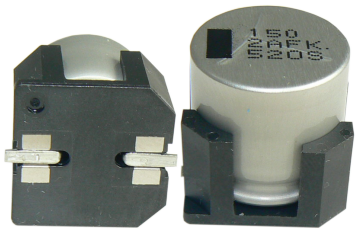
Type AFK_V, –55°C to 105°C, High Vibration SMT
Aluminum Electrolytic Capacitors - Lowest E.S.R., 105°C

Low Impedance and Long-Life for Filtering, Bypassing and Power Supply Decoupling



Using a ruggedized construction, type AFK_V withstands a 30 G vibration test and has 40% to 60% lower impedance, 30% to 50% smaller case size and more than twice the life compared to general purpose types. As the main countermeasure to vibration, the metal case is inserted into a molded plastic retaining wall that surrounds the part, keeping it firmly in place. Larger diameter leads provide additional mechanical stability of the internal winding and a larger soldering surface keeps the part firmly affixed to the PCB. Type AFK_V is an excellent choice for power systems subjected to frequent motion and vibration.

Highlights

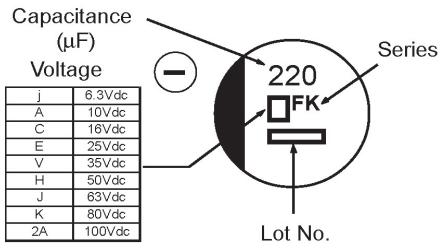
- Withstands 30 G vibration test
- +105 °C, Up to 5000 Hour Load Life
- Capacitance Range: 10 µF to 6800 µF
- Voltage Range: 6.3 Vdc to 100 Vdc
- AEC-Q200 Compliant

Specifications

Capacitance Range	10 µF to 6800 µF
Capacitance Tolerance	±20% @ 120 Hz and +20°C
Rated Voltage	6.3, 10, 16, 25, 35, 50, 63, 80 & 100 Vdc
Operating Temperature Range	–55ºC to +105ºC
Leakage Current	0.01 CV or 3 µA @ +20ºC, after two minutes (whichever is greater)
Ripple Current Multiplier	<table><tr><th>Frequency</th><th>50/60 Hz</th><th>120 Hz</th><th>1 kHz</th><th>10 kHz</th><th>100 kHz</th></tr><tr><td></td><td>0.70</td><td>.0.75</td><td>0.90</td><td>0.95</td><td>1.00</td></tr></table>
Dissipation Factor	<table><tr><th>6.3V</th><th>10 V</th><th>16 V</th><th>25 V</th><th>35 V</th><th>50 V</th><th>63 V</th><th>80 V</th><th>100 V</th></tr><tr><td>0.26</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.1</td><td>0.08</td><td>0.08</td><td>0.07</td></tr></table> Add 0.02 per 1000 µF for values greater than 1000 µF
Low Temperature Impedance Ratio Characteristics at 120 Hz	<table><tr><th>Rated Voltage (Vdc)</th><th>6.3, 10, 16</th><th>25, 35, 50, 63, 80, 100</th></tr><tr><td>Z (-25°C)/Z(+20°C)</td><td>2</td><td>2</td></tr><tr><td>Z (-40°C)/Z(+20°C)</td><td>3</td><td>3</td></tr><tr><td>Z (-55°C)/Z(+20°C)</td><td>4</td><td>3</td></tr></table>
Life Test	2000 h @ 105°C, 8.0 — 10.0 mm dia. 5000 h @ 105°C, 12.5 — 18.0 mm dia. Δ Capacitance ±30% DF: ≤ 200% of limit DCL: ≤ 100% of limit
Shelf Test	1000 h @ 105°C Δ Capacitance ±30% DF: ≤ 200% of limit DCL: ≤ 100% of limit
High Vibration Test	Capacitors with the high vibration base will pass a 30 G acceleration test from 5 Hz to 2000 Hz with a max. amplitude of 5 mm (peak to peak) for 2 hours each in the X,Y and Z directions for a total of 6 hours. During the last 30 minutes of the test, the measured capacitance shall be stable. After the test the capacitor shall meet the following: **ΔC at 120 Hz -** Capacitance value will be within 5% of the initial value. There will be no significant change in appearance.
Regulatory Information	

