

ESDAP3L03C THRU ESDAP3L24C

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ESDAP3L03C THRU ESDAP3L24C

Surface Mount Low Capacitance Bi-Directional TVS For ESD Protection Array 3.3V~24V

Features

- This series is designed for average power 311W~546W approximated ESD protection, different V_{RWM} , different peak pulse power available
- Bi-directional configuration
- Working voltages: 3.3V, 5.0V, 8.0V, 12V, 15V, 18V, 24V
- Protects one I/O line
- Low clamping voltage
- Low leakage current
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free parts, ex. ESDAP3L03C-H

IEC compatibility

- IEC61000-4-2 (ESD) ± 30 kV (Air), ± 30 kV (Contact)
- IEC61000-4-4 (EFT) 40A (5/50ns)

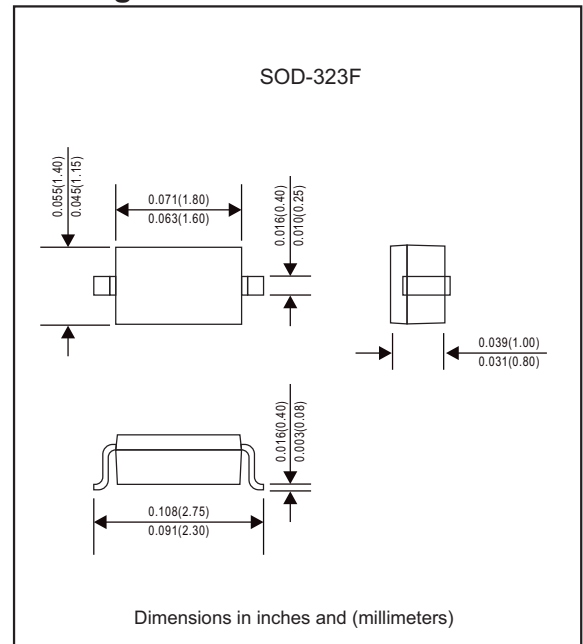
Applications

- Cell phone handsets and accessories
- Microprocessor based equipment
- Personal digital assistants (PDA's)
- Notebooks, desktops, and servers
- Portable instrumentation
- Peripherals
- USB interface

Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-323F
- Terminals : Plated terminals, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.005 gram

Package outline



Maximum ratings (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	ESDAP 3L03C	ESDAP 3L05C	ESDAP 3L08C	ESDAP 3L12C	ESDAP 3L15C	ESDAP 3L18C	ESDAP 3L24C	Unit
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	± 30 ± 30	± 30 ± 30	± 30 ± 30	± 30 ± 30	± 30 ± 30	± 30 ± 30	± 30 ± 30	kV
Electrostatic discharge (Surge) (8/20 μ s) (IEC61000-4-5)	I_{PP}	20	17	20	11	14	12	9	A
Lead soldering temperature	T_L	260 (10 sec.)							$^\circ\text{C}$
Operating junction temperature range	T_J	-55 to +150							$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150							$^\circ\text{C}$

Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Part No. (Note 1)	V_{RWM} (V) Max.	V_{BR} (V) @ I_T Min.	I_T (mA)	V_C (V) @ $I_{PP}=1.0A$ (8/20 μ s) Max.	I_{PP} (A) (8/20 μ s) Max.	V_C (V) @ I_{PP} (8/20 μ s) Typ.	V_C (V) @ I_{PP} (8/20 μ s) Max.	I_R (μ A) @ V_{RWM} Max.	PPP (W) (8/20 μ s) Max.	C_J (pF) (Note 2) Typ.
ESDAP3L03C	3.3	4.0	1.0	11.0	20	16.0	19.0	0.2	380	1.0
ESDAP3L05C	5.0	6.0	1.0	9.8	17	15.3	18.3	1.0	311	1.0
ESDAP3L08C	8.0	8.5	1.0	20.0	20	21.0	25.0	1.0	500	1.0
ESDAP3L12C	12.0	13.3	1.0	23.0	11	25.0	30.0	1.0	330	1.0
ESDAP3L15C	15.0	16.7	1.0	26.5	14	33.0	39.0	1.0	546	1.0
ESDAP3L18C	18.0	20.0	1.0	29.0	12	36.0	40.0	1.0	480	1.0
ESDAP3L24C	24.0	26.7	1.0	43.0	9	51.0	55.0	1.0	495	1.0

