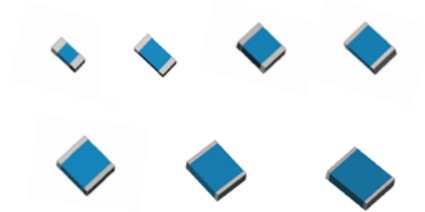


# MLVC

## High energy multilayer varistor



### Product features

- Seven footprint options 0805 (2012 metric), 1206 (3216 metric), 1210 (3225 metric), 1812 (4532 metric), 2220 (5750 metric), 3225 (8063 metric), 4032 (10280 metric)
- Working voltage 11 Vdc to 200 Vdc  
7.8 Vac to 150 Vac
- Absorbs high energy transient voltages seen in EFT and inductive load
- Fast response time to protect downstream circuits

### Applications

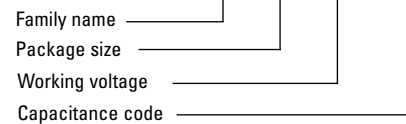
- ESD port protection for mobile/smart phones
- Game console ESD port protection
- Set-top-boxes
- Tablets, notebooks, netbooks, laptops
- Media players
- Medical equipment
- Computers and peripherals ESD port protection
- Consumer electronics
- Industrial: Measuring devices, instruments, controllers

### Environmental compliance



### Ordering part number

**MLVC 40 V100 C1500**



**Product specifications**

Part number	Working voltage		Varistor voltage @ 1 mAdc		Maximum clamping voltage 8/20 $\mu$ s (V)	Energy absorption 10/1000 $\mu$ s (J)	Peak current 8/20 $\mu$ s (A)	Typical capacitance @ 1 MHz (pF)
	(Vdc)	(Vac)	(V)	( $\Delta V_g$ )				
MLVC08V012C420	12	8.5	18	$\pm 15\%$	34 @ 1 A	0.3	120	420
MLVC08V014C400	14	10	20	$\pm 10\%$	35 @ 1 A	0.3	120	400
MLVC08V016C380	16	11.3	22	$\pm 10\%$	39 @ 1 A	0.3	120	380
MLVC08V018C360	18	12.7	25	$\pm 10\%$	44 @ 1 A	0.3	100	360
MLVC08V022C320	22	15.6	30	$\pm 10\%$	53 @ 1 A	0.3	100	320
MLVC08V024C300	24	17	33	$\pm 10\%$	58 @ 1 A	0.3	100	300
MLVC08V026C280	26	18.4	36	$\pm 10\%$	63 @ 1 A	0.3	100	280
MLVC08V030C260	30	21.2	42	$\pm 10\%$	74 @ 1 A	0.3	100	260
MLVC08V033C230	33	23.3	45	$\pm 10\%$	79 @ 1 A	0.3	35	230
MLVC12V012C850	12	8.5	18	$\pm 15\%$	34 @ 1 A	0.4	150	850
MLVC12V014C800	14	10	20	$\pm 10\%$	35 @ 1 A	0.4	150	800
MLVC12V016C750	16	11.3	22	$\pm 10\%$	39 @ 1 A	0.4	150	750
MLVC12V018C700	18	12.7	25	$\pm 10\%$	44 @ 1 A	0.4	150	700
