

## Silicon Avalanche Photodiode SAE-Series (NIR-Enhanced)

### Description

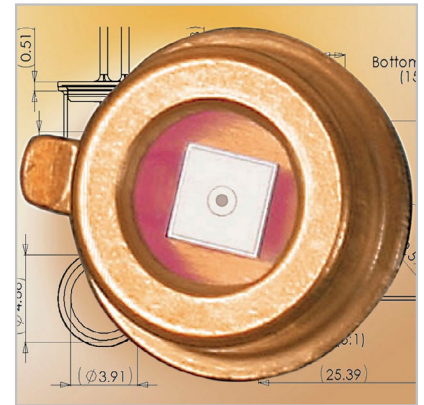
The SAE230NS and SAE500NS epitaxial avalanche photodiodes are general purpose APDs with high responsivity and extremely fast rise and fall times through out the 550 to 1050 nm wavelength range. The responsivity is optimised for 850 nm – 900 nm for use in rangefinding. A variety of package options is available.

### Features

- High quantum efficiency
- Low noise, high speed
- Multiplication gain,  $M > 100$  available
- 230  $\mu\text{m}$  and 500  $\mu\text{m}$  diameter active area
- Gradual multiplication curve
- Wide operating temperature range

### Applications

- Rangefinding
- Optical communication systems



### Generic Characteristics at $T_a = 25\text{ }^\circ\text{C}$

	SAE230NX			SAE500NX			Units
	Min	Typ	Max	Min	Typ	Max	
Wavelength range	550		1050	550		1050	nm
Peak sensitivity		850			850		nm
Diameter		230			500		$\mu\text{m}$

### Absolute Maximum Ratings

	SAE230NX		SAE500NX		Units
	Min	Max	Min	Max	
Storage temperature	-55	100	-55	100	°C
Operating temperature*	-40	85	-40	85	°C
Reverse current Peak value (CW operation)		200		200	µA
Reverse current Peak value (1 sec duration)		1		1	mA
Forward current $I_F$ at 21 °C average value (CW operation)		5		5	mA
Forward current $I_F$ at 21 °C Peak value (1 sec duration)		50		50	mA
Max. total power dissipation		60		60	mW
Soldering (for 15 sec.)		260		260	°C

\* Extended operating temperature range possible for special design considerations

### Electrical Characteristics, $T_a = 25\text{ °C}$ , $M = 100$

	SAE230NX			SAE500NX			Units
	Min	Typ	Max	Min	Typ	Max	
Breakdown voltage @ $I_d = 10\text{ µA}$	150	230	300	150	230	300	Volt
Responsivity @ 905 nm		45			45		A/W
$V_{br}$ temperature coefficient		1.2	1.5		1.2	1.5	V/°C
Dark current		0.5	3.0		1.0	5.0	nA
Noise current		0.2	0.5		0.2	0.5	pA/ sqrtHz
Capacitance		1.0	1.5		2.0	3.0	pF
Rise time @ $M = 100$		500			500		psec

Fig. 1: Spectral Response (@ M = 100)