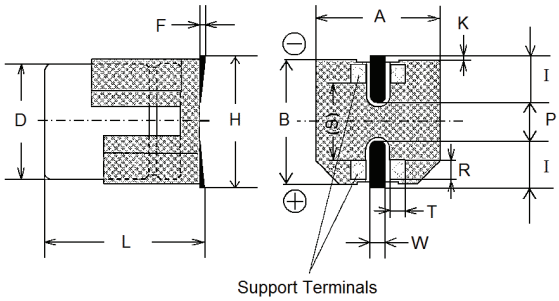
Type AFK_V, –55°C to 105°C, High Vibration SMT
Aluminum Electrolytic Capacitors - Lowest E.S.R., 105°C

AFK Series Marking



j	6.3Vdc
A	10Vdc
C	16Vdc
E	25Vdc
V	35Vdc
H	50Vdc
J	63Vdc
K	80Vdc
2A	100Vdc

Outline Drawing



Case Dimensions

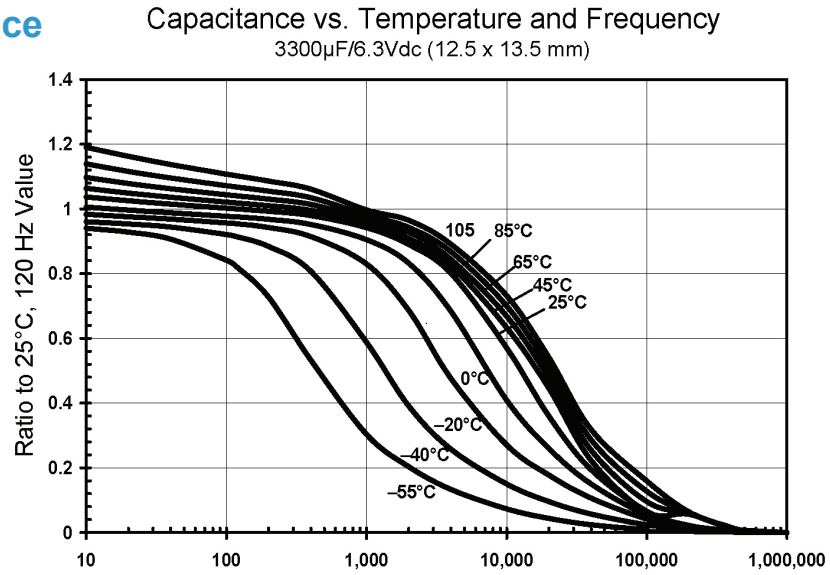
mm

Size Code	D ± 0.5	L	A ± 0.2	B ± 0.2	H max.	F	I	w	P	K	R ± 0.2	S ± 0.2	T ± 0.2
E	8	6.5 ±0.3	8.3	8.3	9.5	0 to +0.15	3.4	0.7 ± 0.1	2.2	.35 ± 0.2	0.70	5.3	1.7
F	8	10.5 ±0.3	8.3	8.3	10	0 to +0.15	3.4	1.2 ± 0.2	3.1	.70 ± 0.2	0.70	5.3	1.3
G	10	10.5 ± 0.3	10.3	10.3	12	0 to +0.15	3.5	1.2 ± 0.2	4.6	.70 ± 0.2	0.70	6.9	1.3
H	12.5	13.8 ±0.5	13.5	13.5	15	-0.1 to +0.15	4.7	1.2 ± 0.3	4.4	.70 ± 0.3	2.2	7.1	2.4
P	16	16.8 ± 0.5	17	17	19	-0.1 to +0.15	5.5	1.4 ± 0.2	6.7	.70 ± 0.3	3.0	9.0	1.9
R	18	16.8 ± 0.5	19	19	21	-0.1 to +0.15	6.7	1.4 ± 0.2	6.7	.70 ± 0.3	3.0	11.0	1.9