Notes1: Part numbers with an additional "C" suffix are bi-directional devices, i.e., ESDAP3L05C

2: Off-state capacitance 1MHz, zero dc bias

Rating and characteristic curves (ESDAP3L03C thru ESDAP3L24C)

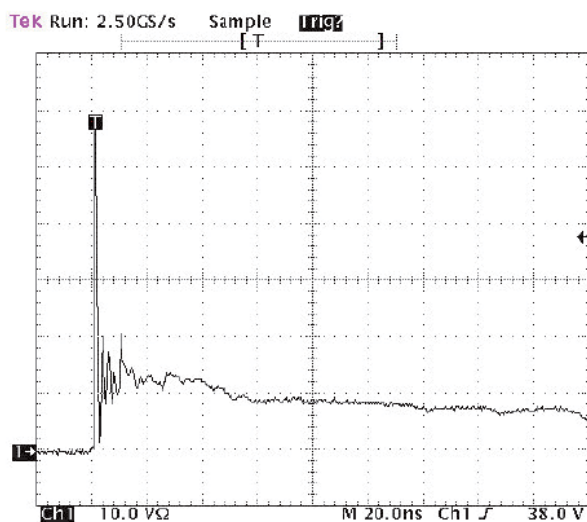


Figure 1. ESD Clamping Voltage Screenshot
Positive 8 kV contact per IEC 61000-4-2

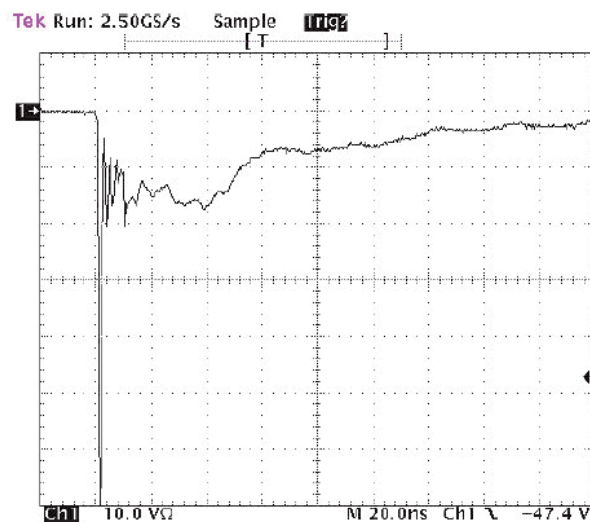
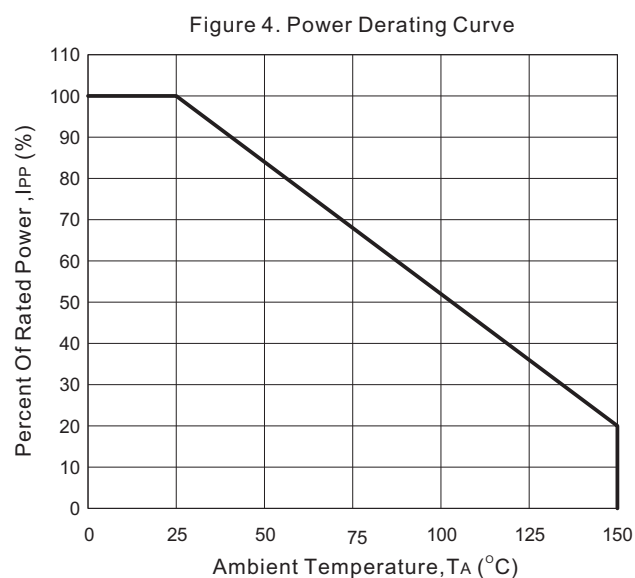
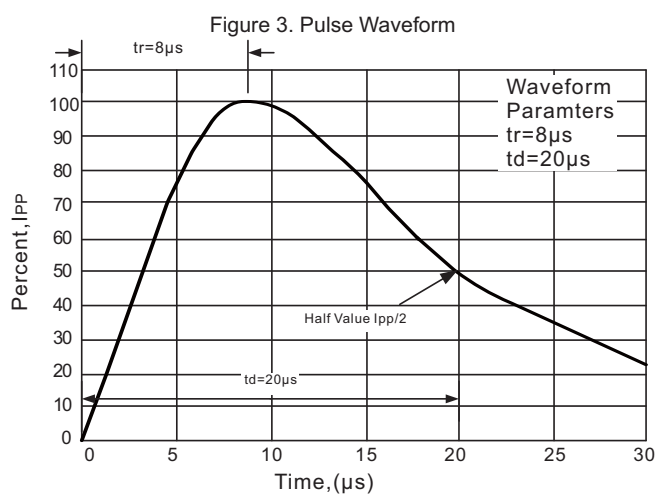


