

General Description

BCD ITVS (Integrated Transient Voltage Suppression) devices are designed and built using BCD proprietary process technology. These devices integrate the various diodes, transistors and resistors into the BCD ITVS products. These diodes and transistors feature low parasitic resistance and the diodes also exhibit low capacitance. Using these devices, BCD is able to design voltage clamping products where low capacitance associated with low dynamic resistance is required.

The BCD AT1240 is designed to compensate for the capacitance variance introduced by the DFN-2.5×1.0-10 package allowing for capacitance matching between the 4 I/Os when, as in normal operation, pins, 1 and 10, 2 and 9, 4 and 7, 5 and 6 are shorted.

The AT1240 is available in the DFN-2.5×1.0-10 package. This package allows simple and optimal placement in existing high-speed PCB layouts.

Features

- Clamping Voltage: 9V at 10A 100ns, TLP
10.5V at 6A 8μs/20μs
- IEC 61000-4-2: ±16kV (Air)
±14kV (Contact)
- IEC 61000-4-4: TBD
- IEC 61000-4-5: ±6A
- Input Capacitance from I/O to VSS: 0.5pF
- TLP Dynamic Resistance: 0.25Ω
- Monolithic Silicon Technology

Applications

- USB 3.0
- USB 2.0
- DVI
- Ethernet Port: 10/100/1000 Mb/s
- HDMI 1.3, High Definition Multi Media
- IEEE 1394 to 3.2Gb/s
- MDDI
- PCI Express
- SATA /eSATA

Pin Configuration

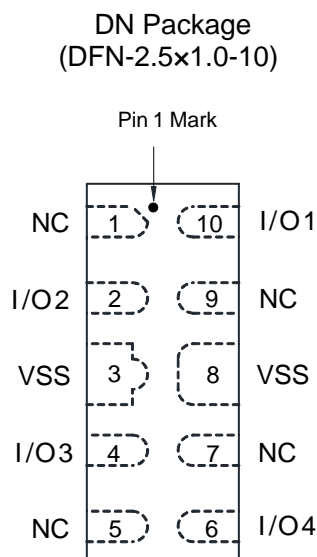


Figure 1. Pin Configuration of AT1240 (Top View)

Circuit Diagram

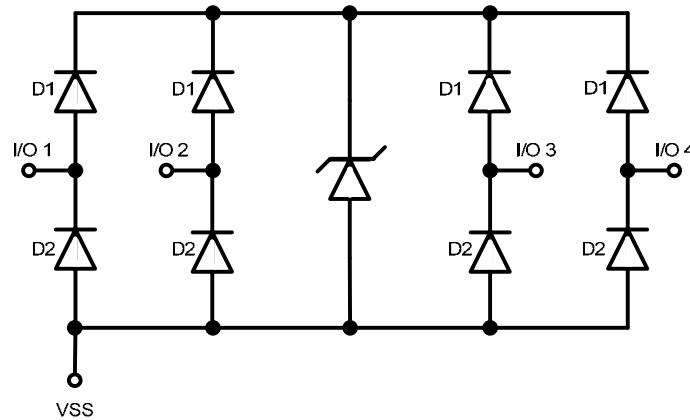
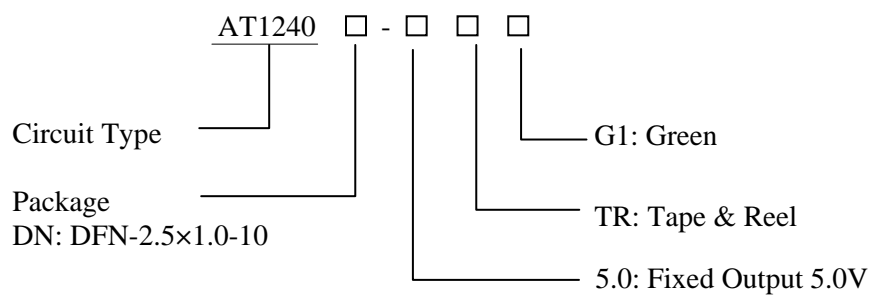


Figure 2. Circuit Diagram of AT1240

Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
DFN-2.5×1.0-10	-55 to 85°C	AT1240DN-5.0TRG1	BGC	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "G1" suffix in the part number, are RoHS compliant and green.



