



CeraDiode

SMD type, array, case size 1012

Series/Type: CDA6C05GTH
Ordering code: B72735D0050H062

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Version: 1

**Reliable ESD protection of multiple high-speed signal lines.
For 1:1 drop-in replacement of SOT23-6L diode packages
without change of PCB layout.**



Description

Due to the ongoing miniaturization, today's electronic devices are more and more sensitive to electrostatic discharges (ESD). Therefore reliable protection components become absolutely necessary to safeguard your valuable electronics against the impact of ESD.

CeraDiodes are ceramic semiconductors optimized specifically for high performance in ESD applications. They have a non-linear voltage/current characteristic for effectively suppressing extremely fast voltage transients and offer superior parametric stability over the complete operating range of $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$.

CeraDiodes are bi-directional devices. A single CeraDiode connected from signal/data line to ground routes both positive and negative ESD transitions safely to the ground plane. This technique eliminates the need to route ESD charge into the power plane, possibly damaging nearby integrated circuits. The CDA6C05GTH exhibits a very low capacitance, making it the ideal solution for direct connection to high-speed signal lines. The result is maximum protection with minimal signal distortion.

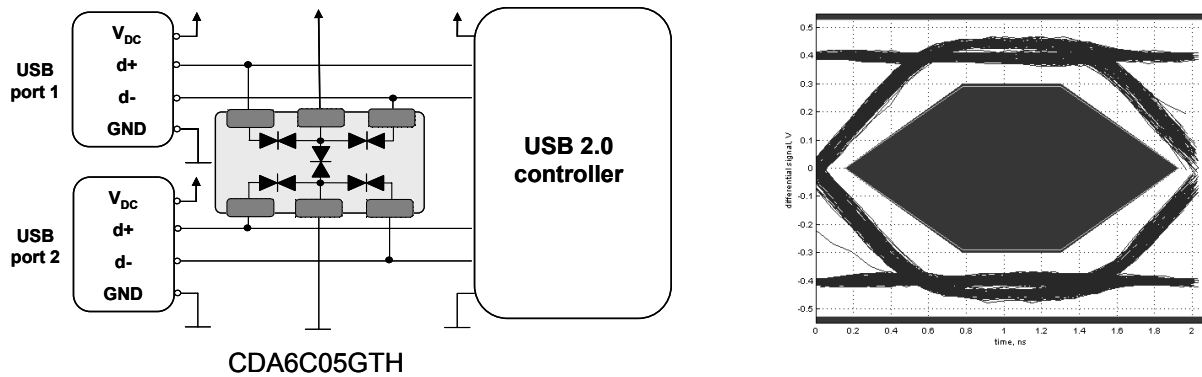
Features

- Bi-directional ESD protection to IEC 61000-4-2 (level 4)
- Suitable for uni- and bi-directional lines
- Bi-directional ESD protection of four data lines and one supply line in a 3-fold array
- Routes all ESD events, both positive and negative, safely to ground
- Suitable for DC working voltages up to 5.6 V
- Low capacitance: 10 pF maximum
- USB 2.0 compliant
- No derating of maximum ratings up to $85\text{ }^{\circ}\text{C}$
- Surface mount package in SOT23-6L case size (inch case size 1012)
- Extremely fast response time $< 0.5\text{ ns}$
- Lead-free nickel barrier terminations suitable for lead-free soldering
- RoHS-compatible

Applications

- Desktop and notebook computers
- Peripherals
- Portable handheld products (e.g. PDA)
- Mobile communication
- Consumer products (set top boxes, MP3 players, digital cameras, etc.)
- Liquid crystal displays (LCD) / monitors

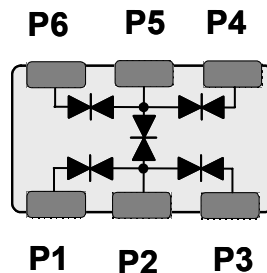
Application example



Note: USB 2.0 line protection with high-speed array CDA6C05GTA and compliance test result.

