ESD Protection Diode : TExST23
SOT-23 package

■ Features

1. RoHS compliant and halogen-free
2. Low clamping voltage
3. Low leakage current
4. IEC 61000-4-2 (ESD) 15~30KV (air), 15~30KV (contact)

■ Recommended Applications

1. Extended common-mode RS-485
2. Security systems
3. Networks
4. Automatic teller machines

■ Mechanical Data

1. Case: SOT-23, molded plastic meets UL flammability rating 94V-0
2. Meets MSL level 1, per J-STD-020

■ Part Number Code

T	E	D	S	T	2	3	1	2	7	5	0	B	0	2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Product Series	
TE	THINKING ESD Transient Voltage Suppression Diodes

Package	
ST23	SOT-23, 3pins

Junction Capacitance (Cj)	
0R5	0.5pF
030	3.0pF
03D	3.3pF
10F	10.5pF

Type Code	
U	Uni-directional
B	Bi-directional

Type code	
D	Standard Capacitance >10pF
L	Low Capacitance >1pF, ≦10pF
U	Ultra-low Capacitance ≦1pF

Reverse Stand off Voltage(V_{RWM})	
3R	3.3V
05	5V
12	12V
24	24V

Optional suffix	
02	Pin 1 to 3 and Pin2 to 3, V_{RWM}=12V Pin 3 to 1 and Pin3 to 2, V_{RWM}=7V

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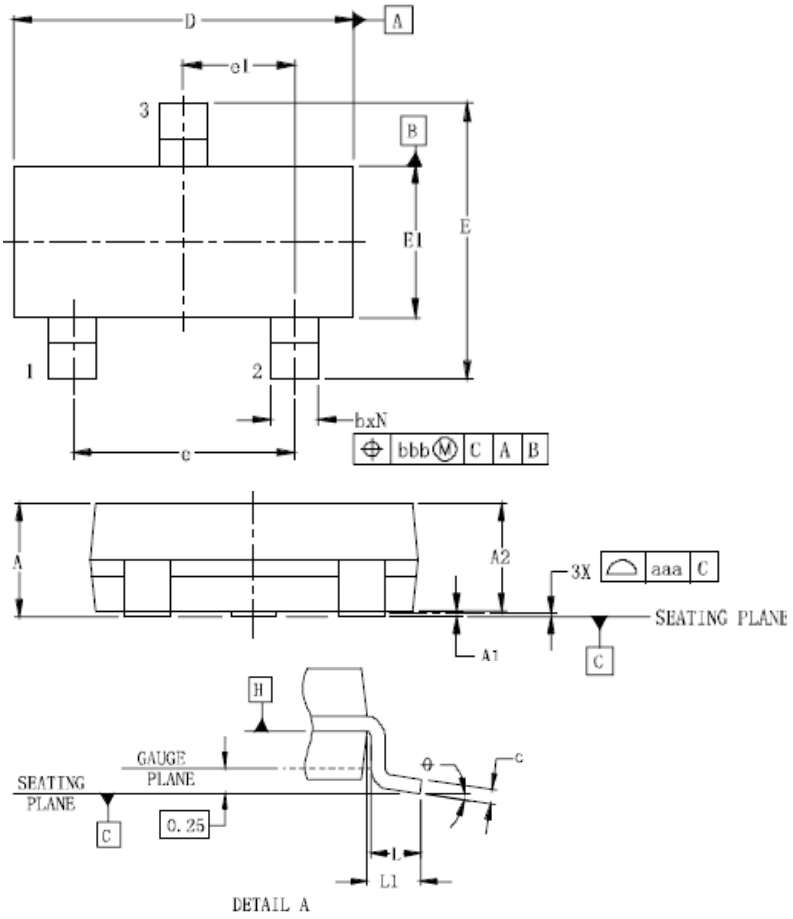
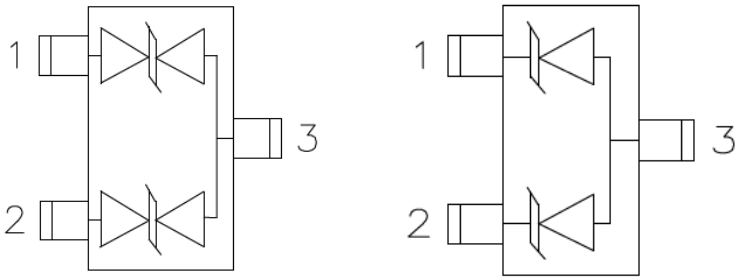
■ Structures and Dimensions



Unit: mm

Symbol	SOT-23		
	Min	Nom	Max
A	0.89	-	1.12
A1	0.01	-	0.1
A2	0.88	0.95	1.02
b	0.3	-	0.51
c	0.08	-	0.18
D	2.8	2.9	3.04
E	2.1	2.37	2.64
E1	1.2	1.3	1.4
e	1.9BSC		
e1	0.95BSC		
L	0.4	0.5	0.6
L1	-0.55		
N	3		
θ	0°	'-	8°
aaa	0.1		
bbb	0.2		

