

1.Description

SET23AXXL02 series of transient voltage suppressor (TVS) are designed to protect components which are connected to data and transmission lines from voltage surges caused by electrostatic discharge (ESD), electrical fast transients (EFT) and lightning.

3.Features

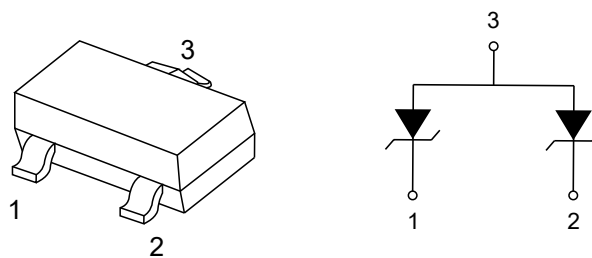
- IEC61000-4-2 ESD 15KV Air, 8KV contact compliance
- Protects one bidirectional line or two unidirectional lines
- Working voltage: 3.3V, 5V, 12V, 15V, 24V and 36V

2.Applications

- Cellular handsets and accessories
- Personal digital assistants (PDA's)
- Portable instrumentation
- Set Top Box (STB)
- Servers, notebook, and desktop PC
- Wireless bus protection
- RS-232, RS-422, RS-423 protection

- Low leakage current
- Low operating and clamping voltages
- Solder reflow temperature: Pure Tin-Sn, 260~270°C

4.Pinning information



SOT-23



5. Absolute Maximum Ratings $T_J = 25^\circ\text{C}$

Parameter	Symbol	Value	Units
ESD voltage (Contact discharge)	V_{ESD}	± 8	kV
ESD voltage (Air discharge)		± 15	kV
Storage & junction temperature range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$



6.1 Electrical Characteristic (SET23A03L02)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				3.3	V
Reverse Breakdown Voltage	V_{BR}	$I_{BR}=1\text{mA}$	4			V
Reverse Leakage Current	I_R	$V_R=3.3\text{V}$, Each I/O pin			5	μA
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=1\text{A}$			7.5	V
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=10\text{A}$			15	V
Off state junction capacitance	C_J	0Vdc, f=1MHz Between I/O pins and GND		200		pF

6.2 Electrical Characteristic (SET23A05L02)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				5	V
Reverse Breakdown Voltage	V_{BR}	$I_{BR}=1\text{mA}$	6			V
Reverse Leakage Current	I_R	$V_R=5\text{V}$, Each I/O pin			5	μA
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=1\text{A}$			9.8	V
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=15\text{A}$			20	V
Off state junction capacitance	C_J	0Vdc, f=1MHz Between I/O pins and GND		220		pF



6.3 Electrical Characteristic (SET23A12L02)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	$I_{BR}=1\text{mA}$	13.3			V
Reverse Leakage Current	I_R	$V_R=12\text{V}$, Each I/O pin			1	μA
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=1\text{A}$			19	V
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=10\text{A}$			25.9	V
Off state junction capacitance	C_J	0Vdc, f=1MHz Between I/O pins and GND		100		pF

6.4 Electrical Characteristic (SET23A15L02)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				15	V
Reverse Breakdown Voltage	V_{BR}	$I_{BR}=1\text{mA}$	16.7			V
Reverse Leakage Current	I_R	$V_R=15\text{V}$, Each I/O pin			1	μA
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=1\text{A}$			24	V
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=10\text{A}$			30	V
Off state junction capacitance	C_J	0Vdc, f=1MHz Between I/O pins and GND		90		pF