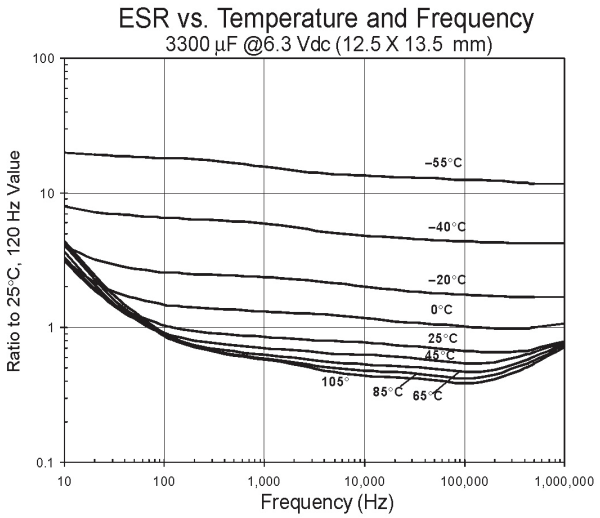
Part Numbering System

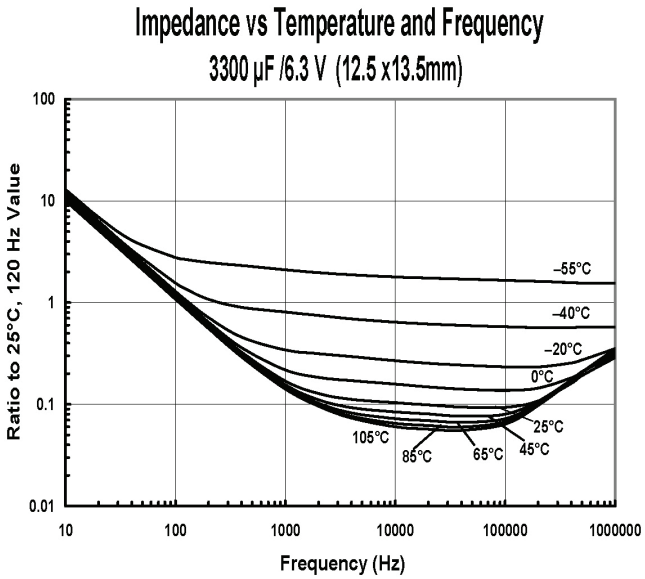
AFK	106	M	80	E	16VT	–F
Type	Capacitance	Capacitance Tolerance	Voltage Code	Case Code	Packaging Code	RoHS Compliant
	106 = 10.0 µF	M = ±20%	06 = 6.3 Vdc		16 = Carrier tape Width (mm)	
	107 = 100.0 µF		10 = 10 Vdc		T = Tape & Reel	
	108 = 1000.0 µF		16 = 16 Vdc		V= High Vibration	
			25 = 25 Vdc			
			35 = 35 Vdc			
			50 = 50 Vdc			
			63 = 63 Vdc			
			80 = 80 Vdc			
			2A = 100 Vdc			