■ Schematic & PIN Configuration



■ Electrical Characteristics (T_A=25℃ unless otherwise noted)

P/N	Reverse Stand-off Voltage		Reverse Leakage Current			Product Polarity	Marking	Peak Pulse Power (8/20μs)	Peak Pulse Current (8/20μs)	ESD (contact)	ESD (air)	Operating Temp.	Storage Temp.
	V_{RWM} (V)		I_R (uA)										
	Pin1to3/ Pin2to3	Pin3to1/ Pin3to2	Pin1to3/ Pin2to3		Pin3to1/ Pin3to2	Uni/Bi		P_{PK} (W)	I_{PP} (A)	KV	KV	T_J(℃)	T_{stg}(℃)
	Max	Max	Typ.	Max	Max								
TEDSD233R100B	3.3		0.01	0.5		Bi	03C	350	32	±30	±30	−55to+125	−55to+150
TEDST233R201U	3.3		0.01	0.5		Uni	S03	350	32	±30	±30	−55to+125	−55to+150
TEUST23050R7U	5		0.5	1		Uni	5ML	60	3.5	15	15	−55to+125	−55to+125
TEDST2305101B	5		0.01	0.5		Bi	05C	350	26	±30	±30	−55to+125	−55to+150
TEDST2305101U	5		0.01	0.5		Uni	S05	350	26	±30	±30	−55to+125	−55to+150
TEDST2312101B	12		0.01	0.5		Bi	12C	350	15	±30	±30	−55to+125	−55to+150
TEDST2312101U	12		0.01	0.5		Uni	S12	350	15	±30	±30	−55to+125	−55to+150
TEDST2312750B02	12	7		0.05	2	Bi	712	400	17	±30	±30	−55to+125	−55to+150
TEDST2324280B	24			0.2		Bi	24M	300	5	±25	±30	−55to+125	−55to+150
TEDST2324280U	24		0.01	0.5		Uni	S24	350	6	±30	±30	−55to+125	−55to+150

■ Electrical Characteristics (T_A=25℃ unless otherwise noted)

TEDSD233R100B		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ.	Max		
Reverse Working Voltage	V_{RWM}			3.3				V	
Breakdown Voltage	V_{BR}	4						V	IT = 1mA
Reverse Leakage Current	I_R		0.01	0.5				uA	VR = VRWM
Clamping Voltage	V_C		5					V	IPP = 1A (8 x 20μs pulse)
			10					V	IPP = 32A (8 x 20μs pulse)
Junction Capacitance	C_J			100				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3

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TEDST233R201U		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ.	Max		
Reverse Working Voltage	V_{RWM}			3.3				V	
Breakdown Voltage	V_{BR}	4						V	IT = 1mA
Reverse Leakage Current	I_R		0.01	0.5				uA	VR = VRWM
Clamping Voltage	V_C		5					V	IPP = 1A (8 x 20μs pulse)
			10					V	IPP = 32A (8 x 20μs pulse)
Junction Capacitance	C_J			200				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3
				100				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 2

TEUST23050R7U		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ.	Max		
Reverse Working Voltage	V_{RWM}			5				V	
Breakdown Voltage	V_{BR}	6	7	8				V	IT = 1mA
Reverse Leakage Current	I_R		0.5	1				uA	VR = VRWM
Clamping Voltage	V_C			17				V	IPP = 3.5A (8 x 20μs pulse)
Junction Capacitance	C_J		0.7	0.8				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3

TEDST2305101B		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ.	Max		
Reverse Working Voltage	V_{RWM}			5				V	
Breakdown Voltage	V_{BR}	6						V	IT = 1mA
Reverse Leakage Current	I_R		0.01	0.5				uA	VR = VRWM
Clamping Voltage	V_C		7					V	IPP = 1A (8 x 20μs pulse)
			11					V	IPP = 26A (8 x 20μs pulse)
Junction Capacitance	C_J			100				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3

ESD Protection Diode : TExST23

SOT-23 package

TEDST2305101U		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ.	Max		
Reverse Working Voltage	V_{RWM}			5				V	
Breakdown Voltage	V_{BR}	6						V	IT = 1mA
Reverse Leakage Current	I_R		0.01	0.5				uA	VR = VRWM
Clamping Voltage	V_C		7					V	IPP = 1A (8 x 20μs pulse)
			11					V	IPP = 26A (8 x 20μs pulse)
Junction Capacitance	C_J			200				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3
				100				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 2

