

N032AT23 THRU N362AT23**List**

List.....	1
Package outline.....	2
Features.....	2
Mechanical data.....	2
Maximum ratings	2
Electrical characteristics.....	2
Rating and characteristic curves.....	3~8
Applications.....	9
Pinning information.....	9
Marking.....	9
Suggested solder pad layout.....	9
Packing information.....	10
Reel packing.....	11
Suggested thermal profiles for soldering processes.....	11
High reliability test capabilities.....	12

N032AT23 THRU N362AT23

2-Channel Surface Mount Uni-Directional TVS for ESD Protection 3.3V~36V

Features

- Protects one bidirectional line or two unidirectional lines
- Working voltage : 3.3V, 5.0V, 12V, 15V, 24V, 36V
- Low leakage current
- Low clamping voltages
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex.N032AT23-H

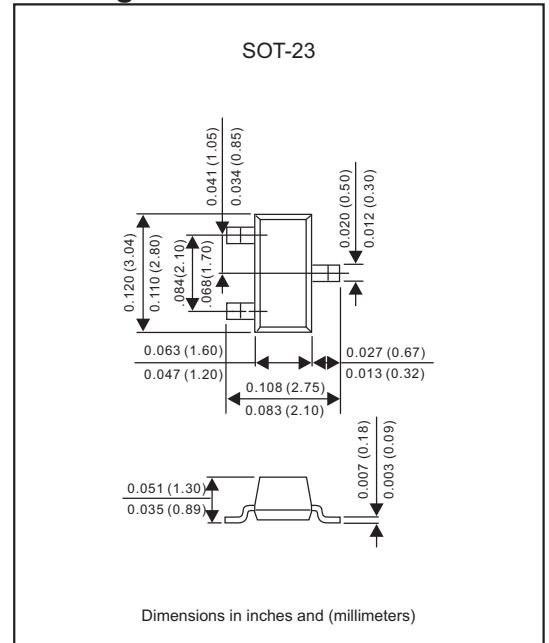
Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

IEC compatibility

- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) IPP (max.) (8/20μs)

Package outline



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

Parameter	Symbols	Value	Units
Operating junction temperature range	T_J	-55 to +125	$^{\circ}\text{C}$
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.	Reverse Stand Off Voltage	Reverse Breakdown Voltage @ I_T	Test Current	Clamping Voltage @ I_{PP} (8/20μs)	Peak Pulse Current (8/20μs)	Peak Pulse Power (8/20μs)	Reverse Leakage Current @ V_{RWM}	Junction Capacitance @ $V_R=0V$, $f=1.0\text{MHz}$	ESD per IEC 61000-4-2 (Air)	ESD per IEC 61000-4-2 (Contact)
	V_{RWM}	$V_{BR}(\text{min.})$	I_T	$V_C(\text{max.})$	$I_{PP}(\text{max.})$	$P_{PP}(\text{max.})$	$I_R(\text{max.})$	$C_J(\text{typ.})$	V_{ESD}	V_{ESD}
	V	V	mA	V	A	W	μA	pF	kV	kV
N032AT23	3.3	4.0	1.0	14	25	350	2.0	200	±30	±30
N052AT23	5.0	6.0	1.0	15	23	345	0.5	170	±30	±30
N122AT23	12.0	13.3	1.0	25	13	325	0.5	80	±30	±30
N152AT23	15.0	16.7	1.0	28	10	280	0.5	65	±30	±30
N242AT23	24.0	26.7	1.0	55	5	275	0.5	45	±30	±30
N362AT23	36.0	40.0	1.0	95	5	475	1.0	25	±15	±8

Rating and characteristic curves (N032AT23)

Figure 1: Peak Pulse Power vs. Pulse Time

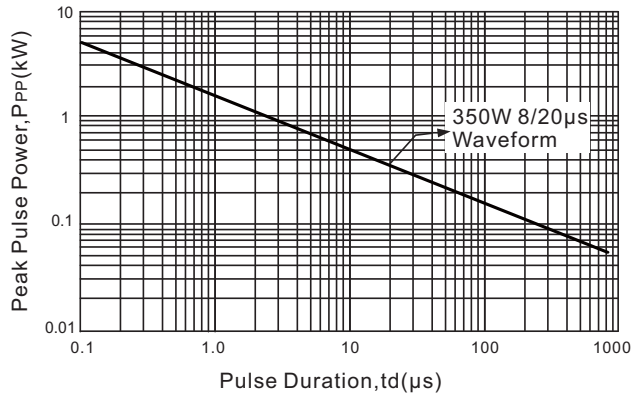


Figure 2: Power Derating Curve

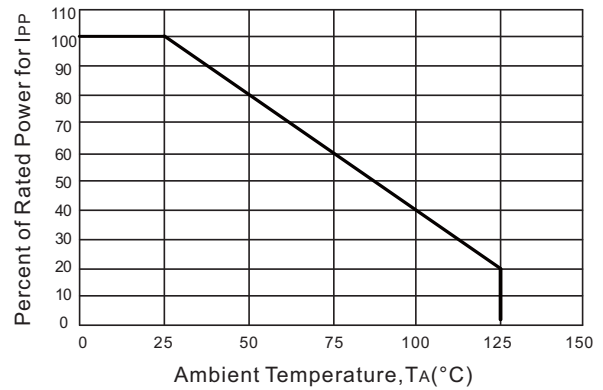


Figure 3: Clamping Voltage vs. Peak Pulse Current

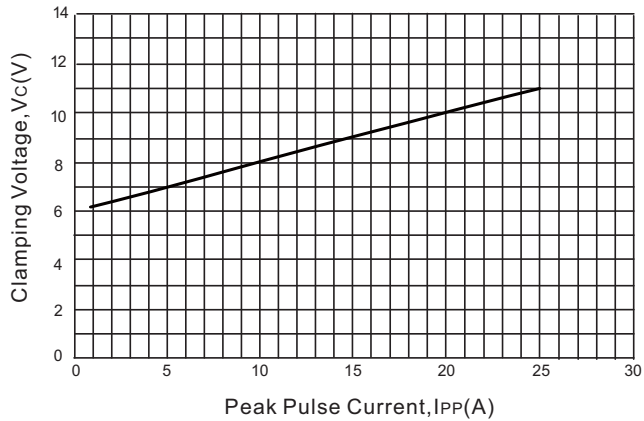


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage (I_O=G)