Pin configuration

Pin	Description
P1	I/O Line 1
P2	GND
P3	I/O Line 2
P4	I/O Line 3
P5	V _{DC}
P6	I/O Line 4



Due to the symmetrical configuration no marking information is needed. P2 and P5 can be interchanged. The part is also working without any V_{DC} supply.

Maximum ratings (T_A = 85 °C)

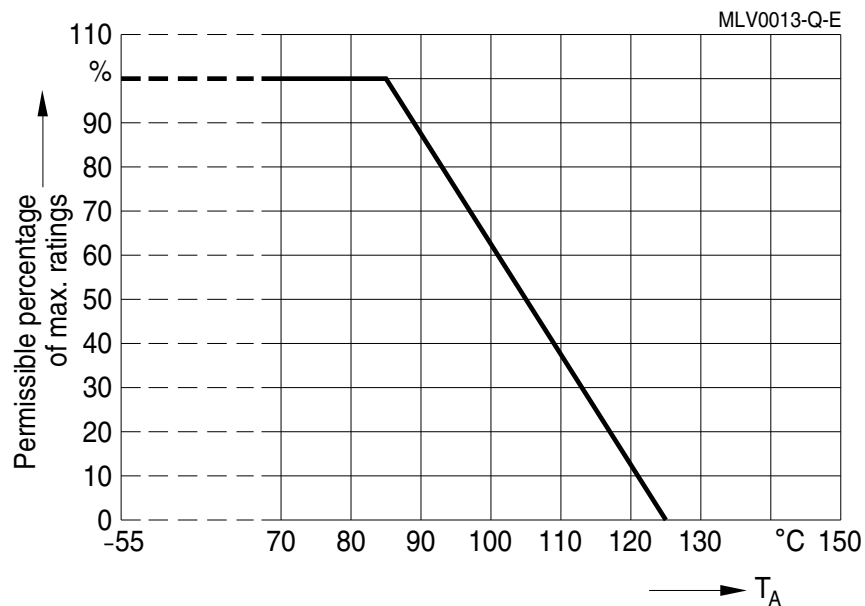
Rating		Value	Unit
Maximum DC working voltage	V _{DC}	5.6	V
Maximum RMS working voltage	V _{RMS}	4	V
Peak current @ 8/20 μs (V _{DC} to GND)	I _{PP}	20	A
Air discharge ESD capability (to IEC 61000-4-2 method)	V _{ESD}	15	kV
Contact discharge ESD capability (to IEC 61000-4-2 method)	V _{ESD}	8	kV
Operating temperature (without derating)	T _{op}	-40 to +85	°C
Storage temperature	T _{stg}	-40 to +125	°C

Characteristics ($T_A = 25\text{ °C}$)

Parameter	Symb.	Conditions	Minimum	Typical	Maximum	Unit
Breakdown voltage	V_{BR}	$I_{BR} = 1\text{ mA}$ (any I/O Pin to GND)	52	-	-	V
	V_{BR}	$I_{BR} = 1\text{ mA}$ (V_{DC} to GND)	14	-	-	V
Leakage current	I_{leak}	$V_{leak} = 5.6\text{ V}$	-	-	1	μA
Clamping voltage	V_{clamp}	$I_{PP} = 1\text{ A}$, 8/20 μs (any I/O Pin to GND)	-	-	195	V
	V_{clamp}	$I_{PP} = 1\text{ A}$, 8/20 μs (V_{DC} to GND)	-	-	40	V
Capacitance	C	$V = 1\text{ V}$, $f = 1\text{ MHz}$ (any I/O Pin to GND)	-	7	10	pF
	C	$V = 1\text{ V}$, $f = 1\text{ MHz}$ (V_{DC} to GND)	-	3.5	5	pF