Typical Performance Curves



Typical Performance Curves





Ratings Table

Capacitance (µF)	Catalog Part Number	Max. DCL 2 min. (µA)	Max. Dissipation Factor @120 Hz/20°C	Max. ESR @100 kHz/20°C (Ω)	Impedance @100 kHz/20°C (Ω)	Max. Ripple Current @100 kHz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
6.3 Vdc (8 Vdc Surge)									
330	AFK337M06E16VT-F	20.8	0.26	0.26	0.26	300	E	8 x 6.5	1000
470	AFK477M06F24VT-F	29.6	0.26	0.16	0.16	600	F	8 x 10.5	500
1000	AFK108M06F24VT-F	63	0.26	0.16	0.16	600	F	8 x 10.5	500
1500	AFK158M06G24VT-F	94.8	0.26	0.08	0.08	850	G	10 x 10.5	500
3300	AFK338M06H32VT-F	207.9	0.30	0.06	0.06	1100	H	12.5 x 13.8	200
6800	AFK688M06P44VT-F	428.4	0.36	0.035	0.035	1800	P	16 x 16.8	125
10 Vdc (13 Vdc Surge)									
220	AFK227M10E16VT-F	22	0.19	0.26	0.26	300	E	8 x 6.5	1000
330	AFK337M10F24VT-F	33	0.19	0.16	0.16	600	F	8 x 10.5	500
470	AFK477M10F24VT-F	47	0.19	0.16	0.16	600	F	8 x 10.5	500
680	AFK687M10F24VT-F	68	0.19	0.16	0.16	600	F	8 x 10.5	500
1000	AFK108M10G24VT-F	100	0.19	0.08	0.08	850	G	10 x 10.5	500
2200	AFK228M10H32VT-F	220	0.21	0.06	0.06	1100	H	12.5 x 13.8	200
4700	AFK478M10P44VT-F	470	0.25	0.035	0.035	1800	P	16 x 16.8	125
6800	AFK688M10R44VT-F	680	0.29	0.033	0.033	2060	R	18 x 16.8	125
16 Vdc (20 Vdc Surge)									
220	AFK227M16E16VT-F	35.2	0.16	0.26	0.26	300	E	8 x 6.5	1000
330	AFK337M16F24VT-F	52.8	0.16	0.16	0.16	600	F	8 x 10.5	500
470	AFK477M16F24VT-F	75.2	0.16	0.16	0.16	600	F	8 x 10.5	500
680	AFK687M16G24VT-F	108.8	0.16	0.08	0.08	850	G	10 x 10.5	500
1500	AFK158M16H32VT-F	240	0.16	0.06	0.06	1100	H	12.5x 13.8	200
3300	AFK338M16P44VT-F	528	0.2	0.035	0.035	1800	P	16 x 16.8	125
4700	AFK478M16R44VT-F	752	0.22	0.033	0.033	2060	R	18 x 16.8	125

Type AFK_V, –55°C to 105°C, High Vibration SMT
Aluminum Electrolytic Capacitors - Lowest E.S.R., 105°C