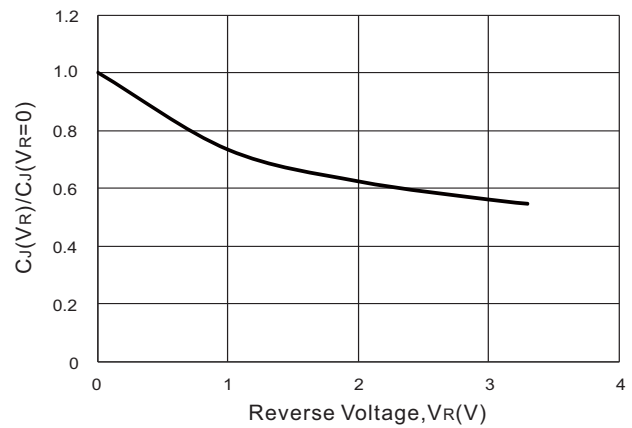


Figure 5: 8/20μs Pulse Waveform

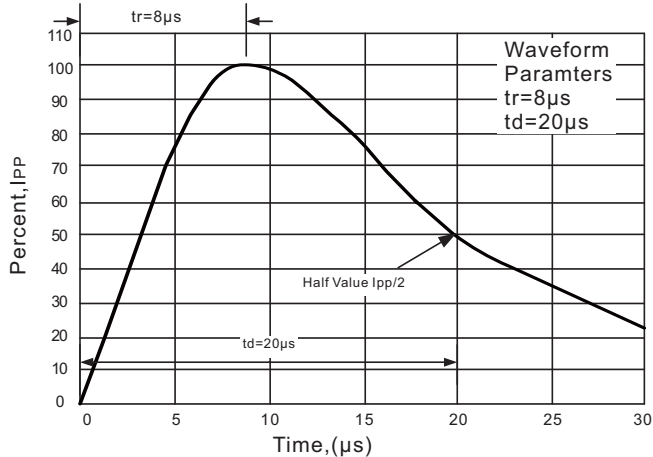
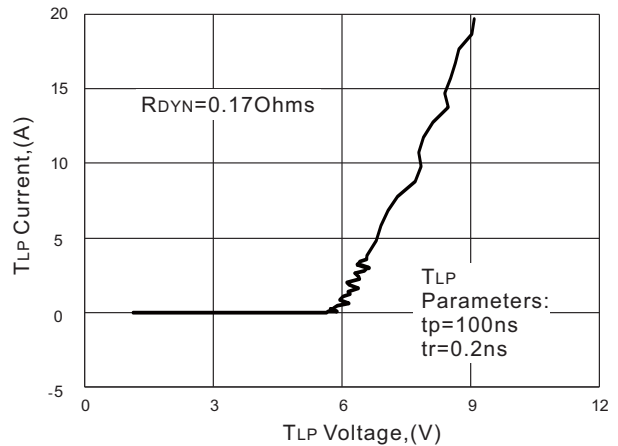


Figure 6: TLP I-V Curve



Rating and characteristic curves (N052AT23)