Figure 2. ESD Clamping Voltage Screenshot
Negative 8 kV contact per IEC 61000-4-2



Rating and characteristic curves (ESDAP3L03C thru ESDAP3L24C)

Figure 5. Peak Pulse Power vs. Pulse Time

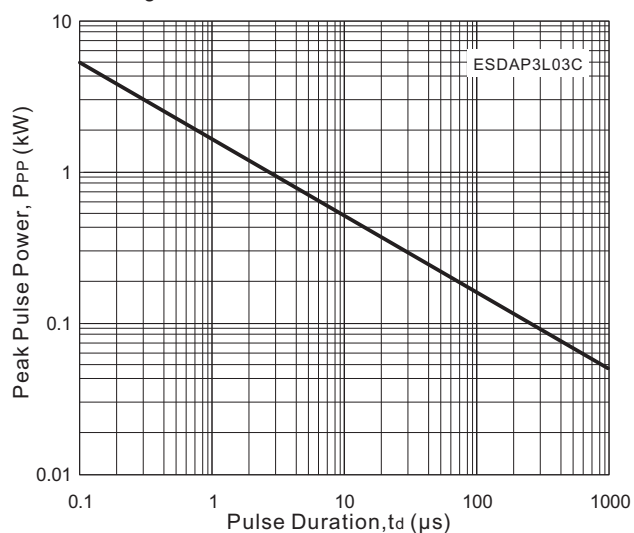


Figure 6. Peak Pulse Power vs. Pulse Time

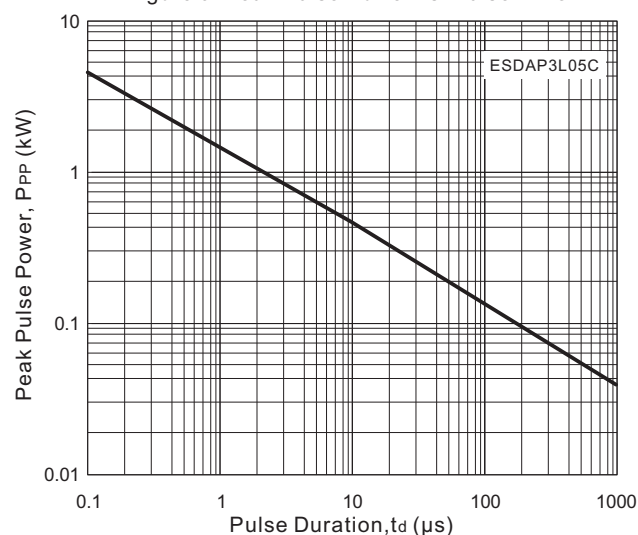


Figure 7. Peak Pulse Power vs. Pulse Time

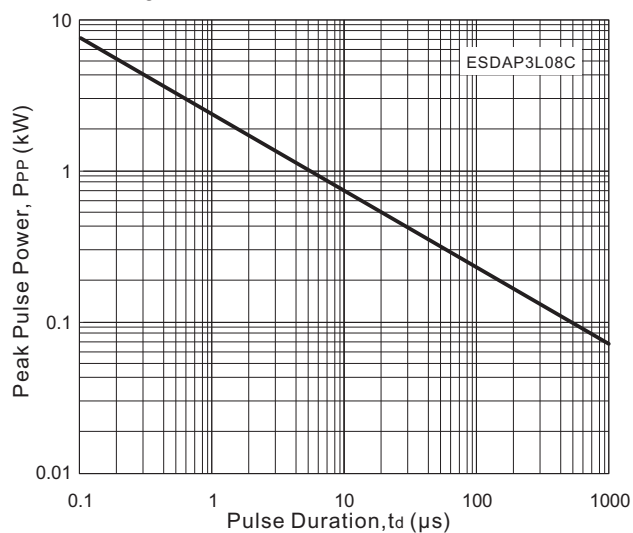
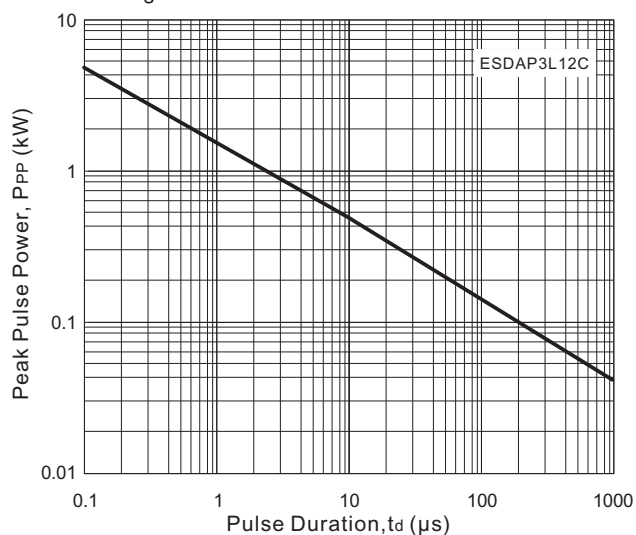


Figure 8. Peak Pulse Power vs. Pulse Time



Rating and characteristic curves (ESDAP3L03C thru ESDAP3L24C)