Capacitance (µF)	Catalog Part Number	Max. DCL 2 min. (µA)	Max. Dissipation Factor @120 Hz/20°C	Max. ESR @100 kHz/20°C (Ω)	Impedance @100 kHz/20°C (Ω)	Max. Ripple Current @100 kHz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
25 Vdc (31 Vdc Surge)									
100	AFK107M25E16VT-F	25	0.14	0.26	0.26	300	E	8 x 6.5	1000
150	AFK157M25F24VT-F	37.5	0.14	0.16	0.16	600	F	8 x 10.5	500
220	AFK227M25F24VT-F	55	0.14	0.16	0.16	600	F	8 x 10.5	500
330	AFK337M25F24VT-F	82.5	0.14	0.16	0.16	600	F	8 x 10.5	500
470	AFK477M25G24VT-F	117.5	0.14	0.08	0.08	850	G	10 x 10.5	500
1000	AFK108M25H32VT-F	250	0.14	0.06	0.06	1100	H	12.5 x 13.8	200
1500	AFK158M25P44VT-F	375	0.14	0.035	0.035	1800	P	16 x 16.8	125
2200	AFK228M25P44VT-F	550	0.16	0.035	0.035	1800	P	16 x 16.8	125
3300	AFK338M25R44VT-F	825	0.18	0.033	0.033	2060	R	18 x 16.8	125
35 Vdc (44 Vdc Surge)									
100	AFK107M35F24VT-F	35	0.12	0.16	0.16	600	F	8 x 10.5	500
150	AFK157M35F24VT-F	52.5	0.12	0.16	0.16	600	F	8 x 10.5	500
220	AFK227M35F24VT-F	77	0.12	0.16	0.16	600	F	8 x 10.5	500
330	AFK337M35G24VT-F	115.5	0.12	0.08	0.08	850	G	10 x 10.5	500
470	AFK477M35H32VT-F	164.5	0.12	0.06	0.06	1100	H	12.5 x 13.8	200
680	AFK687M35H32VT-F	238	0.12	0.06	0.06	1100	H	12.5 x 13.8	200
1000	AFK108M35P44VT-F	350	0.12	0.035	0.035	1800	P	16 x 16.8	125
1500	AFK158M35P44VT-F	525	0.12	0.035	0.035	1800	P	16 x 16.8	125
50 Vdc (63 Vdc Surge)									
33	AFK336M50E16VT-F	16.5	0.1	0.68	0.68	195	E	8 x 6.5	1000
47	AFK476M50E16VT-F	23.5	0.1	0.68	0.68	195	E	8 x 6.5	1000
100	AFK107M50F24VT-F	50	0.1	0.34	0.34	350	F	8 x 10.5	500
150	AFK157M50G24VT-F	75	0.1	0.18	0.18	670	G	10 x 10.5	500
220	AFK227M50G24VT-F	110	0.1	0.18	0.18	670	G	10 x 10.5	500
330	AFK337M50H32VT-F	165	0.1	0.12	0.12	900	H	12.5 x 13.8	200
390	AFK397M50H32VT-F	195	0.1	0.12	0.12	900	H	12.5 x 13.8	200
470	AFK477M50P44VT-F	235	0.1	0.073	0.073	1610	P	16 x 16.8	125
560	AFK567M50P44VT-F	280	0.1	0.073	0.073	1610	P	16 x 16.8	125
680	AFK687M50P44VT-F	340	0.1	0.073	0.073	1610	P	16 x 16.8	125
1000	AFK108M50P44VT-F	500	0.1	0.073	0.073	1610	P	16 x 16.8	125
63 Vdc (75 Vdc Surge)									
22	AFK226M63E16VT-F	13.9	0.08	1.2	1.2	120	E	8 x 6.5	1000
33	AFK336M63F24VT-F	20.8	0.08	0.65	0.65	250	F	8 x 10.5	500
47	AFK476M63F24VT-F	29.6	0.08	0.65	0.65	250	F	8 x 10.5	500
68	AFK686M63G24VT-F	42.8	0.08	0.35	0.35	400	G	10 x 10.5	500
100	AFK107M63G24VT-F	63	0.08	0.35	0.35	400	G	10 x 10.5	500
150	AFK157M63H32VT-F	94.5	0.08	0.16	0.16	800	H	12.5 x 13.8	200
220	AFK227M63H32VT-F	138.6	0.08	0.16	0.16	800	H	12.5 x 13.8	200
470	AFK477M63P44VT-F	296.1	0.08	0.082	0.082	1410	P	16 x 16.8	125
680	AFK687M63R44VT-F	428.4	0.08	0.08	0.08	1690	R	18 x 16.8	125