General Purpose ITVS, 4 I/Os, $C_{I/O-VSS} < 0.65\text{pF}$

AT1240

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Min	Typ	Max	Unit
Peak Pulse Current (tp 8μs/20μs)				6	A
Peak Pulse Power (tp 8μs/20μs)				65	W
Operating Voltage (DC)		-0.5		6	V
IEC61000-4-2 ESD (Air)		-16		16	kV
IEC61000-4-2 ESD (Contact)		-14		14	kV
IEC61000-4-5 (Lightning)				6	A
				65	W
Lead Temperature (Soldering, 10sec)	T_{LEAD}			260	°C
Operating Temperature		-55		85	°C
Storage Temperature		-55		150	°C

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Electrical Characteristics

$T_A=25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage, I/O to VSS		$I_{I/O-VSS}=1\text{mA}$			5.5	V
Forward Working Voltage, I/O to VSS		$I_F=-1\text{mA}$	-0.7			V
Channel Leakage Current	I_R	Operating Voltage			0.5	μA
Reverse Breakdown Voltage	V_{BR}	At 1mA	5.5			V
Holding Voltage	V_H		5.5			V
Clamping Voltage (Surge) (IEC61000-4-5)		At 6A		10.5		V
Trigger Voltage	V_{TRIG}				9.5	V
ESD Clamping Voltage		At 10A, TLP, 100ns		9		V
Dynamic Reverse Resistance	R_{DIFF-R}			0.25	0.3	Ω
Dynamic Forward Resistance	R_{DIFF-F}			0.15		Ω
Channel Input Capacitance (I/O to VSS)	$C_{I/O}$ (Note 2)	$V_{I/O}=2.5\text{V}$, $V_{SS}=0\text{V}$, $f=1\text{MHz}$		0.55	0.65	pF
Delta $C_{I/O}$	$C_{I/O\text{MAX}}-C_{I/O\text{MIN}}$			0.04		pF

Note 2: $C_{I/O1}=C_{PIN1}+C_{PIN10}$, $C_{I/O2}=C_{PIN2}+C_{PIN9}$, $C_{I/O3}=C_{PIN4}+C_{PIN7}$, $C_{I/O4}=C_{PIN5}+C_{PIN6}$.



Typical Performance Characteristics

$T_A = 25^\circ\text{C}$, unless otherwise specified.