6.5 Electrical Characteristic (SET23A24L02)

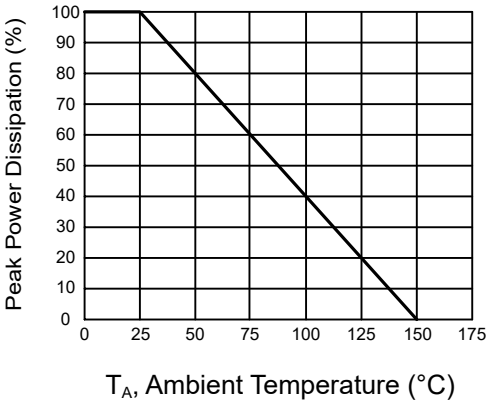
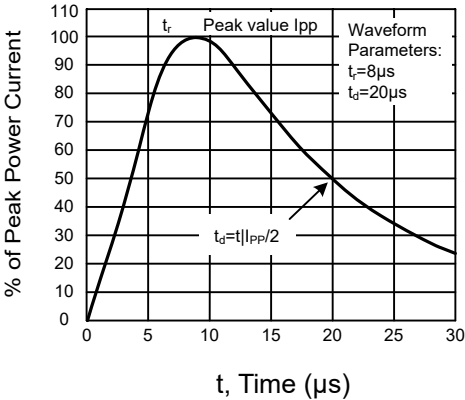
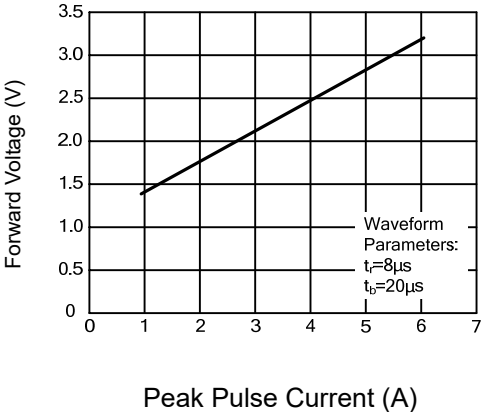
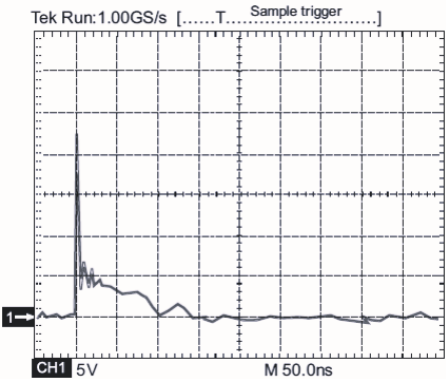
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				24	V
Reverse Breakdown Voltage	V_{BR}	$I_{BR}=1\text{mA}$	26.7			V
Reverse Leakage Current	I_R	$V_R=24\text{V}$, Each I/O pin			1	μA
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=1\text{A}$			43	V
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=5\text{A}$			49	V
Off state junction capacitance	C_J	0Vdc, $f=1\text{MHz}$ Between I/O pins and GND		80		pF

6.6 Electrical Characteristic (SET23A36L02)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				36	V
Reverse Breakdown Voltage	V_{BR}	$I_{BR}=1\text{mA}$	40			V
Reverse Leakage Current	I_R	$V_R=36\text{V}$, Each I/O pin			1	μA
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=1\text{A}$			51	V
Clamping voltage ($t_p=8/20\mu\text{s}$)	V_C	$I_{PP}=5\text{A}$			76.8	V
Off state junction capacitance	C_J	0Vdc, $f=1\text{MHz}$ Between I/O pins and GND		70		pF



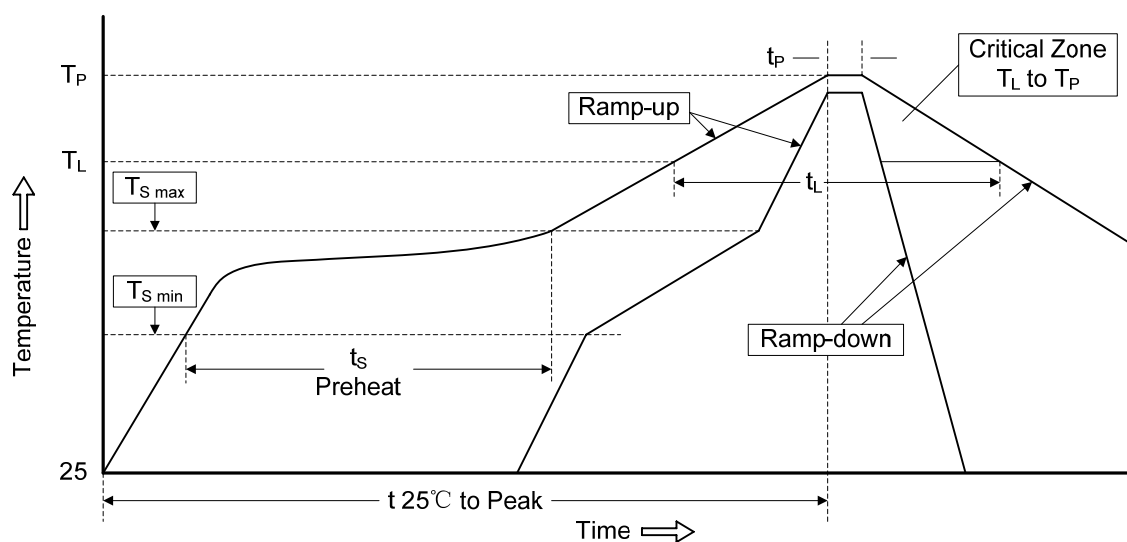
7. Typical characteristic

 Peak Power Dissipation (%) T_A, Ambient Temperature ($^{\circ}\text{C}$)	 t_r Peak value I_{pp} Waveform Parameters: $t_r=8\mu\text{s}$ $t_d=20\mu\text{s}$ $t_d=t I_{pp}/2$ % of Peak Power Current t, Time (μs)
Figure 1: Power Derating Curve	Figure 2: Pulse Waveforms
 Forward Voltage (V) Peak Pulse Current (A) Waveform Parameters: $t_r=8\mu\text{s}$ $t_d=20\mu\text{s}$	 Tek Run: 1.00GS/s [.....T.....] Sample trigger CH1 5V M 50.0ns
Figure 3: Forward Voltage vs. Forward Current	Figure 4: ESD Clamping(8kV Contact IEC61000-4-2)