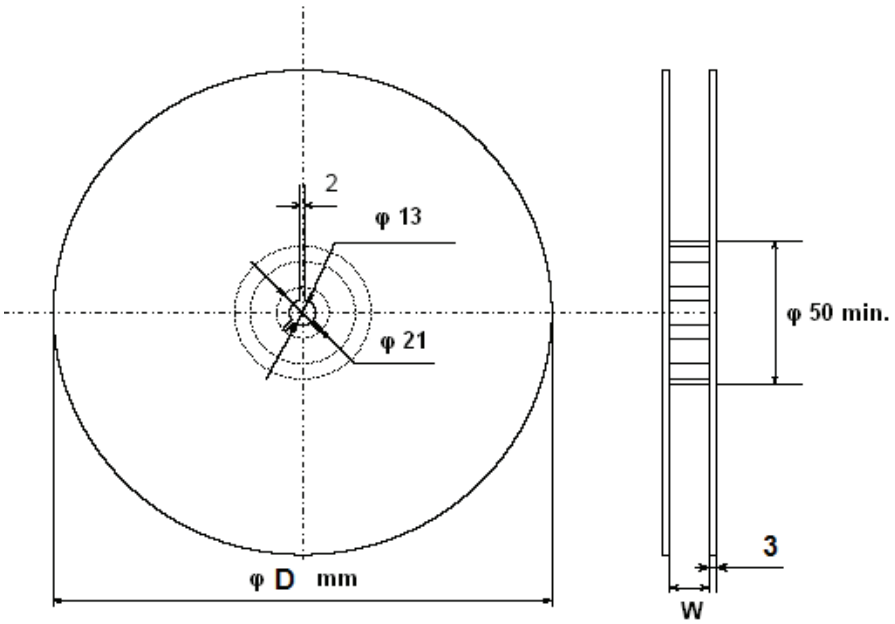
Note: ≥50V, 8 and 10 mm Dia.; 235ºC peak solder temperature

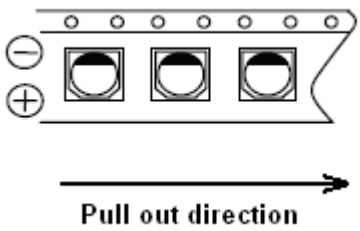
Type AFK_V, –55°C to 105°C, High Vibration SMT
Aluminum Electrolytic Capacitors - Lowest E.S.R., 105°C

Capacitance (µF)	Catalog Part Number	Max. DCL 2 min. (µA)	Max. Dissipation Factor @120 Hz/20°C	Max. ESR @100 kHz/20°C (Ω)	Impedance @100 kHz/20°C (Ω)	Max. Ripple Current @100 kHz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
80 Vdc (100 Vdc Surge)									
10	AFK106M80E16VT-F	8	0.08	2.4	2.4	60	E	8 x 6.5	1000
22	AFK226M80F24VT-F	17.6	0.08	1.3	1.3	130	F	8 x 10.5	500
33	AFK336M80F24VT-F	26.4	0.08	1.3	1.3	130	F	8 x 10.5	500
47	AFK476M80G24VT-F	37.6	0.08	0.7	0.7	200	G	10 x 10.5	500
68	AFK686M80H32VT-F	54.4	0.08	0.32	0.32	500	H	12.5 x 13.8	200
100	AFK107M80H32VT-F	80	0.08	0.32	0.32	500	H	12.5 x 13.8	200
150	AFK157M80H32VT-F	120	0.08	0.32	0.32	500	H	12.5 x 13.8	200
330	AFK337M80P44VT-F	264	0.08	0.17	0.17	793	P	16 x 16.8	125
470	AFK477M80R44VT-F	376	0.08	0.15	0.15	917	R	18 x 16.8	125
100 Vdc (125 Vdc Surge)									
22	AFK226M2AF24VT-F	22	0.07	1.3	1.3	130	F	8 x 10.5	500
33	AFK336M2AG24VT-F	33	0.07	0.7	0.7	200	G	10 x 10.5	500
47	AFK476M2AH32VT-F	47	0.07	0.32	0.32	500	H	12.5 x 13.8	200
68	AFK686M2AH32VT-F	68	0.07	0.32	0.32	500	H	12.5 x 13.8	200
100	AFK107M2AP44VT-F	100	0.07	0.17	0.17	793	P	16 x 16.8	125
150	AFK157M2AP44VT-F	150	0.07	0.17	0.17	793	P	16 x 16.8	125
220	AFK227M2AR44VT-F	220	0.07	0.15	0.15	917	R	18 x 16.8	125
330	AFK337M2AR44VT-F	330	0.07	0.15	0.15	917	R	18 x 16.8	125