Figure 9. Peak Pulse Power vs. Pulse Time

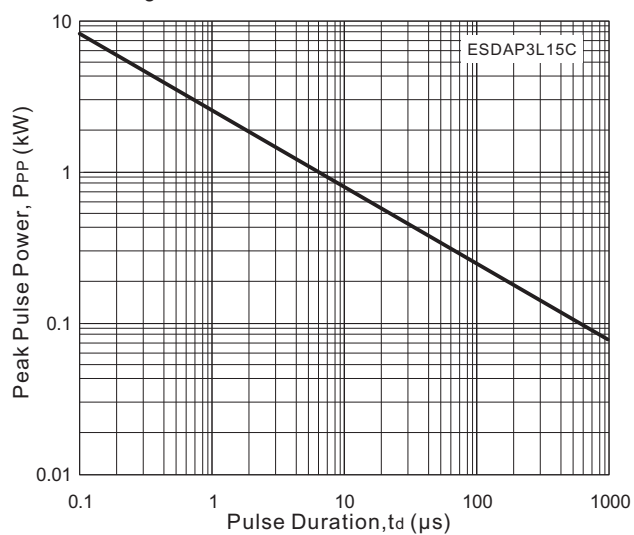


Figure 10. Peak Pulse Power vs. Pulse Time

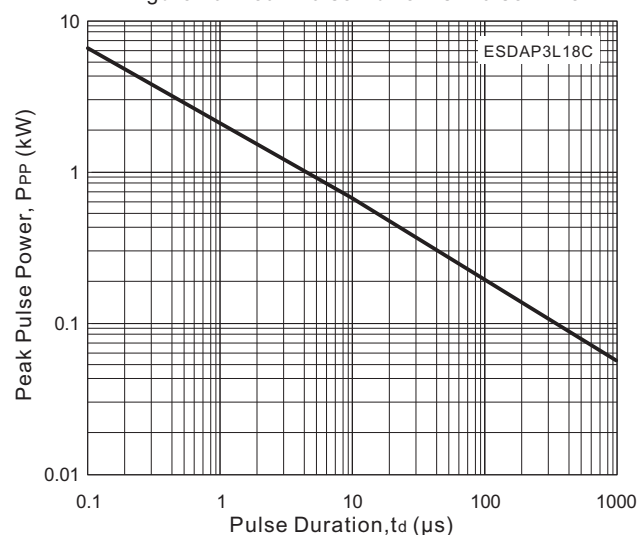
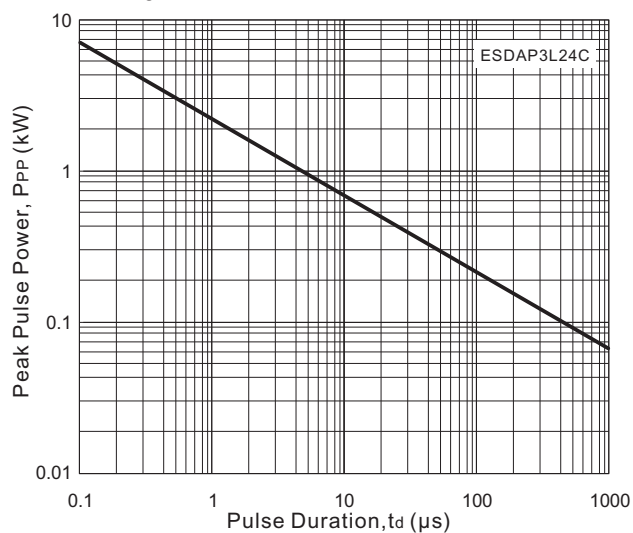


Figure 11. Peak Pulse Power vs. Pulse Time



Rating and characteristic curves (ESDAP3L03C thru ESDAP3L24C)

Figure 12. Normalized Junction Capacitance vs. Reverse Voltage (ESDAP3L03C)