Figure 1: Peak Pulse Power vs. Pulse Time

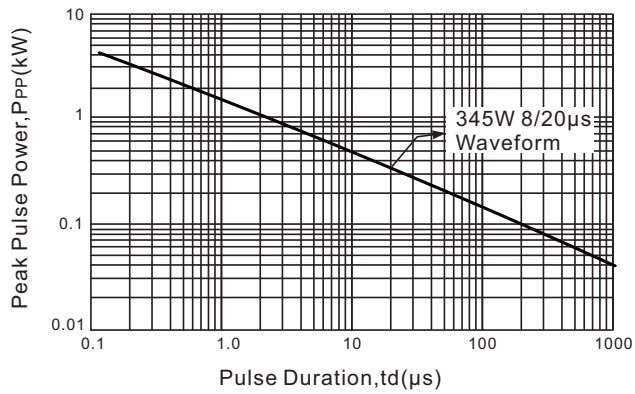


Figure 2: Power Derating Curve

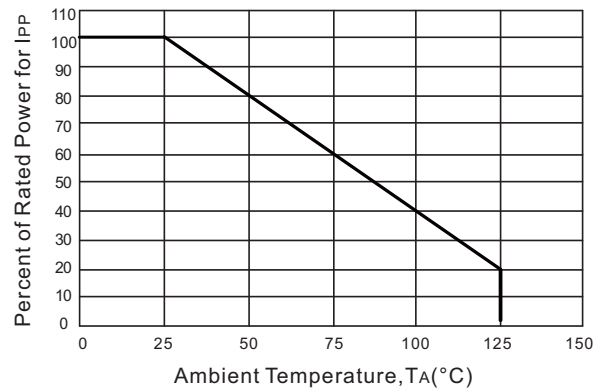


Figure 3: Clamping Voltage vs. Peak Pulse Current

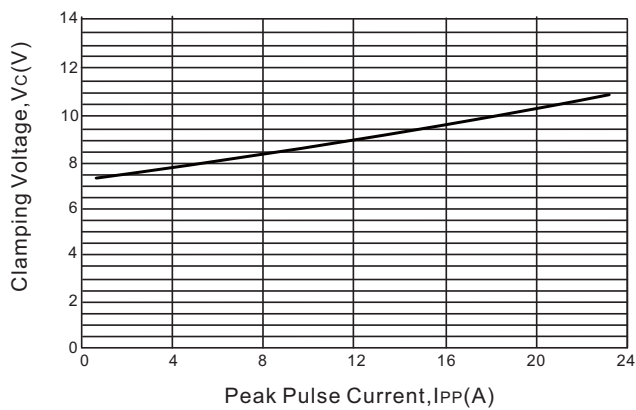


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage (PIN1-PIN3)

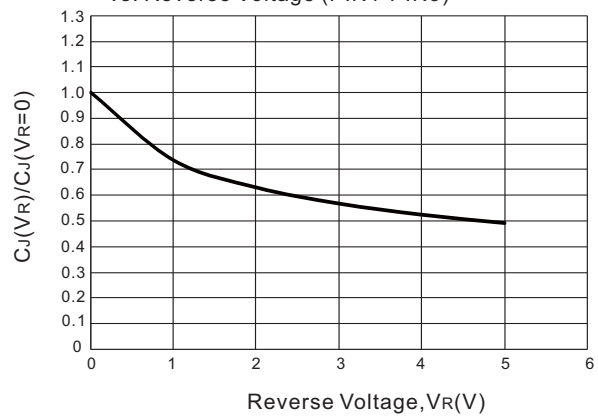


Figure 5: 8/20μs Pulse Waveform

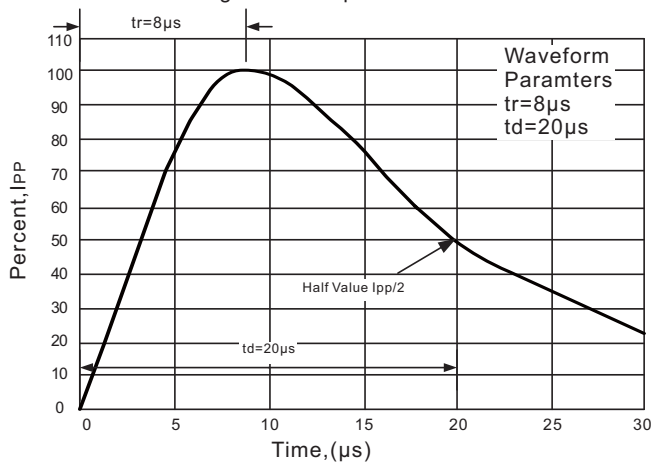
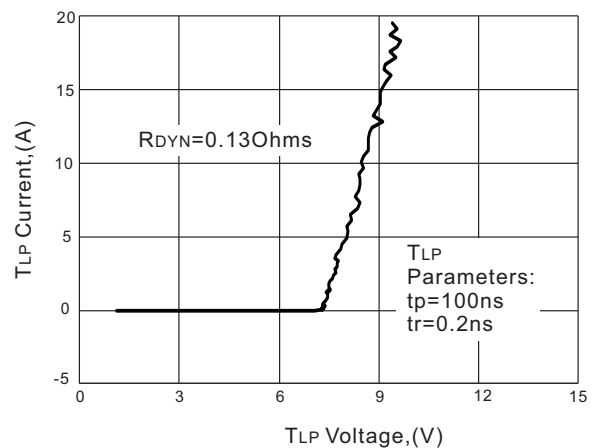


Figure 6: TLP I-V Curve



Rating and characteristic curves (N122AT23)