Note: ≥50V, 8 and 10 mm Dia.; 235ºC peak solder temperature

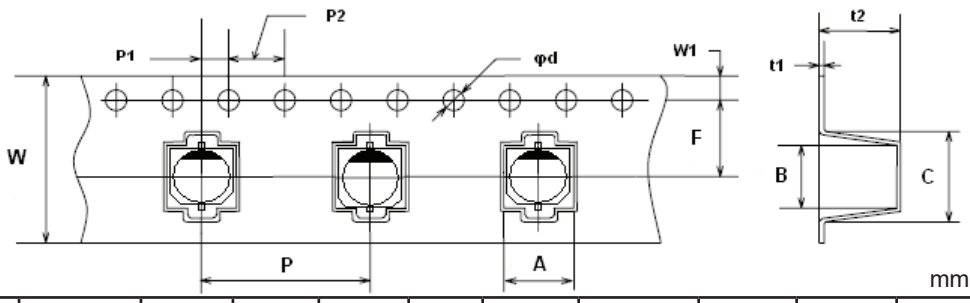
Reel Dimensions





							mm
Case Code	E	F	G	H	P	R	
D	380	380	380	330	330	330	
W	18	26	26	34	46	46	

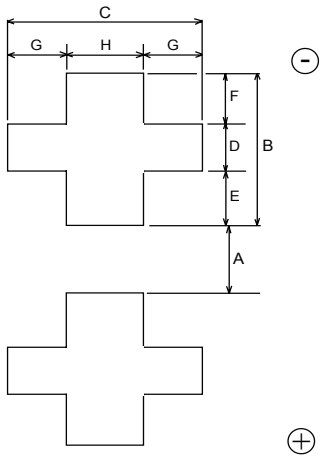
Case Code E, F and G Tape Dimensions



mm

Case Size	Case Code	W ± 0.3	A ± 0.2	B +0.3/-0.2	C ± 0.2	F ± 0.1	P ± 0.1	t1	t2 ± 0.2	φd +0.1/-0	P1 ± 0.1	P2 ± 0.1	W1 ± 0.1
8 x6.2	E	16	8.7	8.7	11.4	7.5	12	0.4	6.8	1.5	2	4	1.75
8 x 10.2	F	24	8.7	8.7	12.5	11.5	16		11				
10 x 10.2	G		10.7	10.7	14.5								

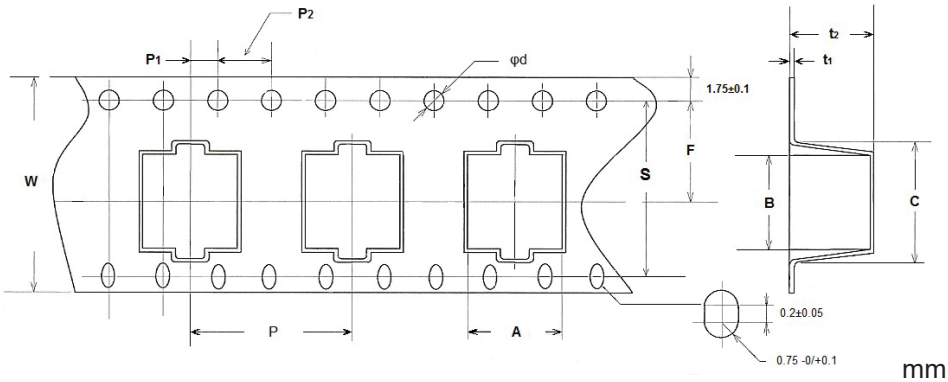
Recommended Land Dimensions



mm

Case Code	Case Dia.	A	B	C	D	E	F	G	H
E	8	1.8	4.1	5.0	1.3	1.5	1.4	1.5	2.0
F	8	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
G	10	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
H	12.5	3.9	6.2	6.9	2.8	1.3	2.1	2.2	2.5
P	16	5.8	7.0	6.2	3.6	1.3	2.1	1.7	2.8
R	18	5.8	8.0	6.2	3.6	2.3	2.1	1.7	2.8