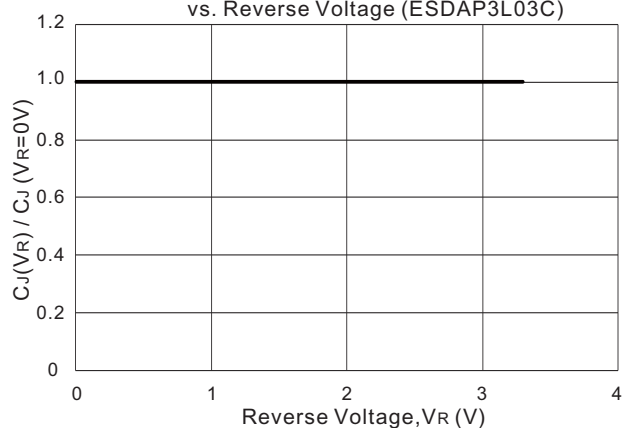


Figure 13. Normalized Junction Capacitance vs. Reverse Voltage (ESDAP3L05C)

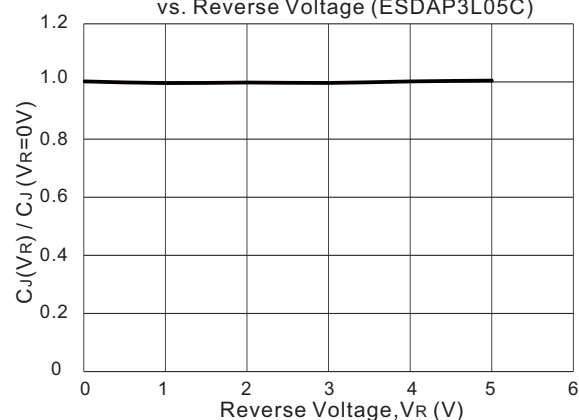


Figure 14. Normalized Junction Capacitance vs. Reverse Voltage (ESDAP3L08C)

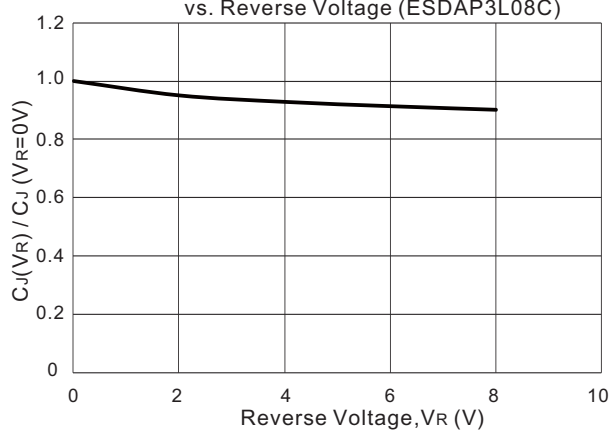


Figure 15. Normalized Junction Capacitance vs. Reverse Voltage (ESDAP3L12C)

