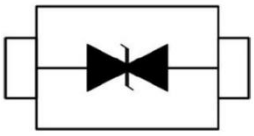
## Description

The GBLCXXCH is a bi-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The GBLCXXCH has a low capacitance with a typical value at , and complies with the IEC 61000-4-2 (ESD) standard with ±30kV air and ±30kV contact discharge. It is assembled into a leadfree SOD-323 package. The small size, low capacitance and high ESD surge protection make GBLCXXCH an ideal choice to protect cell phone, wireless systems, and communication equipment. .

## Features

- 350W peak pulse power (8/20us)
- Protects one data or power line
- Ultra low leakage: nA level
- Stand−off Voltage: 3.3 V ~ 36 V
- Ultra low clamping voltage
- Complies with following standards:
  - – IEC 61000-4-2 (ESD) immunity test
    - Air discharge: ±30kV
    - Contact discharge: ±30kV
  - – IEC61000-4-4 (EFT) 40A (5/50ns)
- RoHS Compliant

## Dimensions & Symbol



## Mechanical Characteristics

- Package: SOD-323
- Case Material: “Green” Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

## Applications

- Cell Phone Handsets and Accessories
- Microprocessor based equipment
- Personal Digital Assistants (PDA’s)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Networking and Telecom
- Serial and Parallel Ports.
- Peripherals

## Marking Information

Details marking code reference customer approval list

## Ordering Information

| Part Number | Packaging | Reel Size |
|---|---|---|
| GBLCXXCH | 3000/Tape & Reel | 7 inch |

## Absolute Maximum Ratings ($T_A$=25ºC, RH=45%-75%, unless otherwise noted)

| GBLC03CH | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 20 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |
| **GBLC05CH** | | | |
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 17 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |
| **GBLC12CH** | | | |
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 11 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| GBLC15CH | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 10 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |
| GBLC18CH | | | |
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 8 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |
| GBLC24CH | | | |
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 7 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

| GBLC36CH | | | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Value** | **Unit** |
| Peak Pulse Power (8/20μs) | Ppk | 350 | W |
| Peak Pulse Current (8/20μs) | Ipp | 5 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | VESD | ±30<br>±30 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

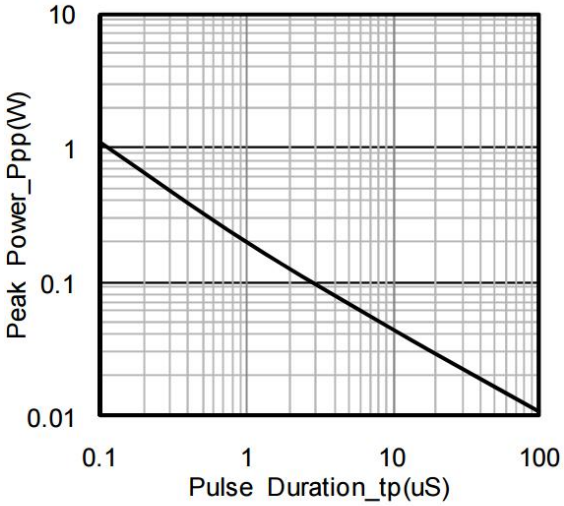
## Electrical Characteristics ($T_A$=25℃)

| GBLC03CH | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 3.3 | V | |
| Breakdown Voltage | $V_{BR}$ | 4.0 | | | V | IT = 1mA |
| Reverse Leakage Current | $I_R$ | | | 40 | uA | VRWM = 3.3V |
| Clamping Voltage | $V_C$ | | 7 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | $V_C$ | | | 19 | V | IPP = 20A (8 x 20uS pulse) |
| Junction Capacitance | $C_J$ | | 450 | | pF | VR = 0V, f = 1MHz |
| **GBLC05CH** | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 5 | V | |
| Breakdown Voltage | $V_{BR}$ | 6.2 | | | V | IT = 1mA |
| Reverse Leakage Current | $I_R$ | | | 10 | uA | VRWM = 5V |
| Clamping Voltage | $V_C$ | | 9.8 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | $V_C$ | | | 21 | V | IPP = 17A (8 x 20uS pulse) |
| Junction Capacitance | $C_J$ | | 200 | | pF | VR = 0V, f = 1MHz |