MLVC12V022C600	22	15.6	30	$\pm 10\%$	53 @ 1 A	0.4	150	600
MLVC12V024C550	24	17	33	$\pm 10\%$	58 @ 1 A	0.4	150	550
MLVC12V026C500	26	18.4	36	$\pm 10\%$	63 @ 1 A	0.4	120	500
MLVC12V030C450	30	21.2	42	$\pm 10\%$	74 @ 1 A	0.4	120	450
MLVC12V033C400	33	23.3	45	$\pm 10\%$	79 @ 1 A	0.4	120	400
MLVC12V038C310	38	27	51	$\pm 10\%$	90 @ 1 A	0.4	120	310
MLVC12V042C260	42	30	56	$\pm 10\%$	99 @ 1 A	0.4	120	260
MLVC12V048C240	48	34	62	$\pm 10\%$	110 @ 1 A	0.4	120	240
MLVC12V056C200	56	40	72	$\pm 10\%$	120 @ 1 A	0.4	120	200
MLVC12V060C180	60	45	76	$\pm 10\%$	134 @ 1 A	0.4	120	180
MLVC13V011C1800	11	7.8	16	$\pm 15\%$	33 @ 2.5 A	1.5	300	1800
MLVC13V012C1700	12	8.5	18	$\pm 15\%$	34 @ 2.5 A	1.5	300	1700
MLVC13V014C1500	14	10	20	$\pm 10\%$	35 @ 2.5 A	1.5	300	1500
MLVC13V018C1200	18	12.7	25	$\pm 10\%$	44 @ 2.5 A	1.5	300	1200
MLVC13V022C1100	22	15.6	30	$\pm 10\%$	53 @ 2.5 A	1.5	300	1100
MLVC13V024C1050	24	17	33	$\pm 10\%$	58 @ 2.5 A	1.5	300	1050
MLVC13V026C1000	26	18.4	36	$\pm 10\%$	63 @ 2.5 A	1.5	280	1000
MLVC13V030C800	30	21.2	42	$\pm 10\%$	74 @ 2.5 A	1.5	280	800
MLVC13V033C700	33	23.3	45	$\pm 10\%$	79 @ 2.5 A	1.5	280	700
MLVC13V038C650	38	27	51	$\pm 10\%$	90 @ 2.5 A	1.5	280	650
MLVC13V042C580	42	30	56	$\pm 10\%$	99 @ 2.5 A	1.5	280	580
MLVC13V045C550	45	32	60	$\pm 10\%$	105 @ 2.5 A	1.5	280	550
MLVC13V048C510	48	34	62	$\pm 10\%$	110 @ 2.5 A	1.5	280	510
MLVC13V056C450	56	40	72	$\pm 10\%$	127 @ 2.5 A	1.5	250	450
MLVC13V060C420	60	45	76	$\pm 10\%$	134 @ 2.5 A	1.5	250	420
MLVC13V065C400	65	46	82	$\pm 10\%$	144 @ 2.5 A	1.5	250	400
MLVC18V011C2400	11	7.8	16	$\pm 15\%$	33 @ 5 A	2.5	500	2400
MLVC18V012C2300	12	8.5	18	$\pm 15\%$	34 @ 5 A	2.5	500	2300
MLVC18V014C2200	14	10	20	$\pm 10\%$	35 @ 5 A	2.5	500	2200
MLVC18V016C1900	16	11.3	22	$\pm 10\%$	39 @ 5 A	2.5	500	1900
MLVC18V018C1800	18	12.7	25	$\pm 10\%$	44 @ 5 A	2.5	500	1800
MLVC18V022C1600	22	15.6	30	$\pm 10\%$	53 @ 5 A	2.5	500	1600
MLVC18V024C1500	24	17	33	$\pm 10\%$	58 @ 5 A	2.5	500	1500