TEDST2312101B		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ	Max		
Reverse Working Voltage	V_{RWM}			12				V	
Breakdown Voltage	V_{BR}	13.3						V	IT = 1mA
Reverse Leakage Current	I_R		0.01	0.5				uA	VR = VRWM
Clamping Voltage	V_C		15					V	IPP = 1A (8 x 20μs pulse)
			24					V	IPP = 15A (8 x 20μs pulse)
Junction Capacitance	C_J			100				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3

TEDST2312101U		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ	Max		
Reverse Working Voltage	V_{RWM}			12				V	
Breakdown Voltage	V_{BR}	13.3						V	IT = 1mA
Reverse Leakage Current	I_R		0.01	0.5				uA	VR = VRWM
Clamping Voltage	V_C		15					V	IPP = 1A (8 x 20μs pulse)
			24					V	IPP = 15A (8 x 20μs pulse)
Junction Capacitance	C_J			200				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3
				100				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 2

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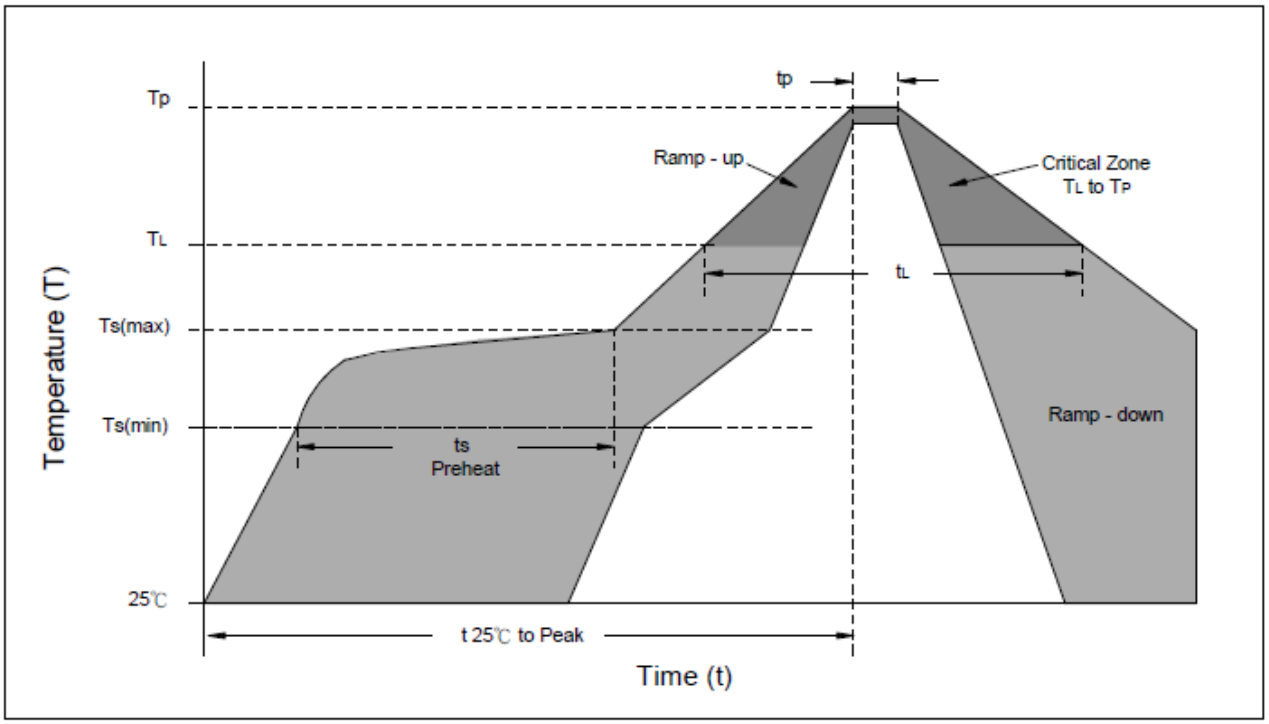
TEDST2312750B02		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ	Max		
Reverse Working Voltage	V_{RWM}			12			7	V	
Breakdown Voltage	V_{BR}	13.5			7.5			V	IT = 1mA
Reverse Leakage Current	I_R			0.05			2	uA	VR = VRWM
Clamping Voltage	V_C			20			10	V	IPP = 5A (8 x 20μs pulse)
Clamping Voltage	V_C			26			12	V	IPP = 17A (8 x 20μs pulse)
Junction Capacitance	C_J			75			75	pF	VR = 0V, f = 1MHz

TEDST2324280B		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ.	Max		
Reverse Working Voltage	V_{RWM}			24				V	
Breakdown Voltage	V_{BR}	27						V	IT = 1mA
Reverse Leakage Current	I_R			0.2				uA	VR = VRWM
Clamping Voltage	V_C			40				V	IPP = 1A (8/20μs pulse)
Junction Capacitance	C_J			20				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3