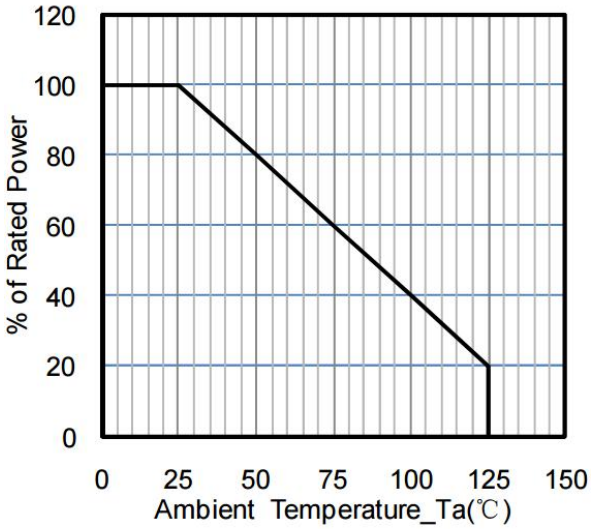
| GBLC12CH | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 12 | V | |
| Breakdown Voltage | $V_{BR}$ | 13.3 | | | V | IT = 1mA |
| Reverse Leakage Current | $I_R$ | | | 1 | uA | VRWM = 12V |
| Clamping Voltage | $V_C$ | | 19 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | $V_C$ | | | 32 | V | IPP =11A (8 x 20uS pulse) |
| Junction Capacitance | $C_J$ | | 75 | | pF | VR = 0V, f = 1MHz |
| GBLC15CH | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 15 | V | |
| Breakdown Voltage | $V_{BR}$ | 16.7 | | | V | IT = 1mA |
| Reverse Leakage Current | $I_R$ | | | 1 | uA | VRWM =15V |
| Clamping Voltage | $V_C$ | | 24 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | $V_C$ | | | 38 | V | IPP = 10A (8 x 20uS pulse) |
| Junction Capacitance | $C_J$ | | 68 | | pF | VR = 0V, f = 1MHz |
| GBLC18CH | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 18 | V | |
| Breakdown Voltage | $V_{BR}$ | 19.2 | | | V | IT = 1mA |
| Reverse Leakage Current | $I_R$ | | | 1 | uA | VRWM =18V |
| Clamping Voltage | $V_C$ | | 32 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | $V_C$ | | 45 | | V | IPP = 8A (8 x 20uS pulse) |
| Junction Capacitance | $C_J$ | | 60 | | pF | VR = 0V, f = 1MHz |

| GBLC24CH | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbo** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 24 | V | |
| Breakdown Voltage | $V_{BR}$ | 26.7 | | | V | IT = 1mA |
| Reverse Leakage Current | $I_R$ | | | 1 | uA | VRWM = 24V |
| Clamping Voltage | $V_C$ | | 43 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | $V_C$ | | 52 | | V | IPP =7A (8 x 20uS pulse) |
| Junction Capacitance | $C_J$ | | 57 | | pF | VR = 0V, f = 1MHz |
| GBLC36CH | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 36 | V | |
| Breakdown Voltage | $V_{BR}$ | 40 | | | V | IT = 1mA |
| Reverse Leakage Current | $I_R$ | | | 1 | uA | VRWM =36V |
| Clamping Voltage | $V_C$ | | 63 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | $V_C$ | | | 80 | V | IPP = 5A (8 x 20uS pulse) |
| Junction Capacitance | $C_J$ | | 35 | | pF | VR = 0V, f = 1MHz |

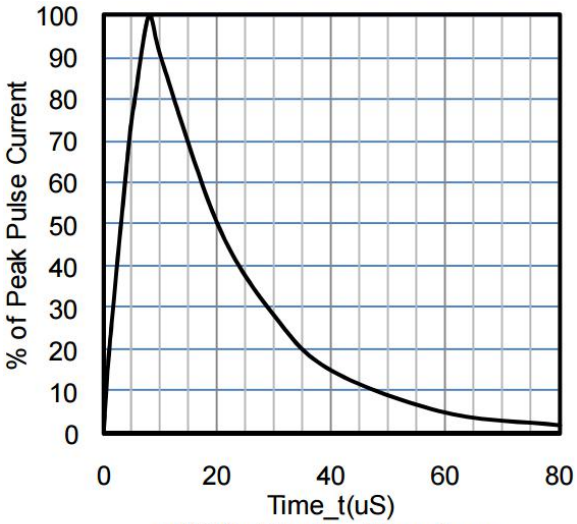
## Typical Performance Characteristics ($T_A$=25°C unless otherwise Specified)