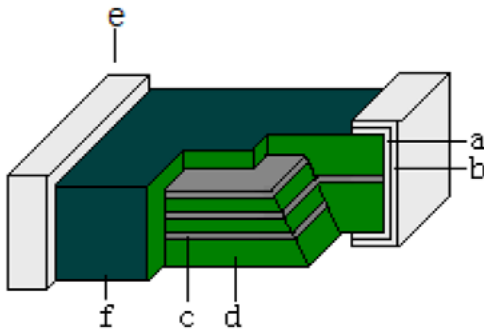
Product specifications

Part number	Working voltage		Varistor voltage @ 1 mAdc		Maximum clamping voltage 8/20 $\mu$ s (V)	Energy absorption 10/1000 $\mu$ s (J)	Peak current 8/20 $\mu$ s (A)	Typical capacitance @ 1 MHz (pF)
	(Vdc)	(Vac)	(V)	( $\Delta V_b$ )				
MLVC18V026C1300	26	18.4	36	$\pm 10\%$	63 @ 5 A	2.5	500	1300
MLVC18V030C1200	30	21.2	42	$\pm 10\%$	74 @ 5 A	2.5	500	1200
MLVC18V033C1100	33	23.3	45	$\pm 10\%$	79 @ 5 A	2.5	500	1100
MLVC18V038C1050	38	27	51	$\pm 10\%$	90 @ 5 A	2.5	500	1050
MLVC18V042C1000	42	30	56	$\pm 10\%$	99 @ 5 A	2.5	500	1000
MLVC18V048C900	48	34	62	$\pm 10\%$	110 @ 5 A	2.5	500	900
MLVC18V056C800	56	40	72	$\pm 10\%$	127 @ 5 A	2.5	500	800
MLVC18V060C650	60	45	76	$\pm 10\%$	134 @ 5 A	2.5	500	650
MLVC22V018C4000	18	12.7	25	$\pm 10\%$	44 @ 5 A	2.5	600	4000
MLVC22V022C3500	22	15.6	30	$\pm 10\%$	53 @ 5 A	2.5	600	3500
MLVC22V024C3000	24	17	33	$\pm 10\%$	58 @ 5 A	2.5	600	3000
MLVC22V026C2500	26	18.4	36	$\pm 10\%$	63 @ 5 A	2.5	600	2500
MLVC22V030C2200	30	21.2	42	$\pm 10\%$	74 @ 5 A	2.5	600	2200
MLVC22V033C2000	33	23.3	45	$\pm 10\%$	79 @ 5 A	2.5	600	2000
MLVC22V038C1800	38	27	51	$\pm 10\%$	90 @ 5 A	2.5	600	1800
MLVC22V042C1600	42	30	56	$\pm 10\%$	99 @ 5 A	2.5	600	1600
MLVC22V048C1400	48	34	62	$\pm 10\%$	110 @ 5 A	2.5	600	1400
MLVC22V056C1000	56	40	72	$\pm 10\%$	127 @ 5 A	2.5	600	1000
MLVC22V060C800	60	45	76	$\pm 10\%$	134 @ 5 A	2.5	600	800
MLVC22V068C700	68	48	86	$\pm 10\%$	151 @ 5 A	2.5	600	700
MLVC32V018C3500	18	14	22	$\pm 10\%$	44 @ 1 A	0.4	100	3500
MLVC32V022C3000	22	17	27	$\pm 10\%$	53 @ 1 A	0.5	100	3000
MLVC32V026C2600	26	20	33	$\pm 10\%$	63 @ 1 A	0.6	100	2600
MLVC32V031C2200	31	25	39	$\pm 10\%$	69 @ 1 A	0.7	100	2200
MLVC32V038C1800	38	30	47	$\pm 10\%$	90 @ 1 A	0.9	100	1800
MLVC32V045C1500	45	35	56	$\pm 10\%$	99 @ 1 A	1.1	100	1500
MLVC32V056C1200	56	40	68	$\pm 10\%$	127 @ 1 A	1.3	100	1200
MLVC32V065C1000	65	50	82	$\pm 10\%$	144 @ 5 A	1.8	400	1100
MLVC32V085C950	85	60	100	$\pm 10\%$	176 @ 5 A	2.2	400	950
MLVC32V100C800	100	75	120	$\pm 10\%$	211 @ 5 A	2.5	400	800
MLVC32V125C650	125	95	150	$\pm 10\%$	264 @ 5 A	3.4	400	650
MLVC32V150C550	150	115	180	$\pm 10\%$	317 @ 5 A	3.6	400	550
MLVC32V170C400	170	130	205	$\pm 10\%$	361 @ 5 A	4.2	400	400
MLVC32V180C350	180	140	220	$\pm 10\%$	387 @ 5 A	4.5	400	350
MLVC32V200C250	200	150	240	$\pm 10\%$	427 @ 5 A	4.9	400	250
MLVC40V014C5000	14	11	18	$\pm 10\%$	35 @ 2.5 A	0.8	250	5000
MLVC40V018C4500	18	14	22	$\pm 10\%$	44 @ 2.5 A	0.9	250	4500
MLVC40V022C4000	22	17	27	$\pm 10\%$	53 @ 2.5 A	1.1	250	4000
MLVC40V026C3500	26	20	33	$\pm 10\%$	63 @ 2.5 A	1.3	250	3500
MLVC40V031C3000	31	25	39	$\pm 10\%$	69 @ 2.5 A	1.6	250	3000
MLVC40V038C2800	38	30	47	$\pm 10\%$	90 @ 2.5 A	2	250	2800
MLVC40V045C2500	45	35	56	$\pm 10\%$	99 @ 2.5 A	2.5	250	2500
MLVC40V056C2000	56	40	68	$\pm 10\%$	127 @ 2.5 A	3	250	2000
MLVC40V065C1900	65	50	82	$\pm 10\%$	144 @ 10 A	4.2	1200	1900
MLVC40V085C1700	85	60	100	$\pm 10\%$	176 @ 10 A	4.8	1200	1700
MLVC40V100C1500	100	75	120	$\pm 10\%$	211 @ 10 A	5.9	1200	1500

