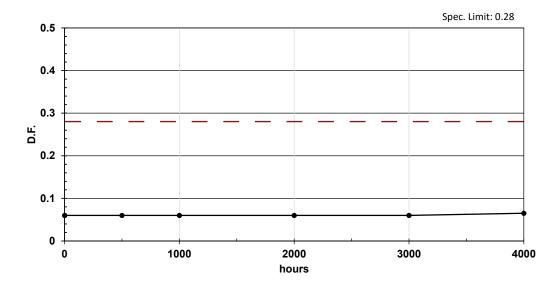
### **SMT Hybrid Polymer-Aluminum Electrolytic Capacitors**

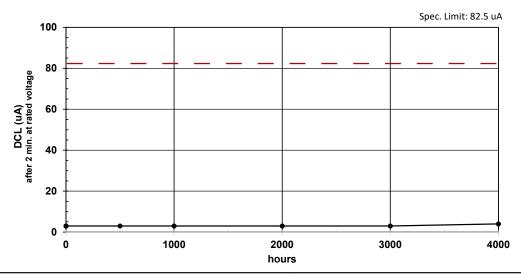
#### **Capacitor Temperature Characteristics**

**Life Test Results** 

330 μF/25V at +125 °C with rated voltage







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