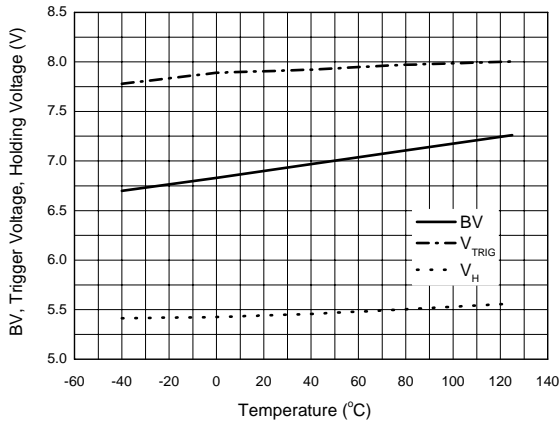


Figure 3. BV, Trigger Voltage, Holding Voltage vs. Temperature

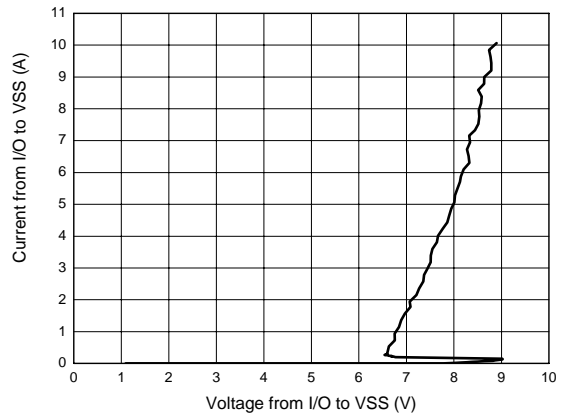


Figure 4. Current from I/O to VSS vs. Voltage from I/O to VSS

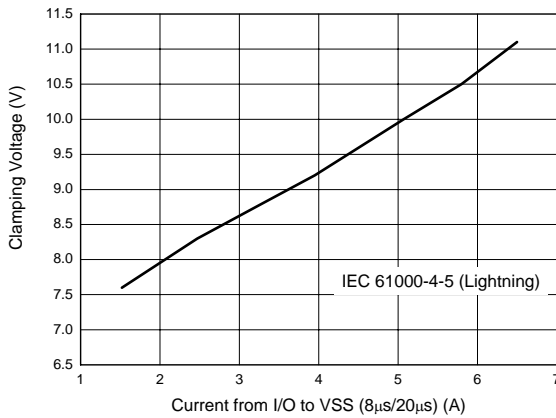


Figure 5. Clamping Voltage

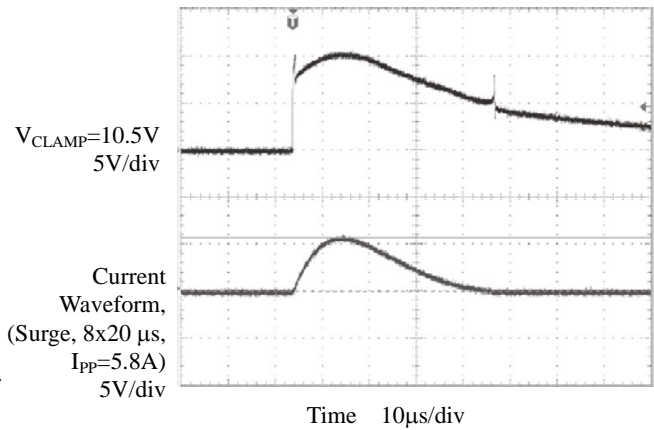


Figure 6. Waveform of I/O to VSS (Positive) vs. Current from I/O to VSS ($8\mu\text{s}/20\mu\text{s}$)



Typical Performance Characteristics (Continued)

$T_A = 25^\circ\text{C}$, unless otherwise specified.

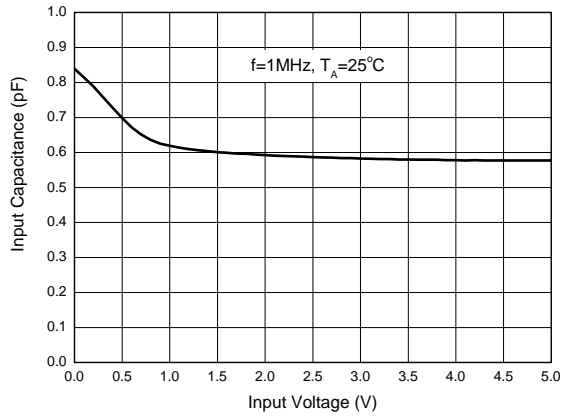
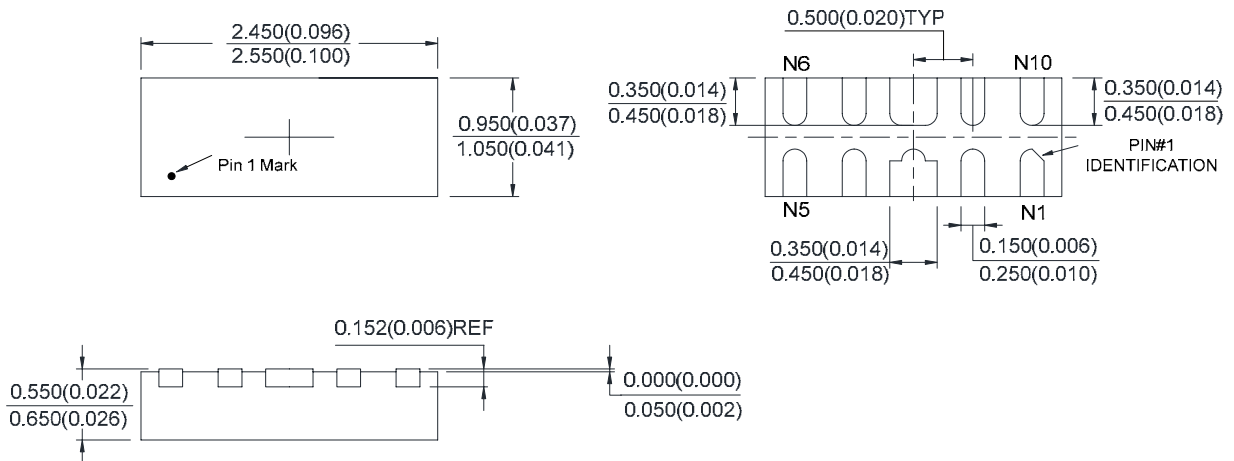


Figure 7. Input Capacitance vs. Input Voltage

Mechanical Dimensions

DFN-2.5x1.0-10

Unit: $\frac{\text{mm}(\text{inch})}{\text{mm}(\text{inch})}$ MIN
 $\frac{\text{mm}(\text{inch})}{\text{mm}(\text{inch})}$ MAX





BCD Semiconductor Manufacturing Limited

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