Figure 1: Peak Pulse Power vs. Pulse Time

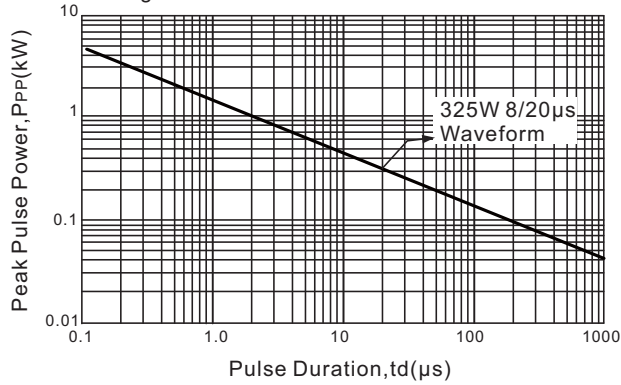


Figure 2: Power Derating Curve

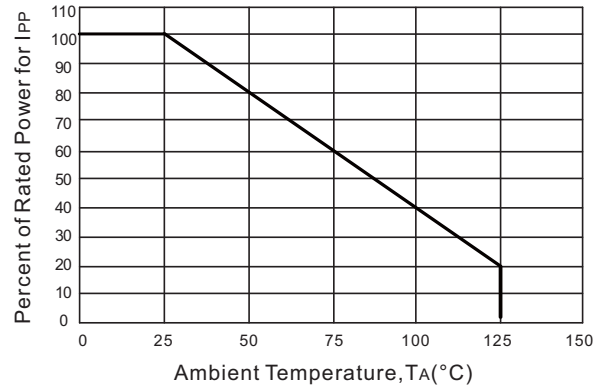


Figure 3: Clamping Voltage vs. Peak Pulse Current

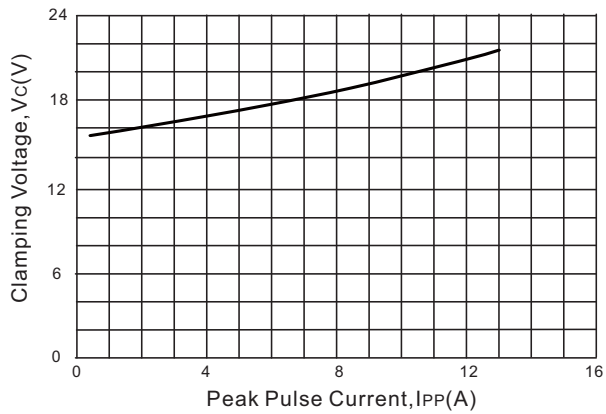


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

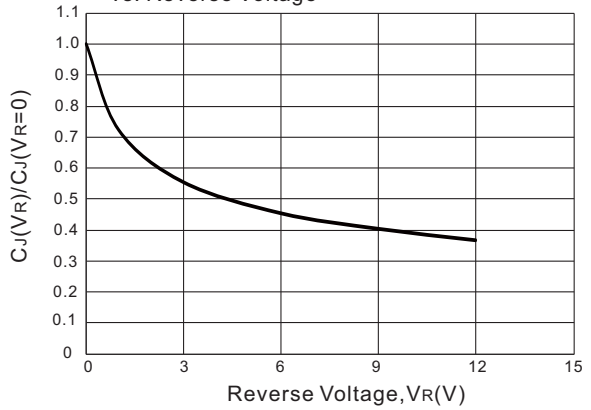


Figure 5: 8/20μs Pulse Waveform

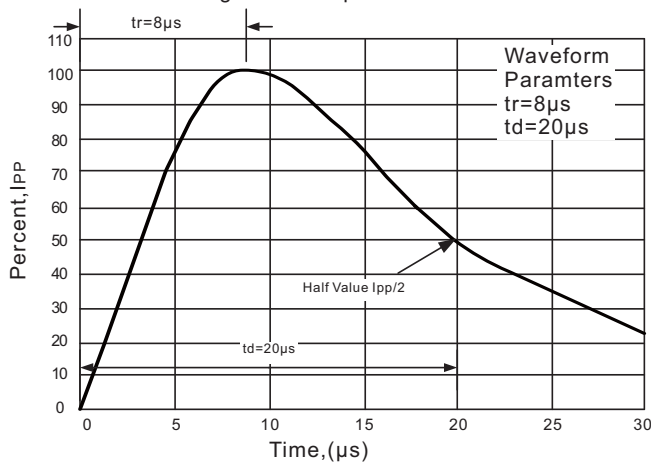
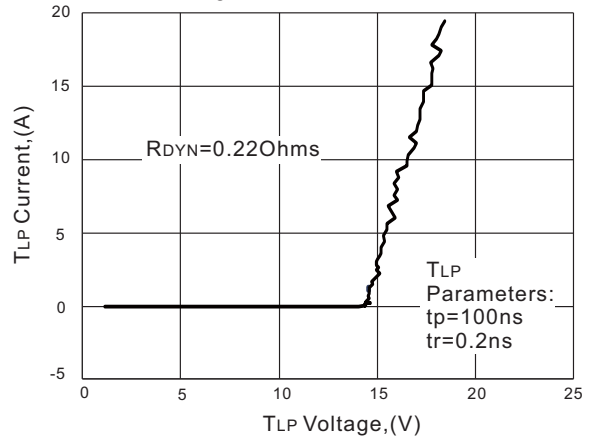


Figure 6: TLP I-V Curve



Rating and characteristic curves (N152AT23)