**Product specifications**

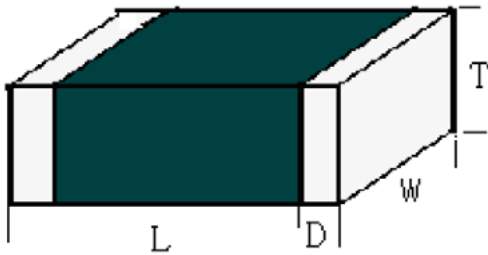
Part number	Working voltage		Varistor voltage @ 1 mAdc		Maximum clamping voltage 8/20 $\mu$ s (V)	Energy absorption 10/1000 $\mu$ s (J)	Peak current 8/20 $\mu$ s (A)	Typical capacitance @ 1 MHz (pF)
	(Vdc)	(Vac)	(V)	( $\Delta V_p$ )				
MLVC40V125C1350	125	95	150	$\pm 10\%$	264 @ 10 A	7.6	1200	1350
MLVC40V150C1000	150	115	180	$\pm 10\%$	317 @ 10 A	8.4	1200	1000
MLVC40V170C900	170	130	205	$\pm 10\%$	361 @ 10 A	9.5	1200	900
MLVC40V180C800	180	140	220	$\pm 10\%$	387 @ 10 A	10	1200	800
MLVC40V200C700	200	150	240	$\pm 10\%$	422 @ 10 A	11	1200	700

**Construction**



Component	Material
a. Ag layer	Ag
b. Ni/Sn plating	Ni-Sn
c. Inner electrode	Pd/Ag
d. Body	ZnO
e. Terminal electrode	Ag layer and Ni/Sn plating
f. Glass layer	Si-Bi

**Dimensions—mm (in)**



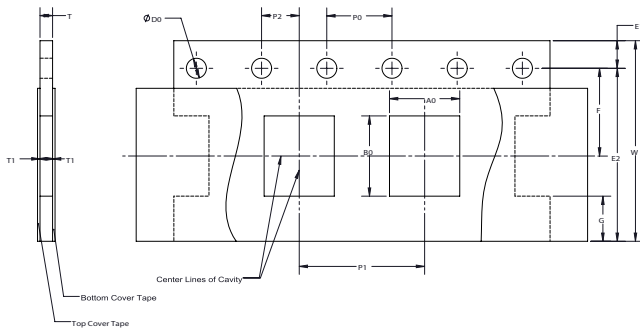
Part size	L	W	T	D
MLVC08	2.0 ± 0.2 (0.079 ± 0.008)	1.2 ± 0.2 (0.047 ± 0.008)	0.9 ± 0.20 (0.035 ± 0.008)	0.5 ± 0.3 (0.02 ± 0.012)
MLVC12	3.2 ± 0.2 (0.126 ± 0.008)	1.6 ± 0.2 (0.063 ± 0.008)	1.1 ± 0.2 (0.043 ± 0.008)	0.5 ± 0.3 (0.02 ± 0.012)
MLVC13	3.2 ± 0.2 (0.126 ± 0.008)	2.5 ± 0.2 (0.098 ± 0.008)	1.3 ± 0.2 (0.051 ± 0.008)	0.5 ± 0.3 (0.02 ± 0.012)
MLVC18	4.5 ± 0.2 (0.18 ± 0.008)	3.2 ± 0.2 (0.126 ± 0.008)	1.5 ± 0.2 (0.06 ± 0.008)	0.5 ± 0.3 (0.02 ± 0.012)
MLVC22	5.7 ± 0.3 (0.22 ± 0.012)	5.0 ± 0.3 (0.2 ± 0.012)	1.0 ~ 2.5 (0.05 ~ 0.1)	0.7 ± 0.3 (0.028 ± 0.012)
MLVC32	8.0 ± 0.3 (0.32 ± 0.012)	6.3 ± 0.3 (0.25 ± 0.012)	1.0 ~ 2.5 (0.05 ~ 0.1)	0.7 ± 0.3 (0.028 ± 0.012)
MLVC40	10.2 ± 0.3 (0.4 ± 0.012)	8.0 ± 0.3 (0.32 ± 0.012)	1.0 ~ 2.5 (0.05 ~ 0.1)	0.7 ± 0.3 (0.028 ± 0.012)