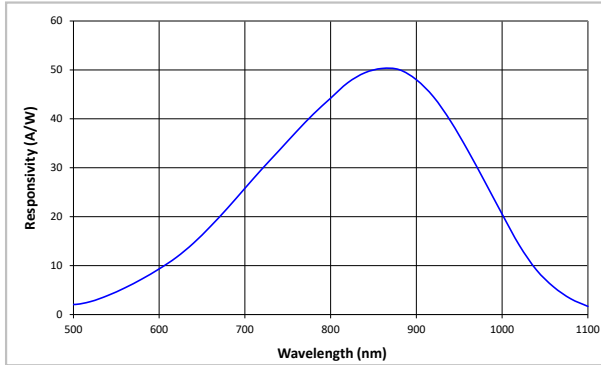


Fig. 2: Quantum Efficiency vs. Wavelength

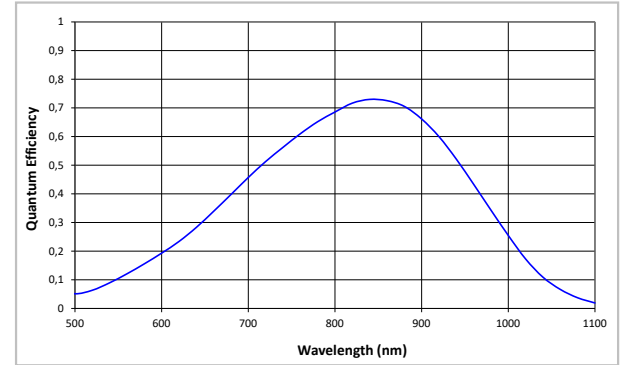


Fig. 3: Typical Dark Current Characteristics

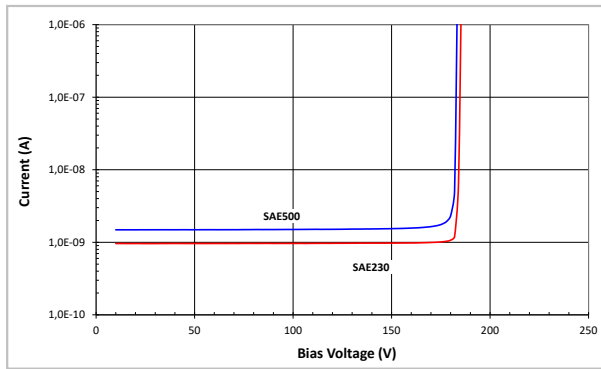


Fig. 4: Dark Current - Voltage characteristics

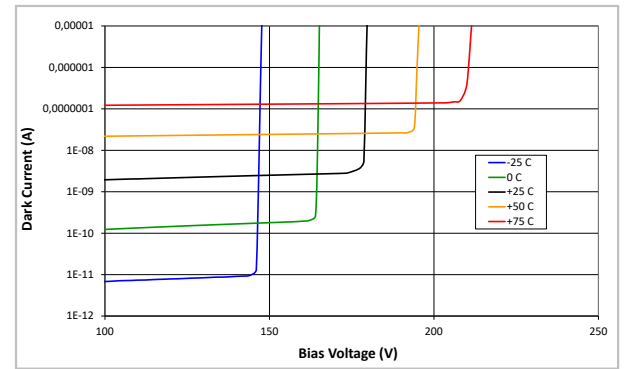


Fig. 5: Gain - Voltage Characteristics

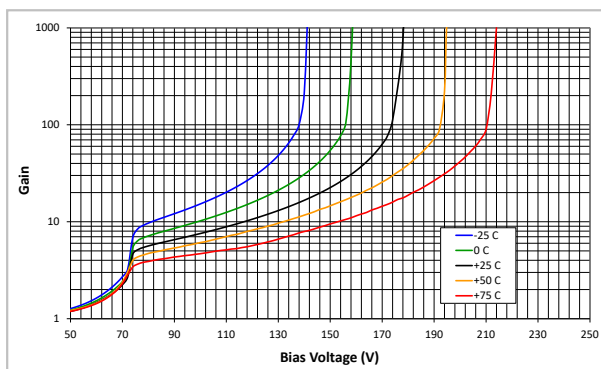


Fig. 5: Capacitance vs. Reverse Voltage