Figure 1: Peak Pulse Power vs. Pulse Time

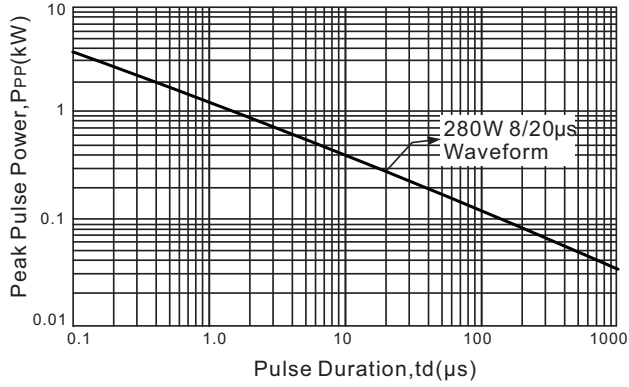


Figure 2: Power Derating Curve

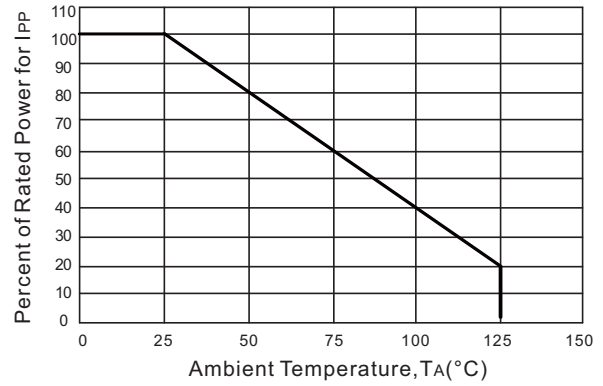


Figure 3: Clamping Voltage vs. Peak Pulse Current

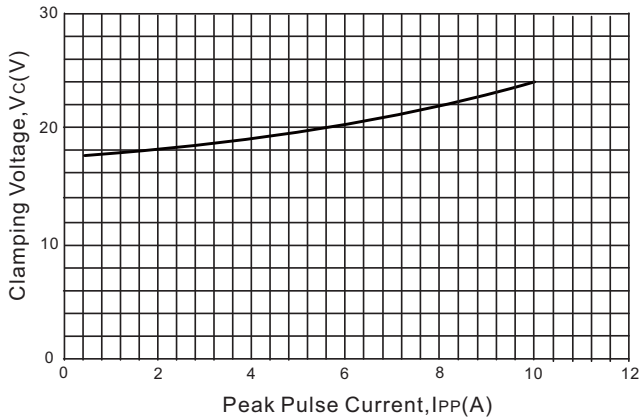


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

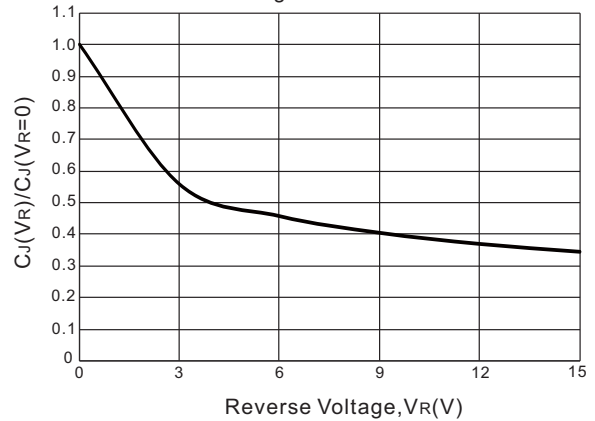


Figure 5: 8/20μs Pulse Waveform

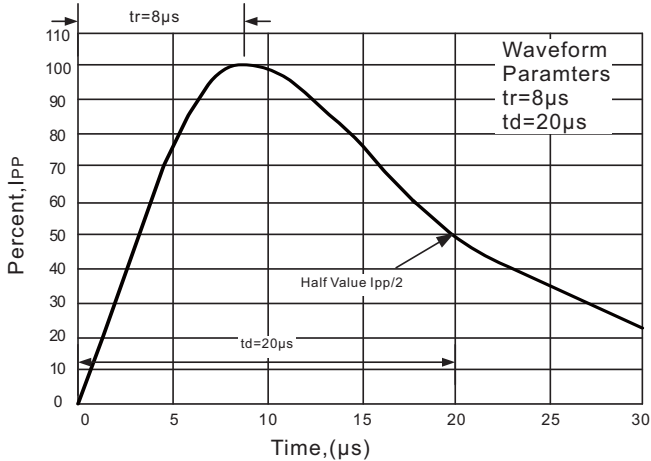
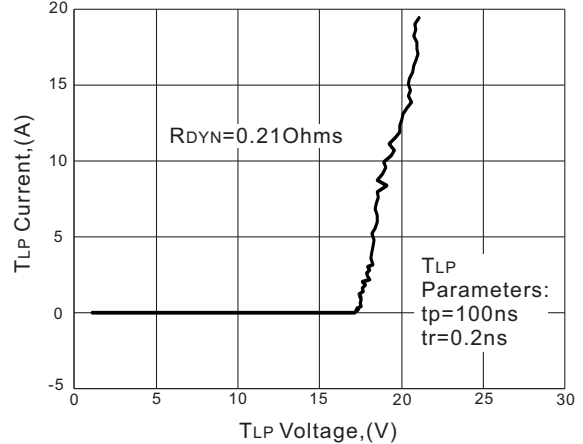


Figure 6: TLP I-V Curve



Rating and characteristic curves (N242AT23)

Figure 1: Peak Pulse Power vs. Pulse Time

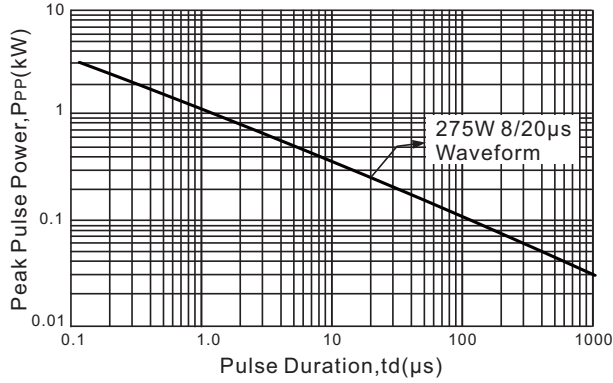


Figure 2: Power Derating Curve

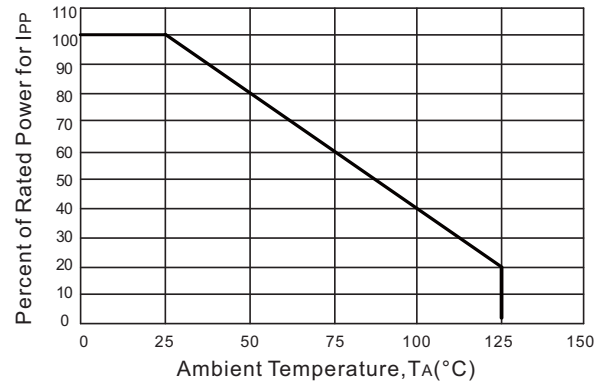


Figure 3: Clamping Voltage vs. Peak Pulse Current

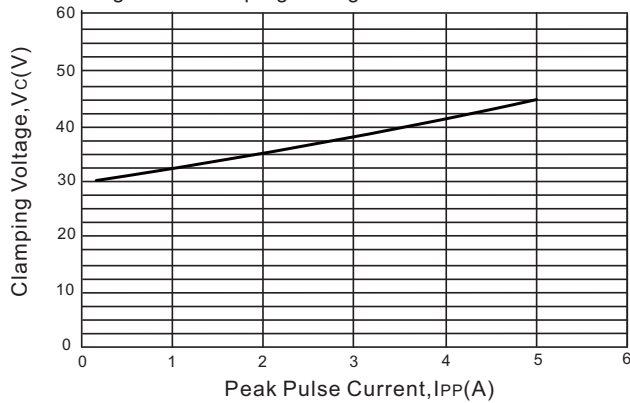


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage(PIN1-PIN3)