**General specifications**

Operating temperature: - 55 °C to +125 °C
Solder ability: +245 ± 5 °C, 5 ± 1 s
Resistance to soldering: +260 ± 5 °C, 10 ± 1 s
Low temperature resistance: -55 ± 2 °C, 1000 hours
Vibration: 1.5 mm, A period of 2 hours in each of 3 mutually perpendicular directions, 10 Hz to 55 Hz to 10 Hz for 1 minute
High temperature resistance: 1000 hours, +125 ± 2 °C.
High temperature load: Applied voltage: Working voltage, Testing time: 1000 hours, +85 ± 2 °C.
Static humidity: 90% to 95% RH, +60 °C ± 2 °C, 1000 hours
Thermal shock: -55 °C, 30 ± 3 minutes, +125 °C, 30 ± 3 minutes 32 cycles

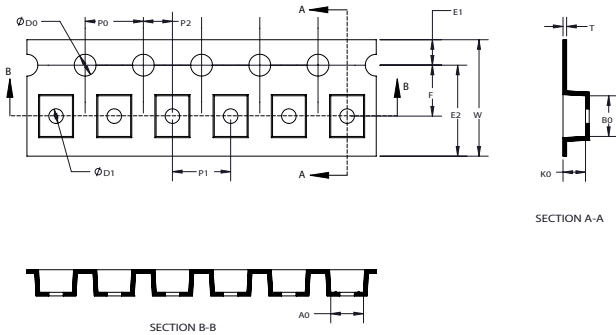
**Packaging information – mm**

Paper tape: MLVC08



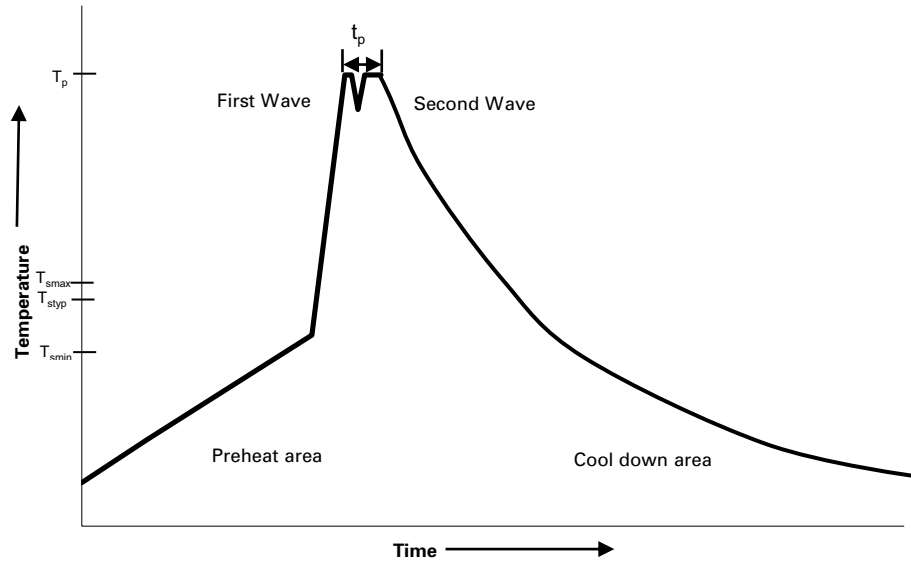
Dimension	MLVC08
W	8 ± 0.3
F	3.5 ± 0.05
E1	1.75 ± 0.1
P0	4 ± 0.1
P1	4 ± 0.2
P2	2 ± 0.1
D0	1.5 ± 0.1/-0
A0	1.5 ± 0.2
B0	2.3 ± 0.2
T	1.1 max
Qty	4000 parts per 7" reel