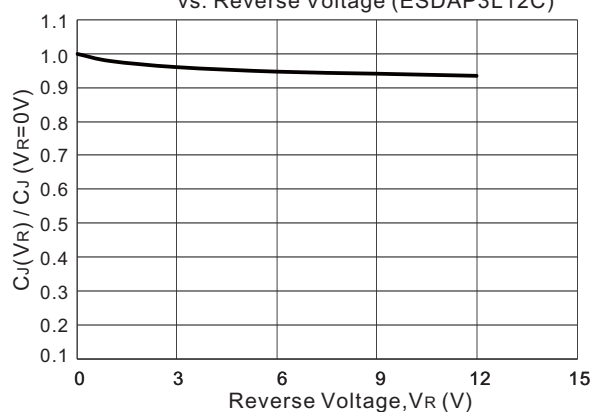


Figure 16. Normalized Junction Capacitance vs. Reverse Voltage (ESDAP3L15C)

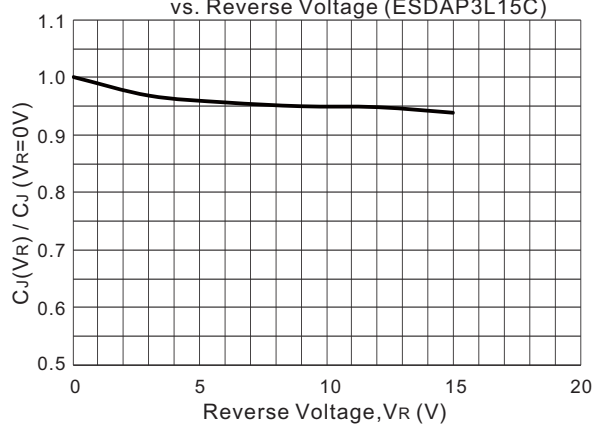
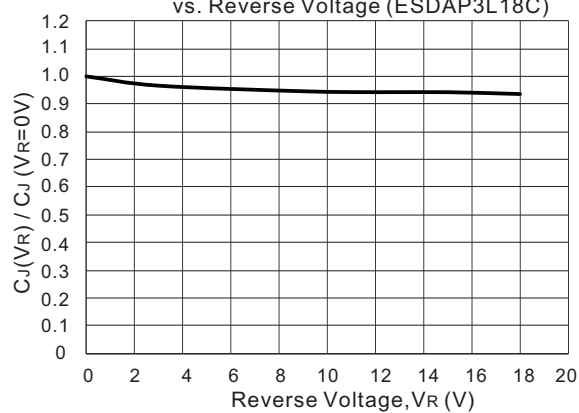
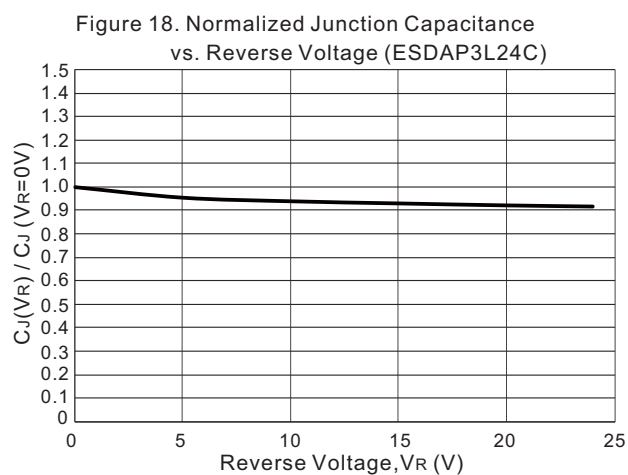


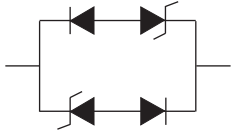
Figure 17. Normalized Junction Capacitance vs. Reverse Voltage (ESDAP3L18C)



