

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

**AT1140**

**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 AT1140 is a general purpose, high performance device suitable for protecting four high speed I/Os. These devices are assembled in DFN packages for operation at higher frequencies minimizing distortion to the lines being protected.

The AT1140 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: 11.5V at 20A 100ns, TLP  
10.5V at 6A 8μs/20μs
- IEC 61000-4-2: +24kV, -18kV (Air)  
+20kV, -16kV (Contact)
- IEC 61000-4-5 (Lightning, 8μs/20μs): ±6A
- Input Capacitance From I/O to VSS: 0.5pF
- TLP Dynamic Resistance: 0.25Ω
- Monolithic Silicon Technology

**Applications**

- 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
- USB 2.0 to 480 MHz

**Pin Configuration**

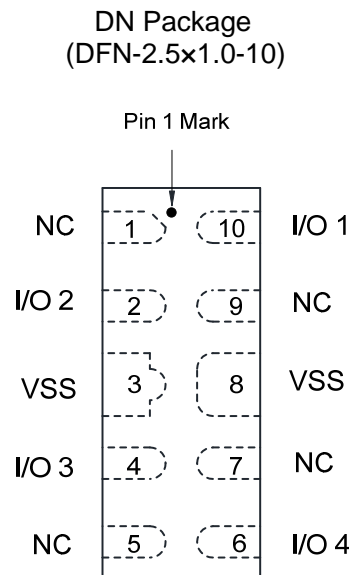


Figure 1. Pin Configuration of AT1140 (Top View)

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**AT1140**

**Circuit Diagram**

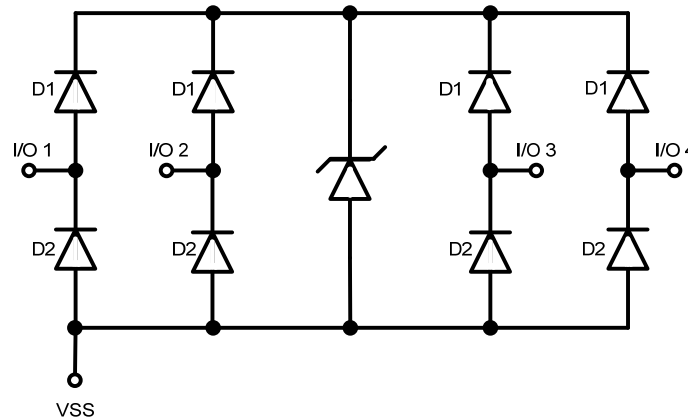
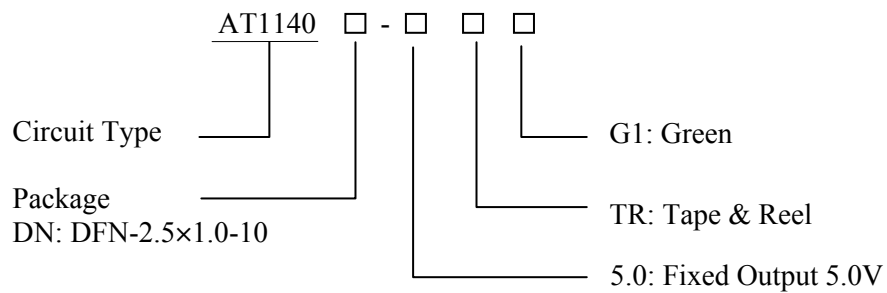