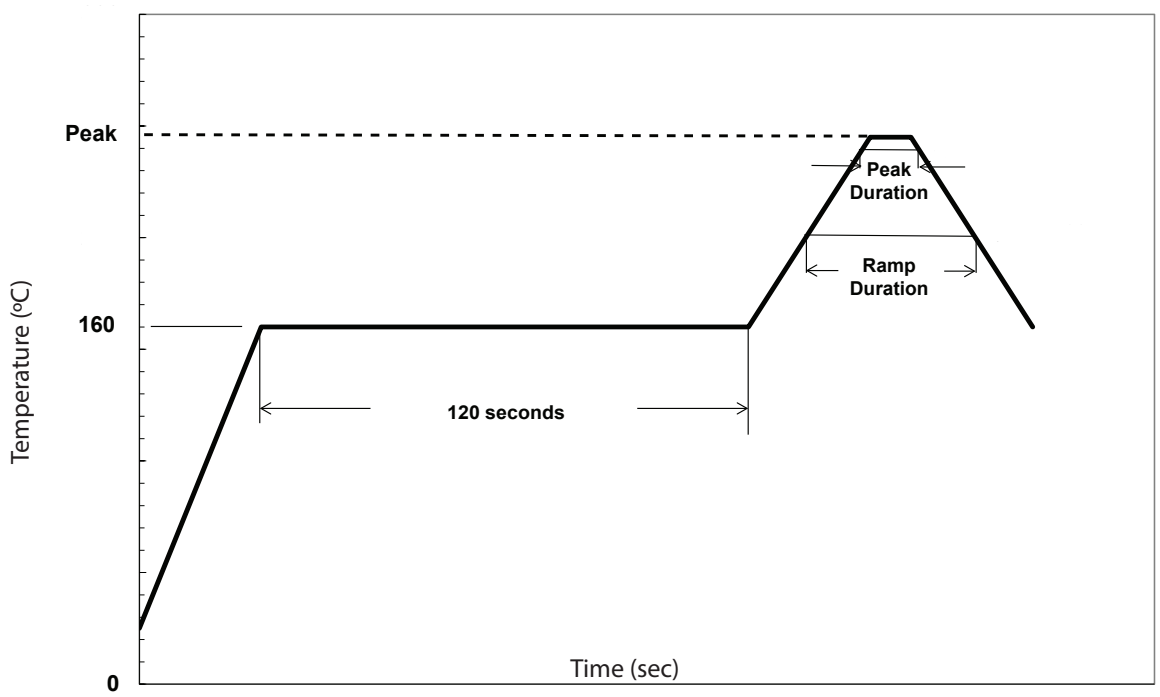
Case Code H, P and R Tape Dimensions



mm

Case Size	Case Code	W ± 0.3	A ± 0.5	B ±0.5	C ± 0.5	F ± 0.1	S ± 0.1	P ± 0.1	t1	t2 ± 0.2	φd +0.1/-0	P1 ± 0.1	P2 ± 0.1
12.5 x 13.5	H	32	14.0	14.0	18.0	14.2	28.4	24	0.5	14.5	1.5	2	4
16 x 16.5	P	44	17.5	17.5	23.00	20.2	40.4	28		17.5			
18 x 16.5	R		19.5	19.5	26.00			32					

Recommended Reflow Soldering



Case Code	Diameter (mm)	Voltage (Vdc)	Peak Temp	Peak Temp Duration	Ramp Temp Duration	Number of Reflows
E, F, G	8 - 10	6.3 - 35	260°C	≥ 250°C, 5 s	≥ 230°C, 30 s ≥ 200°C, 70 s	1
		50 - 100	235°C	5 s	≥ 200°C, 60 s	1
H, P, R	12.5 - 18	6.3 - 35	245°C	≥ 240°C, 30 s	≥ 217°C, 90 s	2
		50 - 63	245°C	≥ 240°C, 5 s	≥ 217°C, 30 s	2
		80 - 100	245°C	≥ 240°C, 5 s	≥ 217°C, 30 s	1

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