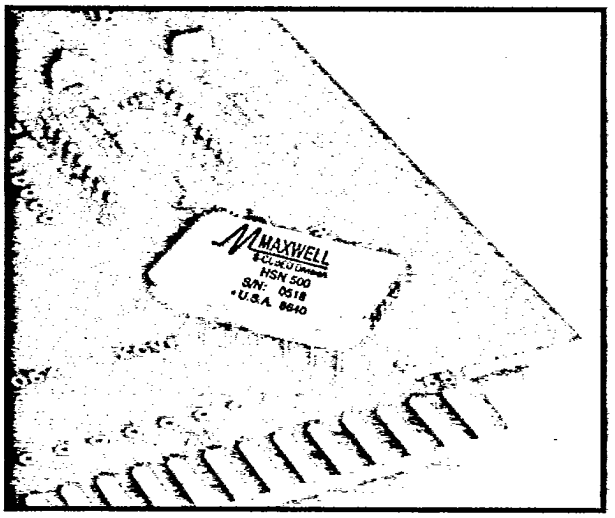
MAXWELL
S-CUBED Division

T-65-13

RADIATION HARDENED HYBRID NUCLEAR EVENT DETECTOR

Model HSN-500



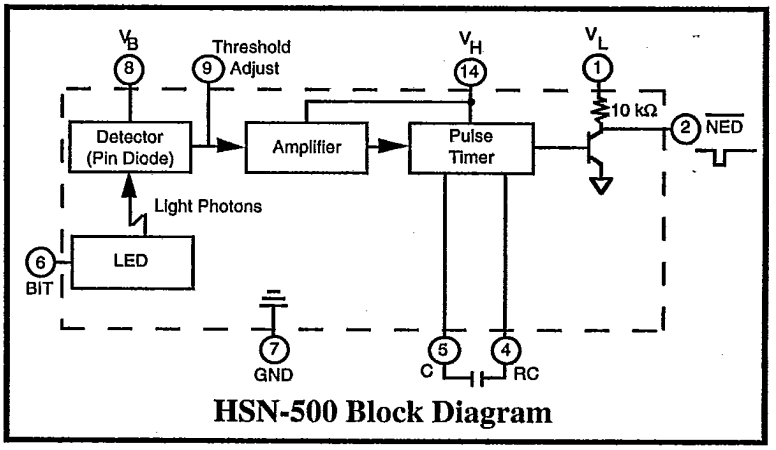
FEATURES

- **Detects ionizing radiation pulses**
- **Tested/certified detection threshold level**
- **Adjustable circumvention period**
- **100% testable with built-in test**
- **Detection threshold adjustability**
- **Compliant MIL-STD-883 Class B**

DESCRIPTION

The S-Cubed Radiation Hardened Hybrid Nuclear Event Detector (NED), Model HSN-500, senses ionizing radiation pulses generated by a nuclear event, such as the detonation of a nuclear weapon, and rapidly switches its outputs from the normal high state to a low state with a propagation delay time of less than 20 ns. The active low Nuclear Event Detection signal ($\overline{\text{NED}}$) is used to initiate a wide variety of circumvention functions, thus preventing upset and burnout of electronic components. The $\overline{\text{NED}}$ output is also used to initiate both hardware and software recovery. This high-speed, 14-pin hybrid detector is used in electronic systems as a general-purpose circumvention device to protect memory, stop data processing, and drive power supply switches as well as signal clamps.

The HSN-500 is designed to operate through three critical environments: ionizing dose rate [10^{12}rad(Si)/s], gamma total dose [10^{6}rad(Si)], and neutron fluence [5×10^{13}n/cm^2]. In addition, the HSN-500 is designed to function throughout the transient neutron pulse. The hybrid's discrete design ensures a controlled response in these radiation environments as well as immunity to latchup. The detection level and functionality of a sample of each HSN-500 production lot are tested in an ionizing dose rate environment. A certificate is provided reporting the test results for the production lot.