Figure 2. Circuit Diagram of AT1140

**Ordering Information**



Package	Temperature Range	Part Number	Marking ID	Packing Type
DFN-2.5x1.0-10	-55 to 85°C	AT1140DN-5.0TRG1	BGB	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,  $C_{I/O-VSS} < 0.65\text{pF}$** **AT1140****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Min	Typ	Max	Unit
Peak Pulse Current (tp 8 $\mu$ s/20 $\mu$ s)				8	A
Peak Pulse Power (tp 8 $\mu$ s/20 $\mu$ s)				75	W
Operating Voltage (DC)		-0.5		6	V
IEC61000-4-2 ESD (Air)		-18		24	kV
IEC61000-4-2 ESD (Contact)		-16		20	kV
IEC61000-4-5 (Lightning)				6	A
				75	W
Lead Temperature (Soldering, 10sec)	T <sub>LEAD</sub>			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<sub>A</sub>=25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Working Voltage, I/O to VSS			-0.7		5.5	V
Channel Leakage Current	I <sub>R</sub>	Operating Voltage			0.5	$\mu$ A
Reverse Breakdown Voltage	V <sub>BR</sub>	At 1mA	5.5			V
Holding Voltage	V <sub>H</sub>		5.5			V
Clamping Voltage (Surge) (IEC61000-4-5)		At 6A		10.5		V
Trigger Voltage	V <sub>TRIG</sub>				9.5	V
ESD Clamping Voltage		At 20A, TLP, 100ns		11.5		V
Dynamic Reverse Resistance	R <sub>DIFF-R</sub>			0.25	0.3	$\Omega$
Dynamic Forward Resistance	R <sub>DIFF-F</sub>			0.25		$\Omega$
Channel Input Capacitance (I/O to VSS)	C <sub>I/O</sub>	V <sub>I/O</sub> =2.5V, V <sub>SS</sub> =0V, f=1MHz		0.5	0.65	pF

### Typical Performance Characteristics

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

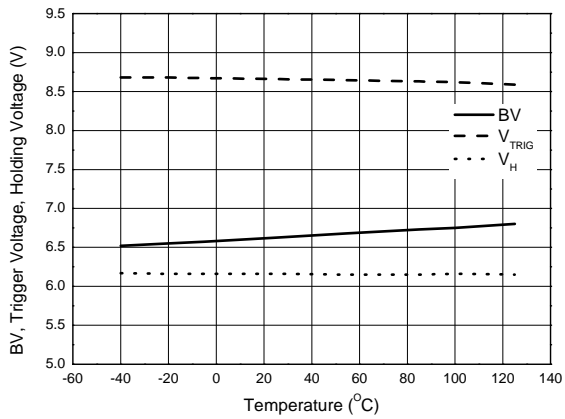


Figure 3. BV, Trigger Voltage, Holding Voltage vs. Temperature

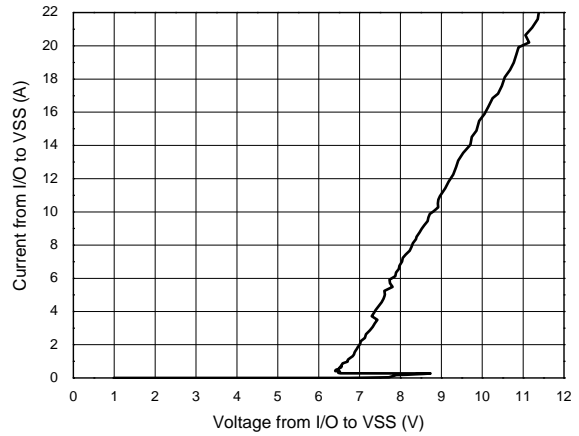


Figure 4. Current from I/O to VSS vs. Voltage from I/O to VSS

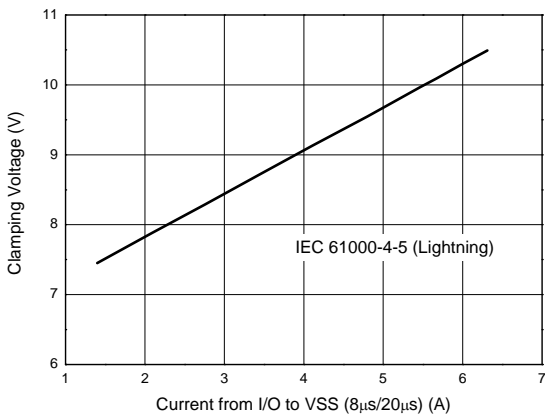


Figure 5. Clamping Voltage vs. Current from I/O to VSS ( $8\mu\text{s}/20\mu\text{s}$ )