Rating and characteristic curves (ESDAP3L03C thru ESDAP3L24C)

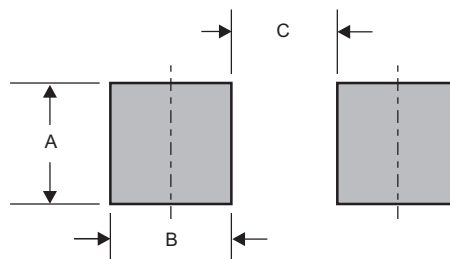


ESDAP3L03C THRU ESDAP3L24C**Pinning information**

Pin	Simplified outline	Symbol
Bi-Directional		

Marking

Type number	Marking code	
ESDAP3L03C	3B	3C
ESDAP3L05C	5B	5C
ESDAP3L08C	8B	8C
ESDAP3L12C	AB	AC
ESDAP3L15C	BB	BC
ESDAP3L18C	EB	EC
ESDAP3L24C	CB	CC
	 Notes1: "XX"=Marking code. 2: "LC" =Fixed.	or  Note1: "XX"=Marking code.

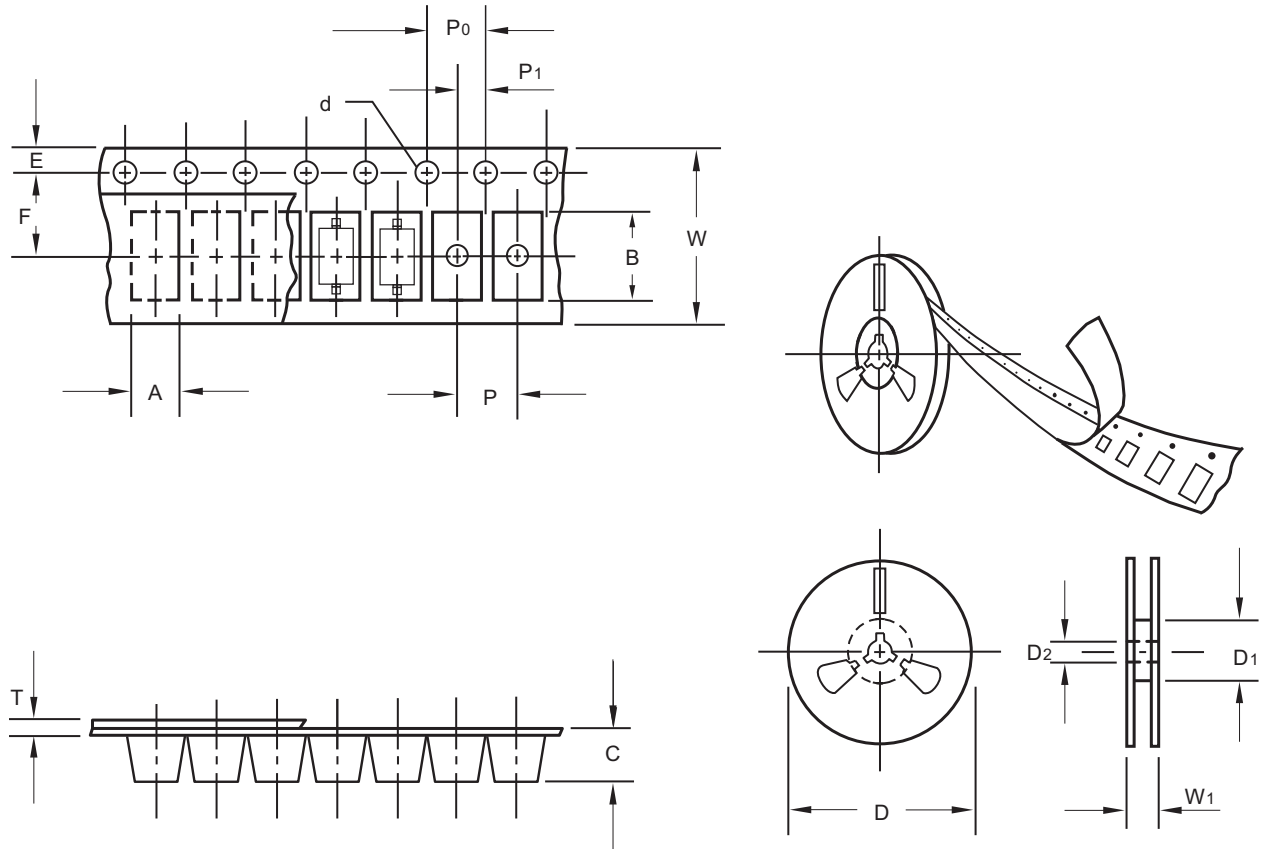
Suggested solder pad layout

Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SOD-323F	0.033 (0.83)	0.025 (0.63)	0.063 (1.60)

ESDAP3L03C THRU ESDAP3L24C

Packing information



unit:mm

Item	Symbol	Tolerance	SOD-323F
Carrier width	A	0.1	1.46
Carrier length	B	0.1	2.95
Carrier depth	C	0.1	1.25
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	62.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	11.40

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

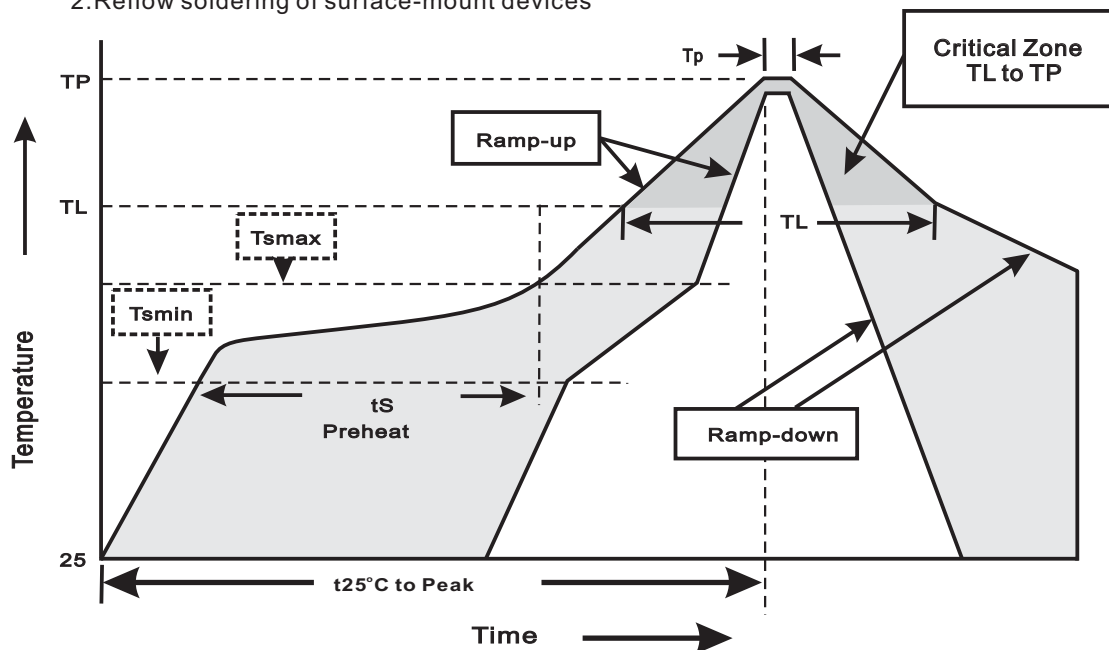
ESDAP3L03C THRU ESDAP3L24C

Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOD-323F	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	8.0

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _p)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

ESDAP3L03C THRU ESDAP3L24C

High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at $260 \pm 5^\circ\text{C}$ for $10 \pm 2\text{sec.}$	MIL-STD-750D METHOD-2031
2. Solderability	at $245 \pm 5^\circ\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_{\text{BR}} = V_{\text{BR Min}} * 80\%$ at $T_j = 150^\circ\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	$15P_{\text{SIG}}$ at $T_A = 121^\circ\text{C}$ for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to $+125^\circ\text{C}$ dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
6. Humidity	at $T_A = 85^\circ\text{C}$, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
7. High Temperature Storage Life	at 150°C for 1000 hrs.	MIL-STD-750D METHOD-1031