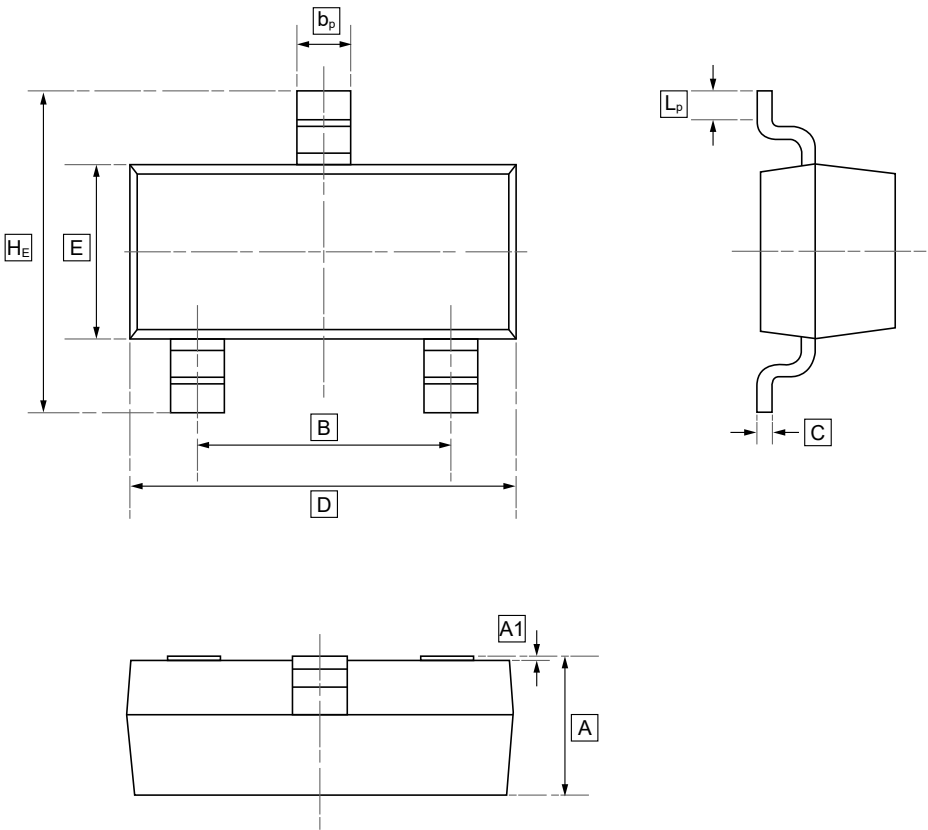
8.Recommended Soldering Conditions

Reflow Condition		Pb-Free Assembly
Pre Heat	-Temperature Min ($T_{s(min)}$)	150°C
	-Temperature Max ($T_{s(max)}$)	200°C
	-Time (Min to Max) (t_s)	60-180 secs.
Average ramp-up rate (T_L to T_P)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Time maintained above:	-Temperature(T_L)	217°C
	-Time(T_L)	60-150 secs.
Peak Temp (T_P)		260°C
Time within 5°C of actual Peak Temp (T_P)		20-40 seconds
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temperature		8 min. Max





9.SOT-23 Package Outline Dimensions

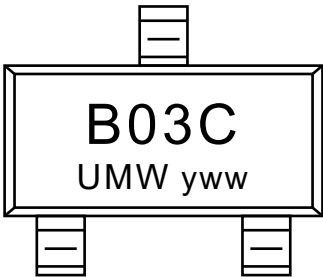


DIMENSIONS (mm are the original dimensions)

Symbol	A	B	b _p	C	D	E	H _E	A1	L _p
Min	0.95	1.78	0.35	0.08	2.70	1.20	2.20	0.013	0.20
Max	1.40	2.04	0.50	0.19	3.10	1.65	3.00	0.100	0.50



10.Ordering information



yww: Batch Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW SET23A03L02	B03C	SOT-23	3000	Tape and reel
UMW SET23A05L02	B05C	SOT-23	3000	Tape and reel
UMW SET23A12L02	B12C	SOT-23	3000	Tape and reel
UMW SET23A15L02	B15C	SOT-23	3000	Tape and reel
UMW SET23A24L02	B24C	SOT-23	3000	Tape and reel
UMW SET23A36L02	B36C	SOT-23	3000	Tape and reel



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