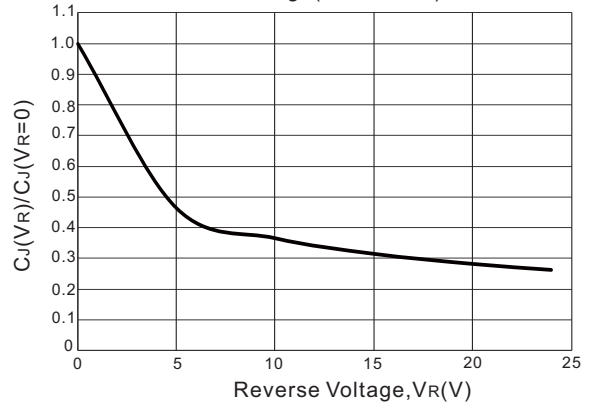


Figure 5: 8/20μs Pulse Waveform

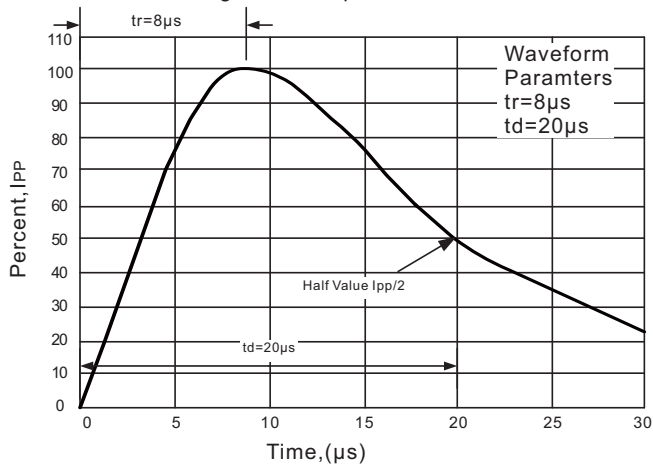
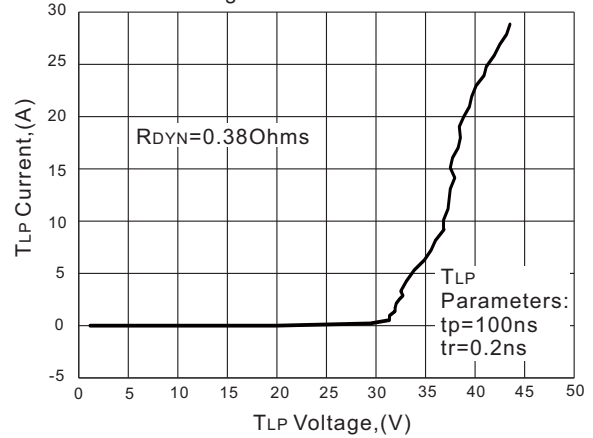
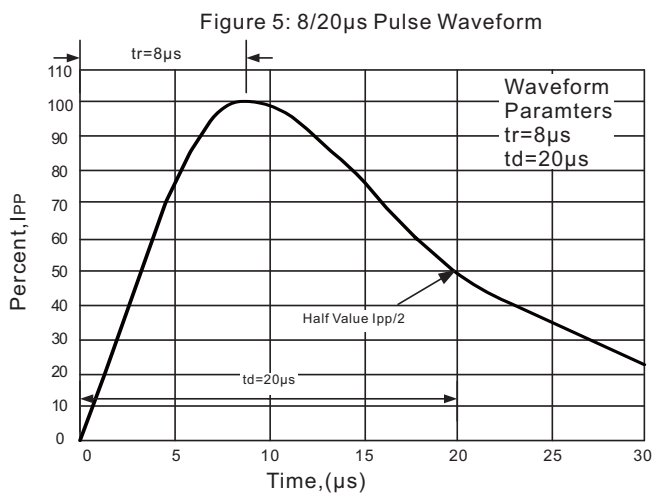
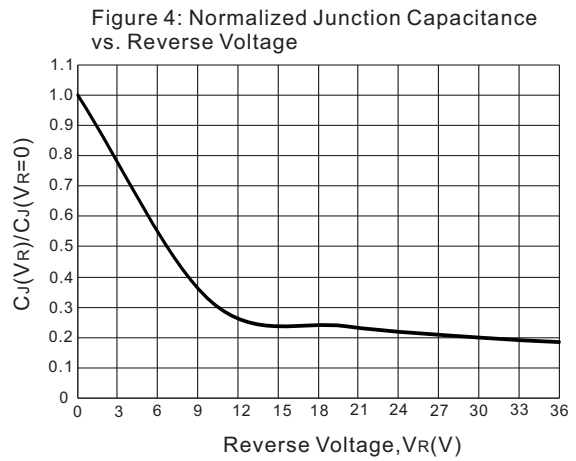
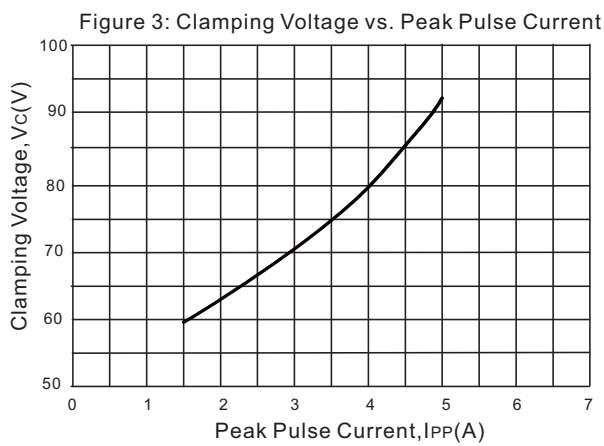
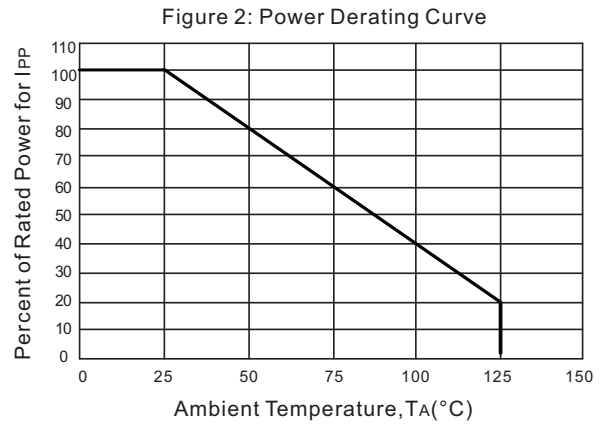
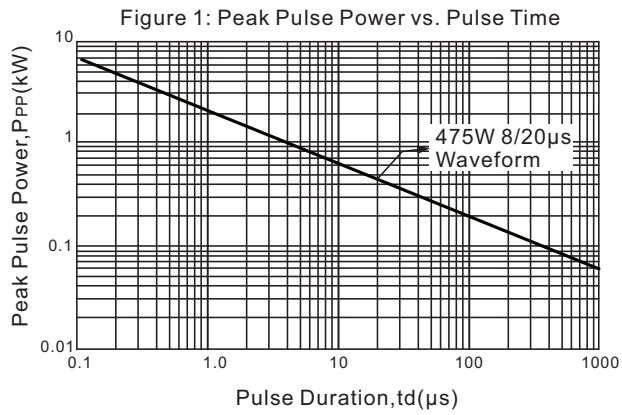


