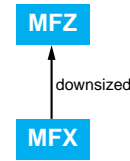


Alchip® MFZ/MFX Series

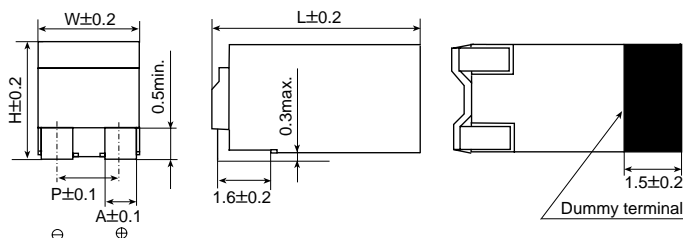
- Manganese dioxide is employed as electrolyte
- For digital equipment
- High heat reflow capability
- Solvent-proof type



◆ SPECIFICATIONS

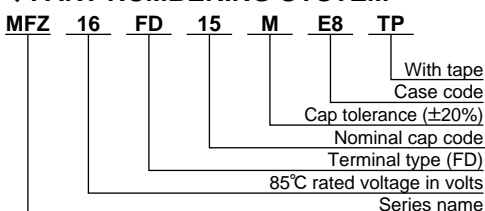
Items	Characteristics										
Operating Temperature Range	-55 to +105°C										
Rated Voltage Range	4 to 20V _{dc} ±20% of the initial value (For the maximum operating voltage at 105°C, see STANDARD RATINGS)										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Surge voltage	105°C : (value at 105°C in STANDARD RATINGS) × 1.15 85°C and below : Rated voltage × 1.15 (V)										
Leakage Current	I = 0.1CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	0.12max. (at 20°C, 120Hz)										
Low Temperature Characteristics	Z(-25°C)/Z(+20°C) ≤ 1.5 Z(-55°C)/Z(+20°C) ≤ 2.0 (at 500kHz)										
Load Life	The following specifications shall be satisfied after the capacitors are subjected to DC voltage at 85°C or 105°C for 1000 hours with the specified rated maximum ripple current applied. <table border="1"> <tr><td>Appearance</td><td>No significant damage</td></tr> <tr><td>Capacitance change</td><td>≤ ±10% of the initial value</td></tr> <tr><td>DF (tanδ)</td><td>≤ 150% of the initial specified value</td></tr> <tr><td>ESR</td><td>≤ 150% of the initial specified value</td></tr> <tr><td>Leakage current</td><td>≤ The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤ ±10% of the initial value	DF (tanδ)	≤ 150% of the initial specified value	ESR	≤ 150% of the initial specified value	Leakage current	≤ The initial specified value
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Capacitance change	≤ ±10% of the initial value										
DF (tanδ)	≤ 150% of the initial specified value										
ESR	≤ 150% of the initial specified value										
Leakage current	≤ The initial specified value										
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjecting them to the DC rated voltage at 60°C, 90 to 95% RH for 500 hours. <table border="1"> <tr><td>Appearance</td><td>No significant damage</td></tr> <tr><td>Capacitance change</td><td>≤ ±10% of the initial value</td></tr> <tr><td>DF (tanδ)</td><td>≤ 150% of the initial specified value</td></tr> <tr><td>ESR</td><td>≤ 150% of the initial specified value</td></tr> <tr><td>Leakage current</td><td>≤ The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤ ±10% of the initial value	DF (tanδ)	≤ 150% of the initial specified value	ESR	≤ 150% of the initial specified value	Leakage current	≤ The initial specified value
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DF (tanδ)	≤ 150% of the initial specified value										
ESR	≤ 150% of the initial specified value										
Leakage current	≤ The initial specified value										
Surge Voltage Test	The capacitors shall be subjected to 1000 cycles to charge the surge voltage specified at 85°C or 105°C for 30 seconds through a protective resistor (R=1kΩ), then discharge for 5-1/2 minutes through a resistor with the same value. <table border="1"> <tr><td>Appearance</td><td>No significant damage</td></tr> <tr><td>Capacitance change</td><td>≤ ±5% of the initial value</td></tr> <tr><td>DF (tanδ)</td><td>≤ The initial specified value</td></tr> <tr><td>ESR</td><td>≤ 150% of the initial specified value</td></tr> <tr><td>Leakage current</td><td>≤ The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤ ±5% of the initial value	DF (tanδ)	≤ The initial specified value	ESR	≤ 150% of the initial specified value	Leakage current	≤ The initial specified value
Appearance	No significant damage										
Capacitance change	≤ ±5% of the initial value										
DF (tanδ)	≤ The initial specified value										
ESR	≤ 150% of the initial specified value										
Leakage current	≤ The initial specified value										
Reverse Voltage	The capacitors shall be subjected to 15% of the rated voltage at 85°C, or 15% of the maximum operating voltage at 105°C, in the reverse polarity direction for 125 hours, and shall be subjected to the rated voltage at 85°C, or the maximum operating voltage at 105°C, in the forward polarity direction for 125 hours. <table border="1"> <tr><td>Appearance</td><td>No significant damage</td></tr> <tr><td>Capacitance change</td><td>≤ ±10% of the initial value</td></tr> <tr><td>DF (tanδ)</td><td>≤ The initial specified value</td></tr> <tr><td>ESR</td><td>≤ The initial specified value</td></tr> <tr><td>Leakage current</td><td>≤ The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤ ±10% of the initial value	DF (tanδ)	≤ The initial specified value	ESR	≤ The initial specified value	Leakage current	≤ The initial specified value
Appearance	No significant damage										
Capacitance change	≤ ±10% of the initial value										
DF (tanδ)	≤ The initial specified value										
ESR	≤ The initial specified value										
Leakage current	≤ The initial specified value										
Thermal Shock	After the capacitors are subjected to -55°C, for 30 minutes and +125°C for 30 minutes for 5 cycles, they shall be conducted in accordance with the load life test or the bias humidity test specified above.										
Failure Rate	1% per 1000 hours maximum (Confidence level 60% at 105°C)										
Others	IEC 384-18-1 (Fixed Aluminum Electrolytic Chip Capacitors with Solid Electrolyte)										