**Peak Pulse Power vs. Pulse Time**



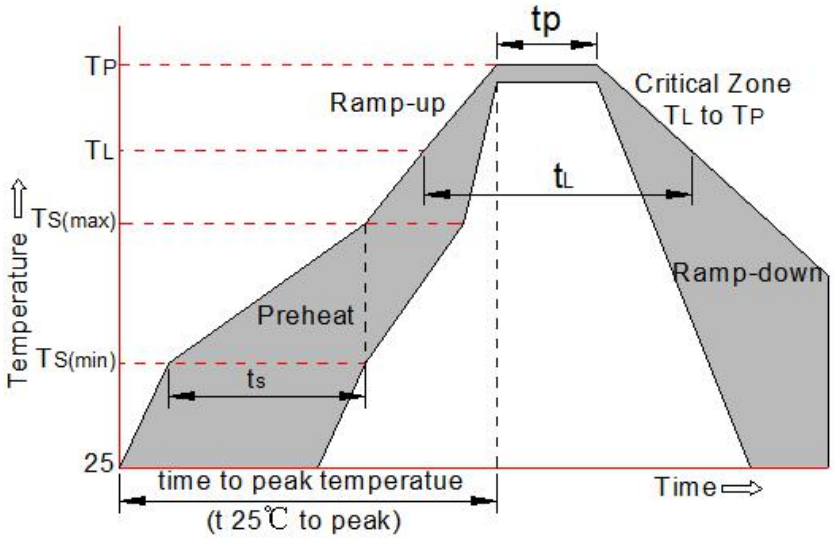

**Power Derating Curve**



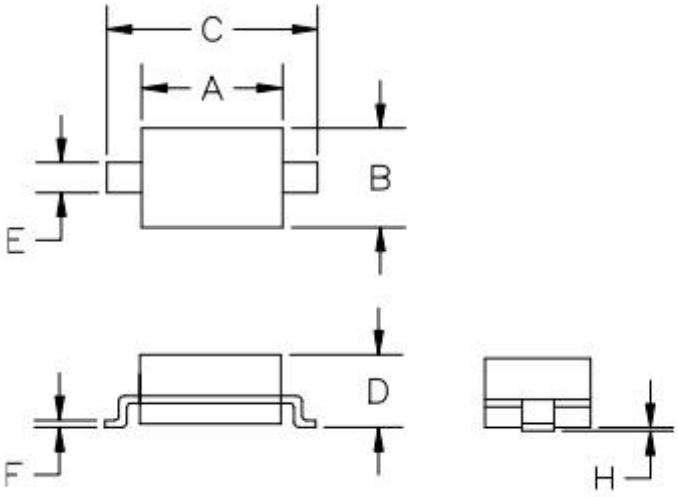

**8 X 20uS Pulse Waveform**

## Soldering Parameters

| Reflow Condition | | Pb-Free assembly (see as bellow) |
|---|---|---|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150℃ |
| | -Temperature Max($T_{s(max)}$) | +200℃ |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp ($T_L$) to peak) | | 3℃/sec. Max |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate | | 3℃/sec. Max |
| Reflow | -Temperature($T_L$) (Liquid us) | +217℃ |
| | -Temperature($t_L$) | 60-150 secs. |
| Peak Temp ($T_p$) | | +260(+0/-5)℃ |
| Time within 5℃ of actual Peak Temp ($t_p$) | | 30 secs. Max |
| Ramp-down Rate | | 6℃/sec. Max |
| Time 25℃ to Peak Temp ($T_P$) | | 8 min. Max |
| Do not exceed | | +260℃ |

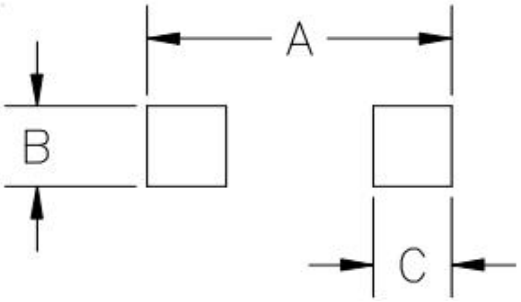


## Package Mechanical Data




| SYM | DIMENSIONS | | | |
|---|---|---|---|---|
| | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 1.50 | 1.80 | 0.060 | 0.071 |
| B | 1.20 | 1.40 | 0.045 | 0.054 |
| C | 2.30 | 2.70 | 0.090 | 0.107 |
| D | - | 1.10 | - | 0.043 |
| E | 0.30 | 0.40 | 0.012 | 0.016 |
| F | 0.10 | 0.25 | 0.004 | 0.010 |
| H | - | 0.10 | - | 0.004 |

## Suggested Land Pattern




| SYM | DIMENSIONS | |
|---|---|---|
| | MILLIMETERS | INCHES |
| A | 3.15 | 0.120 |
| B | 0.80 | 0.031 |
| C | 0.80 | 0.031 |