Figure 6: TLP I-V Curve



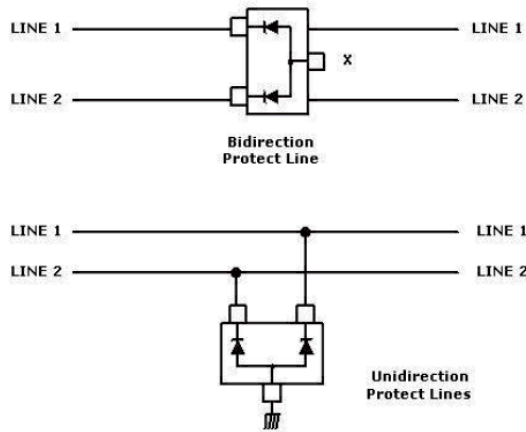
Rating and characteristic curves (N362AT23)



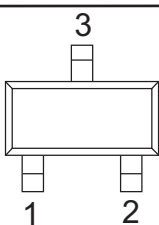
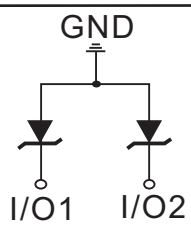
N032AT23 THRU N362AT23

Applications

- RS-232, RS-422 & RS-485
- Cellular Handsets and Accessories
- Control & Monitoring Systems
- Portable Electronics
- Set-Top Box
- Servers, Notebook, and Desktop PC
- Wireless Bus Protection



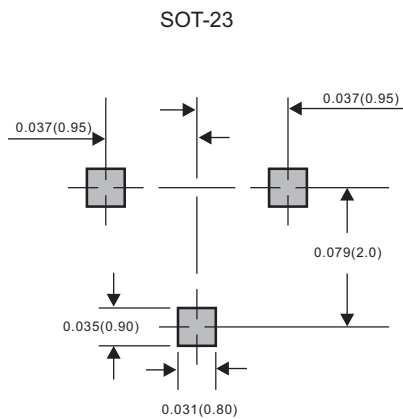
Pinning information

Pin	Simplified outline	Symbol
Pin 1 I/O1 Pin 2 I/O2 Pin 3 GND		

Marking

Type number	Marking code
N032AT23	3M2
N052AT23	5M2
N122AT23	AM2
N152AT23	BM2
N242AT23	CM2
N362AT23	DM2