Embossed tape: MLVC12, MLVC13, MLVC18, MLVC22, MLVC32, MLVC40



Dimension	MLVC12	MLVC13	MLVC18	MLVC22	MLVC32	MLVC40
W	8.1+/-0.2	8.1+/-0.2	12.0+/-0.2	12.0+/-0.2	16.0+/-0.3	24.0+/-0.3
P1	4.0+/-0.10	4.0+/-0.10	8.0+/-0.10	8.0+/-0.10	12.0+/-0.10	12.0+/-0.10
E1	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10
E2	6.25 min	6.25 min	10.25 min	10.25 min	14.25 min	22.25 min
F	3.50+/-0.10	3.50+/-0.10	5.50+/-0.10	5.50+/-0.10	7.50+/-0.10	11.50+/-0.10
D0	1.55+/-0.05	1.55+/-0.05	1.55+/-0.05	1.5+/-0.1	1.50+/-0.1	1.50+/-0.05
D1	1.00+/-0.10	1.00+/-0.10	1.50+/-0.10	1.50+/-0.10	1.50+/-0.10	1.50+/-0.10
P <sub>0</sub>	4.0+/-0.10	4.0+/-0.10	4.0+/-0.10	4.0+/-0.10	4.0+/-0.10	4.0+/-0.10
P2	2.0+/-0.05	2.0+/-0.05	2.0+/-0.05	2.0+/-0.05	2.0+/-0.1	2.0+/-0.05
A <sub>0</sub>	1.90+/-0.10	2.80+/-0.10	3.66+/-0.10	5.1+/-0.20	7.0+/-0.20	8.4+/-0.10
B <sub>0</sub>	3.51+/-0.10	3.50+/-0.10	4.95+/-0.10	6.0+/-0.20	8.7+/-0.20	10.5+/-0.10
T	0.23+/-0.10	0.23+/-0.10	0.23+/-0.10	0.3+/-0.05	0.3+/-0.10	0.3+/-0.10
K <sub>0</sub>	1.27+/-0.10	1.55+/-0.10	1.74+/-0.10	2.0+/-0.10	2.0+/-0.10	1.9+/-0.10
Qty	3000 parts per 7" reel	3000 parts per 7" reel	3000 parts per 13" reel	3000 parts per 13" reel	2500 parts per 13" reel	2500 parts per 13" reel

**Wave solder profile**



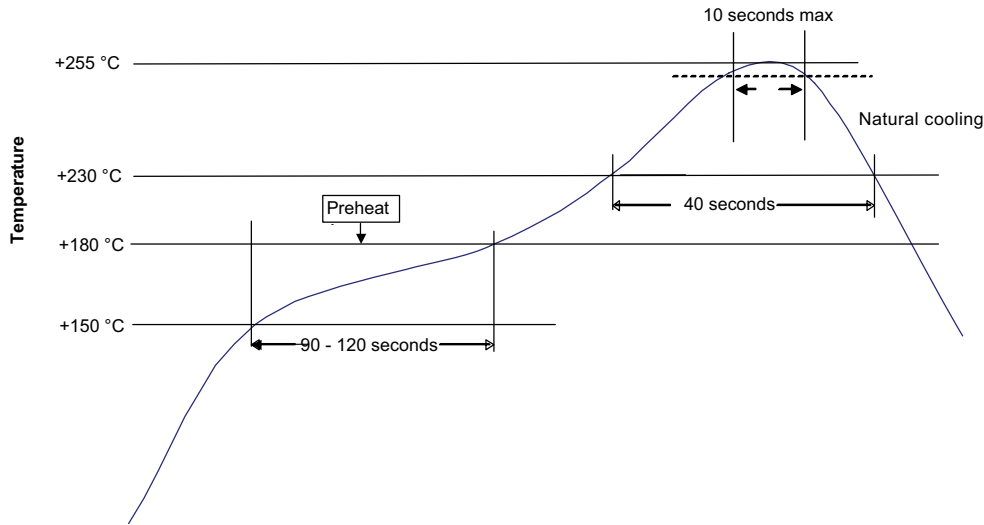
**Reference EN 61760-1:2006**

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat	• Temperature min. ( $T_{smin}$ )	100 °C
	• Temperature typ. ( $T_{styp}$ )	120 °C
	• Temperature max. ( $T_{smax}$ )	130 °C
	• Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	70 seconds
$\Delta$ preheat to max Temperature	150 °C max.	150 °C max.
Peak temperature ( $T_p$ )*	235 °C – 260 °C	250 °C – 260 °C
Time at peak temperature ( $t_p$ )	10 seconds max 5 seconds max each wave	10 seconds max 5 seconds max each wave
Ramp-down rate	~ 2 K/s min ~3.5 K/s typ ~5 K/s max	~ 2 K/s min ~3.5 K/s typ ~5 K/s max
Time 25 °C to peak temperature	4 minutes	4 minutes

**Manual solder**

+350 °C, 4-5 seconds (by soldering iron), generally manual hand soldering is not recommended.

**Solder reflow profile**



Profile feature	Parameters	
Preheat and soak	• Temperature min.	+150 °C
	• Temperature max.	+180 °C
	• Time	60-120 seconds
Liquidous temperature	+230 °C	
Time at liquidous	40 seconds	
Peak package body temperature	+255 °C	
Time	10 seconds max	

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