Note: Any operating voltage lower than 5.6 V results in lower leakage current

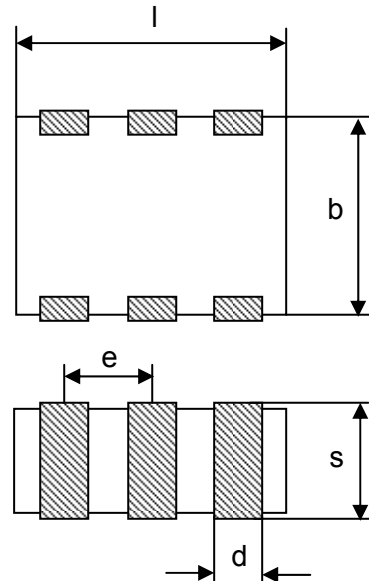
Typical characteristics



Dimensional drawing

Dimensions in mm

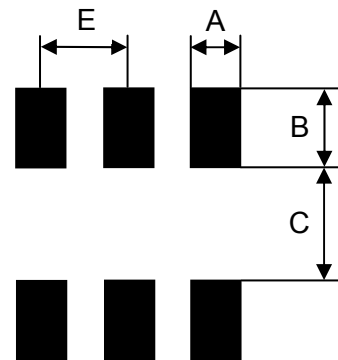
	Min.	Max.
l	2.90	3.50
b	2.25	2.75
s	-	1.2
d	0.35	0.65
e	0.8	1.1



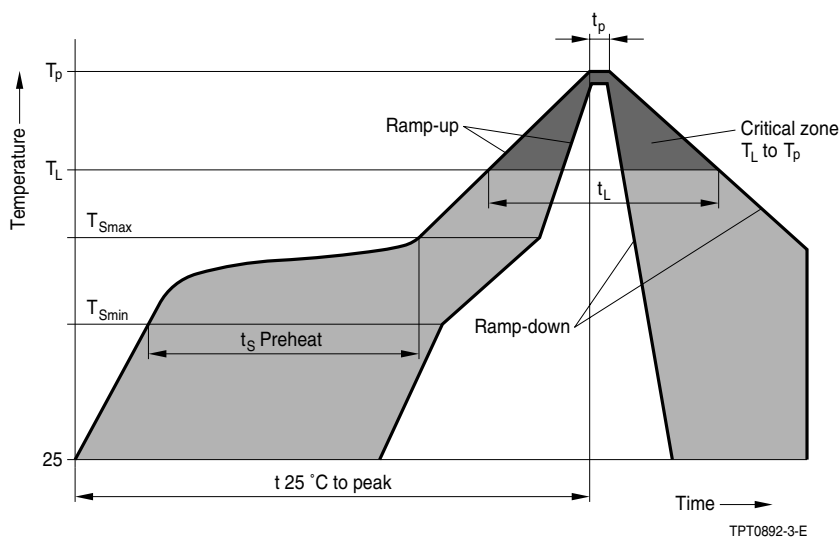
Recommended solder pad

Dimensions in mm

A	0.7
B	1.0
C	1.4
E	0.95



Recommended infrared reflow soldering temperature profile



Profile feature	Sn-Pb eutectic assembly	Pb-free assembly
Average ramp-up rate (T_{Smax} tp T_p)	3 °C/ second max.	3 °C/ second max.
Preheat		
- Temperature min (T_{Smin})	100 °C	150 °C
- Temperature max (T_{Smax})	150 °C	200 °C
- Time (t_{Smin} to t_{Smax})	60 ... 120 seconds	60 ... 180 seconds
Time maintained above		
- Temperature min (T_L)	183 °C	217 °C
- Time (t_L)	60 ... 150 seconds	60 ... 150 seconds
Peak classification temperature (T_p)	220 °C ... 240 °C	240 °C ... 260 °C
Time within 5 °C of actual peak temperature (t_p)	10 ... 30 seconds	20 ... 40 seconds
Ramp-down rate	6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note: All temperatures refer to topside of the package, measured on the package body surface

Soldering guidelines

The usage of mild, non-activated fluxes for soldering is recommended, as well as proper cleaning of the PCB.

The components are suitable for reflow soldering to JEDEC J-STD-020C.

Storage conditions

As far as possible, the components shall be employed within 12 months. They should be left in their original packing to avoid soldering problems due to oxidized contacts.