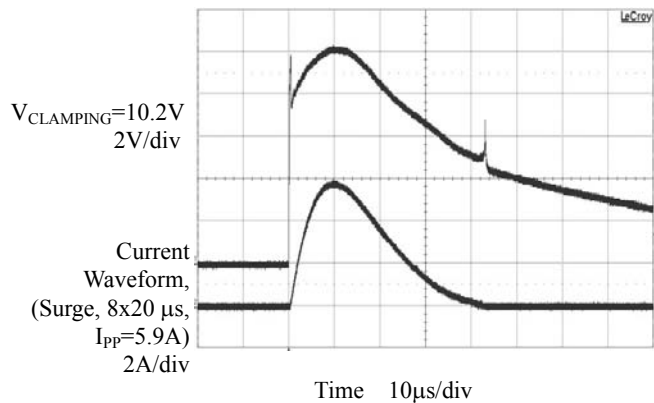


Figure 6. Waveform of I/O to VSS (Positive)

**Typical Performance Characteristics (Continued)**

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

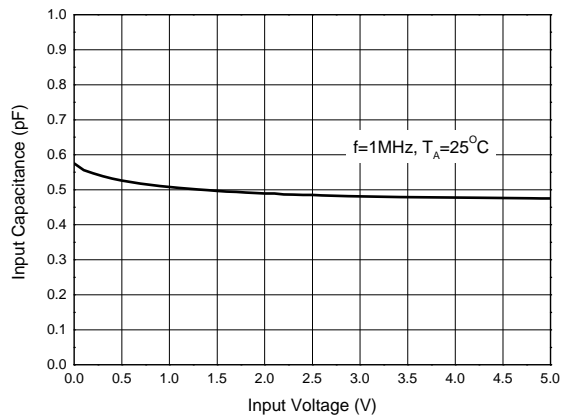
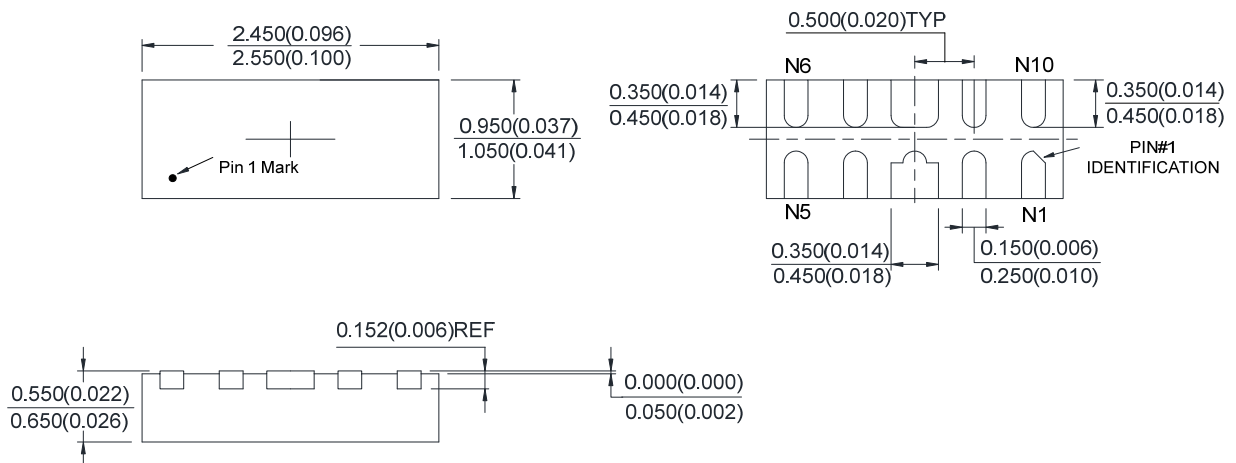


Figure 7. Input Capacitance vs. Input Voltage

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





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