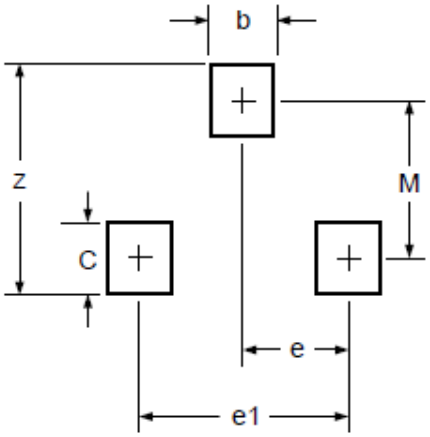
TEDST2324280U		Pin 1 to 3/ Pin 2 to 3			Pin 3 to 1/ Pin3 to 2			Unit	Test Condition
Parameter	Symbol	Min	Typ.	Max	Min	Typ.	Max		
Reverse Working Voltage	V_{RWM}			24				V	
Breakdown Voltage	V_{BR}	26.7						V	IT = 1mA
Reverse Leakage Current	I_R		0.01	0.5				uA	VR = VRWM
Clamping Voltage	V_C		33					V	IPP = 1A (8/20μs pulse)
			45					V	IPP = 6A (8/20μs pulse)
Junction Capacitance	C_J			70				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 3 or Pin 2 to Pin 3
				35				pF	VR = 0V, f = 1MHz , Pin 1 to Pin 2

■ Soldering Recommendation



Reflow Condition	Lead-free assembly
Preheat	
-Temperature Min(Ts min)	150℃
-Temperature Min(Ts max)	200℃
-Time (min to max) (ts)	60 – 180 seconds
Average ramp up rate	
-Temperature Liquidus (TL) to peak	3℃/second max
Ts(max) to TL	
-Ramp-up Rate	3℃/second max.
Reflow	
-Temperature Liquidus (TL)	217℃
-Time (tL)	60 – 150 seconds
Peak Temperature (TP)	260℃
Time within 5℃ of actual peak Temperature(tP)	20 – 40 seconds
Ramp-down Rate	6℃/second max.
Time 25℃ to peak Temperature(TP)	8 minutes max.
Do not exceed	260℃

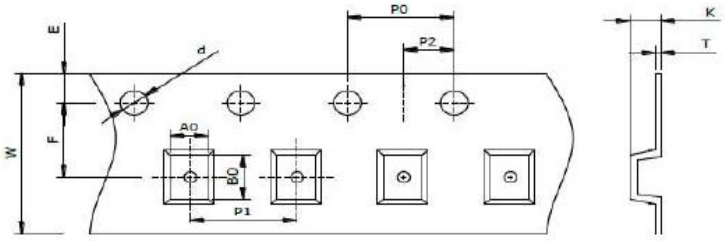
■ Recommended Soldering Pad Dimensions

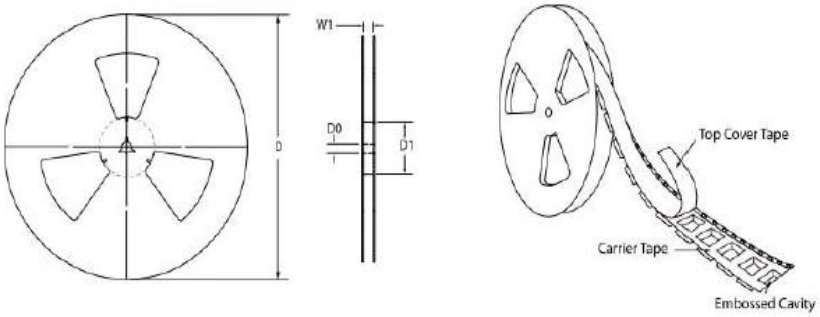


Unit: mm

Symbol	SOT-23
M	2.02
C	0.8
Z	2.82
e	0.95 BSC
e1	1.90 BSC
b	0.8

■ Packaging





Unit: mm

Symbol	SOT-23
A0	3.10 ± 0.10
B0	2.70 ± 0.10
K	1.15± 0.10
d	1.50 ± 0.10
D	178.00 ± 2.00
D0	13.00 ± 0.20
D1	MIN. 54.00
E	1.75 ± 0.10
F	3.50 ± 0.10
P0	4.00 ± 0.10
P1	4.00 ± 0.10
P2	2.00 ± 0.10
T	0.20 ± 0.05
W	8.00 ± 0.20
W1	MAX. 13.50

■ Quantity

MPQ: 3,000pcs

Package Type	Reel Size (inch)	Reel (Kpcs)
SOT-23	7	3

■ Warehouse Storage Conditions of product

● Storage condition:

1. Storage Temperature: -10℃~+40℃
2. Relative Humidity: ≦75%RH
3. Keep away from corrosive atmosphere and sunlight.

● Period of Storage: 1 year.