HSN-500 Block Diagram

The detection threshold of the HSN–500 is adjustable within the range of 2×10^{5}rad(Si)/s to 2×10^{7}rad(Si)/s. This detection level can be preset by S-Cubed or adjusted by the user. Less than a 30% variation in detection threshold can be expected over the entire operating temperature range.

MODEL HSN-500 CHARACTERISTICS

T-65-13

ELECTRICAL CHARACTERISTICS	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
	Input Power Characteristics:					
	V_H		4.5		5.5	V
	I_H	V_H = 5.5 V				
		STANDBY			30.0	mA
		OPERATIONAL			120.0	mA
	V_L				20.0	V
	I_L	V_L = 20.0 V				
		STANDBY			100.0	µA
		OPERATIONAL			2.25	mA
	V_B	STANDBY	4.5		20.0	V
	I_B	STANDBY			100.0	µA
	BIT[1,2]					
	I_{IH}	V_{IH} = 4.0 V			25.0	mA
	t_{PW}	Pin 9 open	10.0			µs
	Output Signal Characteristics:					
	$\overline{NED}$					
	V_{OH}	V_L = 20 V, I_{OH} = -100 µA	18.5			V
	V_{OL}	I_{OL} = 10 mA			0.6	V
		I_{OL} = 100 mA			1.0	V
	Propagation Delay Time t_D				20	ns

NOTES: 1) BIT Electrical Characteristics are not guaranteed over the radiation range; 2) BIT may not meet specification when only a resistor is used to adjust the detection level. To use BIT in this situation, it is advised that a resistor/capacitor combination is used.

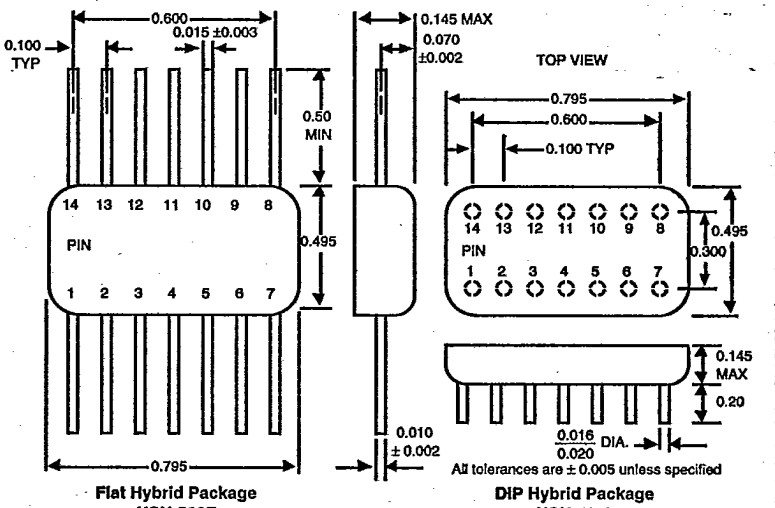
RADIATION HARDNESS CHARACTERISTICS

Dose Rate (operate-through)	$1x10^{12}$	rad(Si)/s
Total Dose	$1x10^{6}$	rad(Si)
Neutron Fluence	$5x10^{13}$	n/cm^2
Approximate Detection Range	$2x10^{5}$ - $2x10^{7}$	rad(Si)/s

PIN CONNECTIONS

Pin#	Function
1	Load Voltage, V_L
2	Nuclear Event Detector, $\overline{NED}$
3	No Connection
4	External Capacitor
5	External Capacitor
6	Built In Test, BIT
7	Package Ground and Case
8	PIN Diode Bias, V_B
9	Threshold Adjust
10	No Connection
11	No Connection
12	No Connection
13	No Connection
14	Hardened Supply Voltage, V_H

MECHANICAL DIMENSIONS



Flat Hybrid Package HSN-500F

DIP Hybrid Package HSN-500L

Specifications subject to change without notice.

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