Storage temperature: -25 °C up to 45 °C

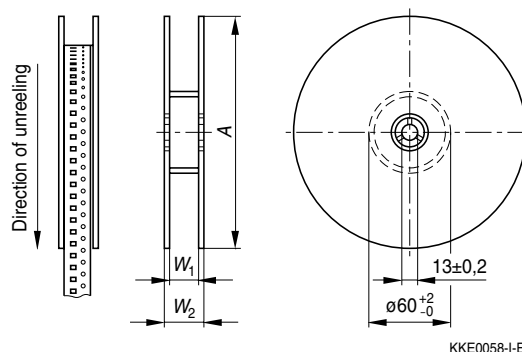
Relative humidity: < 75 % annual average, < 95 % on max. 30 days in a year.

Reel dimensions in mm

Definition		Dim.	Tolerance
Reel diameter	A	180	+0/ -3
Reel width (inside)	W_1	8.4	+1.5/ -0
Reel width (outside)	W_2	14.4	max.

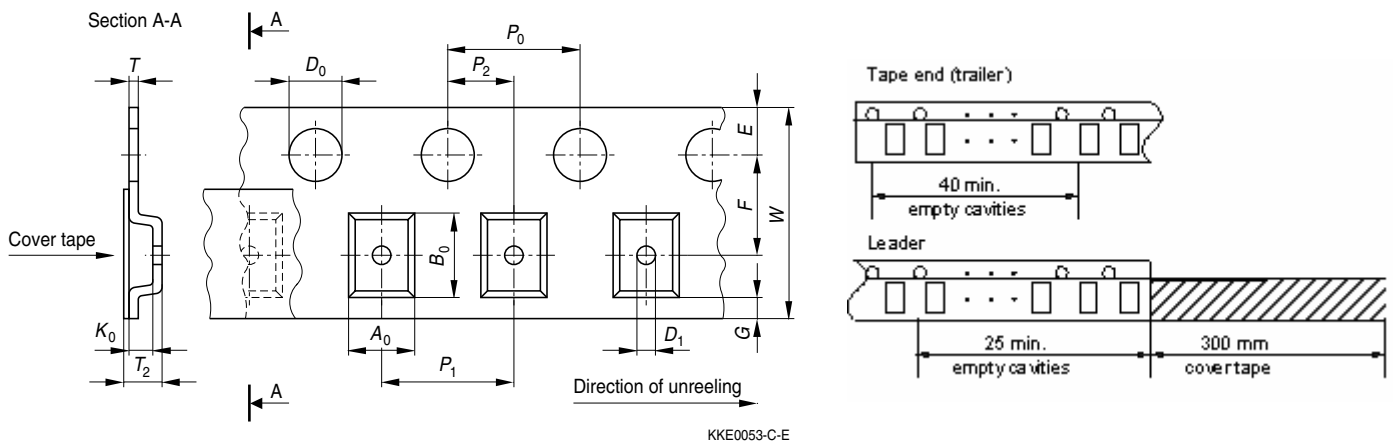
Package: 8-mm tape
Reel material: Plastic

Packing unit: 2000 pcs. / reel



Taping to IEC 60286-3

Tape material: Blister



Dimensions and tolerances in mm:

Definition		Dim.	Tolerance
Compartment width	A ₀	2.8	± 0.2
Compartment length	B ₀	3.5	± 0.2
Compartment height	K ₀	1.8	max.
Sprocket hole diameter	D ₀	1.5	+0.1/ -0
Compartment hole diameter	D ₁	1.0	min.
Sprocket hole pitch	P ₀	4.0	± 0.1 ¹⁾
Distance center hole to centre compartment	P ₂	2.0	± 0.05
Pitch of the component compartments	P ₁	4.0	± 0.1
Tape width	W	8.0	± 0.3
Distance edge to center of hole	E	1.75	± 0.1
Distance centre hole to center compartment	F	3.5	± 0.05
Distance compartment to edge	G	0.75	min.
Thickness tape	T	0.3	max.
Overall thickness	T ₂	2.5	max.

1) $\leq \pm 0.2$ mm over any 10 pitches

Note:

CeraDiodes are not suitable for switching applications or for voltage stabilization, where static power dissipation is required.

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