◆ DIMENSIONS (Terminal type=FD) [mm]



Case code	L	W	H	P	A
D6	6.4	4.6	4.6	3.3	1.1
E8	8.4	5.7	5.7	4.0	1.5

◆ PART NUMBERING SYSTEM



Capacitance	Code
6.8μF	6R8
10μF	10
33μF	33

Alchip® MFZ/MFX Series

◆ STANDARD RATINGS

MFZ

Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Max. ripple (mArms)			Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Max. ripple (mArms)		
						500kHz	300kHz	100kHz							500kHz	300kHz	100kHz
D6	4	27	270	105	3.2	320	300	270	E8	4	56	180	105	3.2	390	370	350
				85	4	500	480	440					85	4	580	550	530
				60	4	570	540	490					60	4	700	660	630
				45	4	660	630	570					45	4	810	770	740
	6.3	22	270	105	5	320	300	270		105	5	390	370	350			
				85	6.3	500	480	440		85	6.3	580	550	530			
				60	6.3	570	540	490		60	6.3	700	660	630			
				45	6.3	660	630	570		45	6.3	810	770	740			
	10	15	270	105	8	320	300	270		105	8	390	370	350			
				85	10	500	480	440		85	10	580	550	530			
				60	10	570	540	490		60	10	700	660	630			
				45	10	660	630	570		45	10	810	770	740			
	16	6.8	425	105	13	130	110	100		105	13	320	300	270			
				85	16	190	170	150		85	16	500	480	440			
				60	16	220	200	180		60	16	570	540	490			
				45	16	250	230	200		45	16	660	630	570			
				105	16	220	200	180	105	16	320	300	270				
				85	20	500	480	440	85	20	500	480	440				
				60	20	570	540	490	60	20	570	540	490				
				45	20	660	630	570	45	20	660	630	570				

MFX

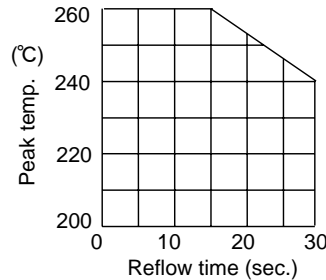
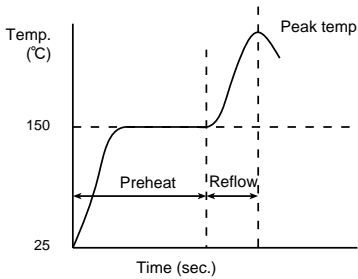
Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Max. ripple (mArms)			Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Max. ripple (mArms)		
						500kHz	300kHz	100kHz							500kHz	300kHz	100kHz
D6	4	22	270	105	3.2	320	300	270	E8	4	47	180	105	3.2	390	370	350
				85	4	500	480	440					85	4	580	550	530
				60	4	570	540	490					60	4	700	660	630
				45	4	660	630	570					45	4	810	770	740
	6.3	15	270	105	5	320	300	270		105	5	390	370	350			
				85	6.3	500	480	440		85	6.3	580	550	530			
				60	6.3	570	540	490		60	6.3	700	660	630			
				45	6.3	660	630	570		45	6.3	810	770	740			
	10	10	270	105	8	320	300	270		105	8	390	370	350			
				85	10	500	480	440		85	10	580	550	530			
				60	10	570	540	490		60	10	700	660	630			
				45	10	660	630	570		45	10	810	770	740			
	16	4.7	425	105	13	130	110	100		105	13	320	300	270			
				85	16	190	170	150		85	16	500	480	440			
				60	16	220	200	180		60	16	570	540	490			
				45	16	250	230	200		45	16	660	630	570			