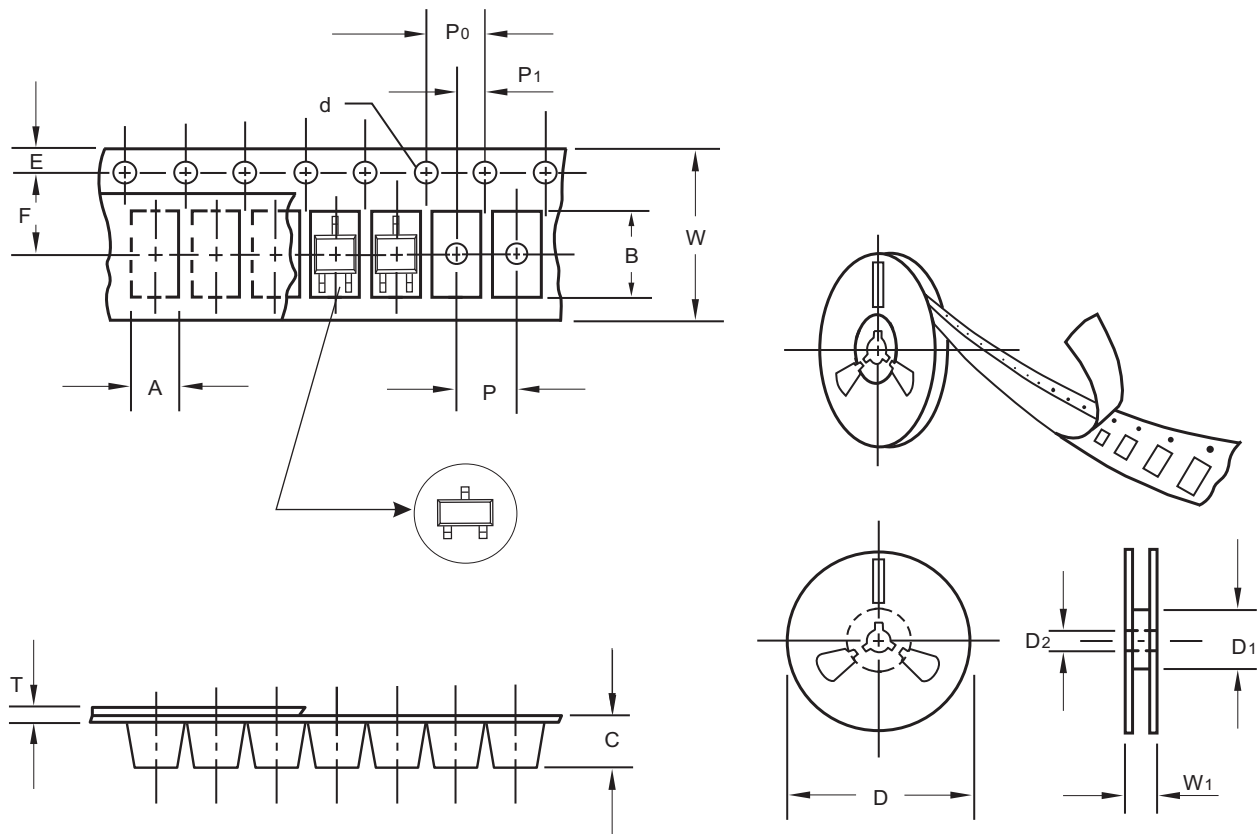
Suggested solder pad layout



Dimensions in inches and (millimeters)

N032AT23 THRU N362AT23

Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
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	55.00
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	12.0

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

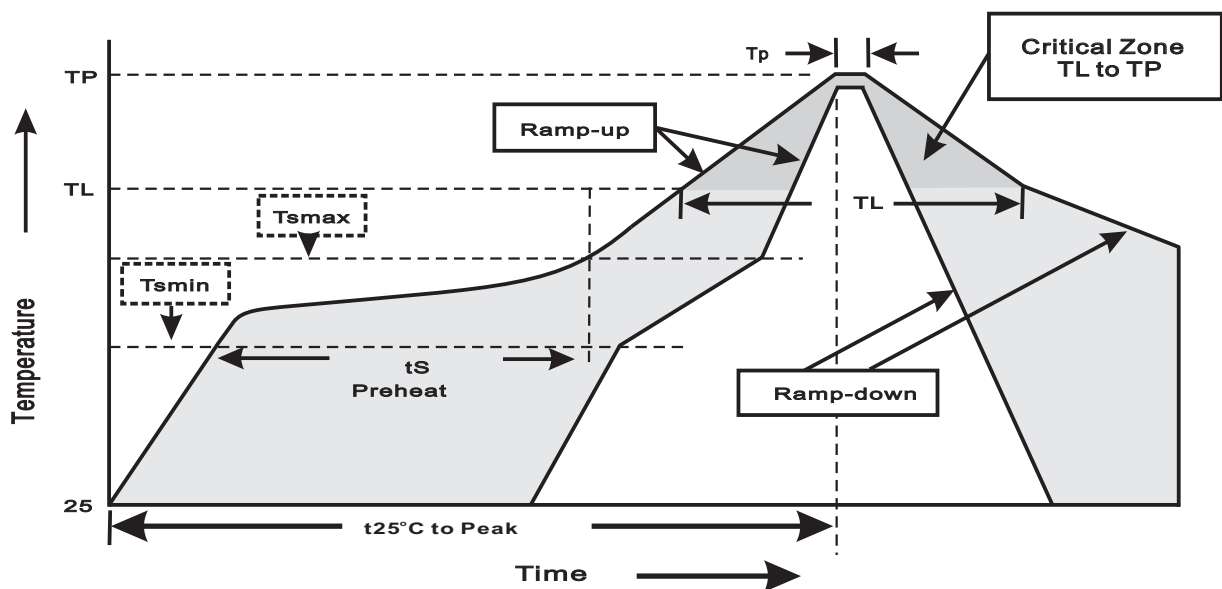
N032AT23 THRU N362AT23

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)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

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 _{Smin}) -Temperature Max(T _{Smax}) -Time(min to max)(t _S)	150°C 200°C 60~120sec
T _{Smax} 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

N032AT23 THRU N362AT23

High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at 260±5°C for 10±2sec.	MIL-STD-750D METHOD-2031
2. Solderability	at 245±5°C for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_{BR} = V_{BR} \text{ Min} * 80\%$ at $T_J = 125^\circ\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	15P _{SIG} at $T_A = 121^\circ\text{C}$ for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to +125°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 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031