RECOMMENDED REFLOW SOLDERING CONDITION

Alchip® MFZ/MFX Series

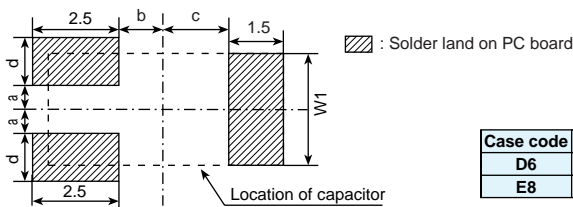
The following conditions are recommended for air or infrared reflow soldering of the surface mount capacitors onto a glass epoxy circuit board of 90×50×0.8mm (with resist) by cream solder (eutectic solder). The temperatures shown are the surface temperature values on the top of the cap.

- Hot plate reflow
- Infrared reflow



preheat : 150°C max. within 120 seconds

● Recommended solder land on PC board



Case code	a	b	c	d	W1
D6	0.8	1.15	1.7	1.7	4.6
E8	0.95	2.15	2.7	2.1	5.7

◆ PRECAUTIONS FOR USERS

Failure mode

1. MFZ and MFX series contain a solid electrolyte, MnO₂ (Manganese Dioxide); therefore, the life ends mostly due to random failure mode, mainly short circuit. The failure rate specified in the catalogue will vary by applying voltage and the ambient temperature. Designing device circuit needs to consider the failure rate under your condition.
2. Continuously a large amount of current through a capacitor results in short circuit of the capacitors. The capacitor is overheated at a higher than 500°C. The heat incurs damage of PC board. The current through capacitor is restricted to less than 5A.

Applying voltage

1. Do not apply an over-voltage exceeding the full rated operating voltage of capacitors. The over-voltage may cause increasing the leakage current and giving short circuit.
2. Reducing an applying voltage minimizes a failure rate. For instance, 50% of the full rated operating voltage can reduce failure rate at one hundredth.

Operating temperature

By applying less-full operating voltage to MFZ and MFX at maximum 105°C, the capacitor exhibits stable characteristics. The temperature as well as the applying voltage is related to the failure rate. For instance, operating at maximum 60°C can reduce to approximately 1/4 failure rate.

Reverse voltage

MFZ and MFX are polarized capacitors. Do not use the capacitors in wrong polarity. Both series still shows stable characteristics even if the reverse voltage up to 15% of the rated voltage at 85°C, or 15% of the maximum operating voltage at 105°C is applied for 250 hours. However, this characteristics is not assured for a long period of time.

Permissible ripple current

1. Do not exceed the rated permissible ripple current of the capacitors.
2. The sum of the DC bias voltage and AC voltage must not exceed the specified full rated or maximum operating voltage of the capacitors.

Reflow soldering

High soldering temperature and long soldering time will affect the char-

acteristics of the capacitors. Use reflow soldering conditions within the recommended range. Also, the temperature varies with the location and population of the components, the material and the thickness of PC board.

Verify temperature profiles prior to actual production run; then, set reflow condition within the limits prescribed in the catalogue.

MFZ and MFX series might have a high leakage current, a few to 100μA, after reflow soldering. However, the applying voltage to the capacitors gradually decreases the leakage current because of dielectric stabilizing.

Cleaning conditions

As long as the cleaning agents prescribed are used, the cleaning does not give the capacitor any damage. For CFCs substitutions and other cleaning agents, consult us before actual use.

For ultrasonic cleaning, take a pretest under the customer's condition and verify that the condition cannot incur breaking terminals due to vibration.

Storage

Storage MFZ and MFX without no mechanical stress to the capacitors. The storage maintains dry and low temperature, approximately 20°C, to prevent the leads and the dummy terminal from degrading.

Dummy terminal

The purpose of the dummy terminal is to prevent the capacitor body from sliding or lifting up on PC board during reflow soldering. The dummy terminal may be peeled off by the following mechanical stress.

1. Mechanical shock by bending or cutting a multi-board
2. Transportation shock
3. Mechanical stress like lifting up, poking or hitting

Terminal strength

Terminal strength is specified 10N maximum from the side for 5 seconds without loosening or cutting off terminals. Do not apply any excessive force to the side of a capacitor soldered on a PC board.