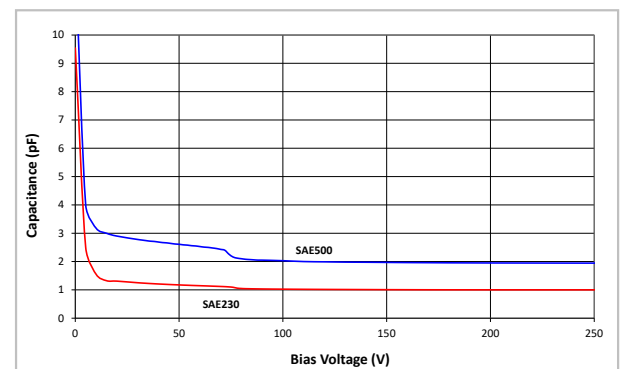


Fig. 7: Typical APD Noise Density as a Function of Gain

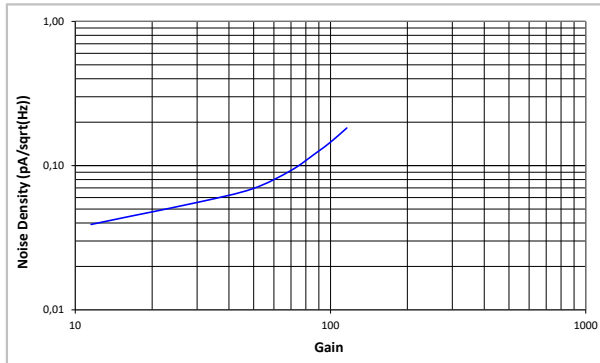
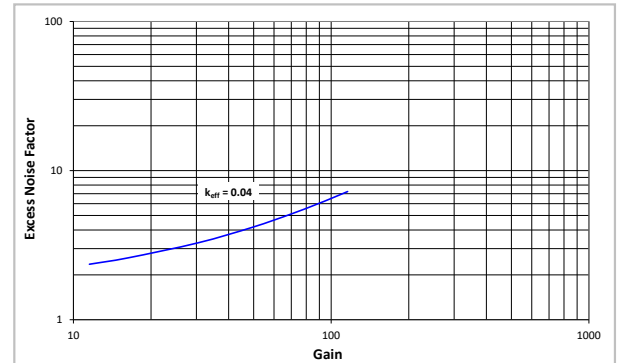
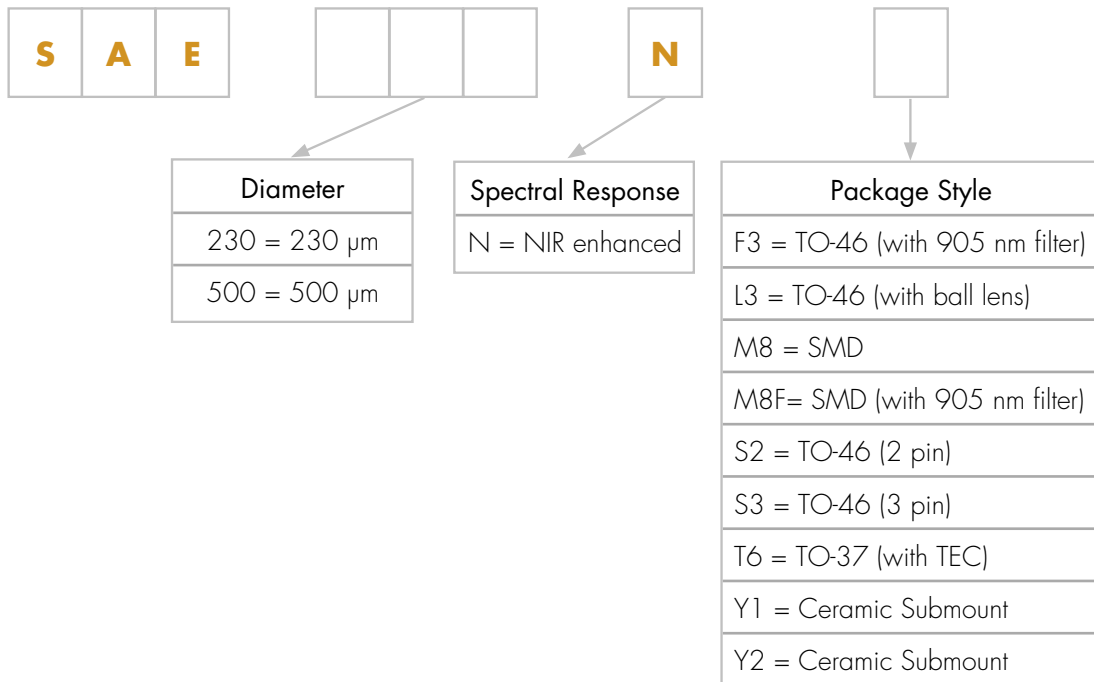


Fig. 8: Excess Noise Factor

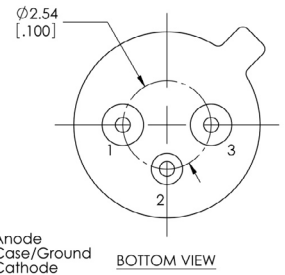
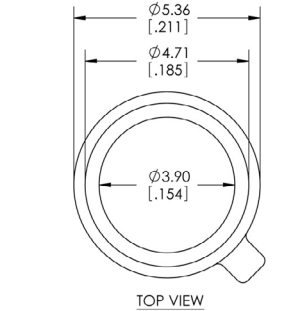
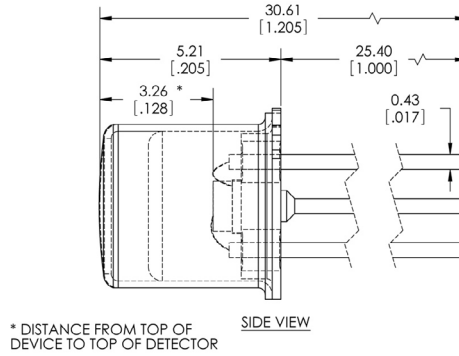


### Product Number Designations

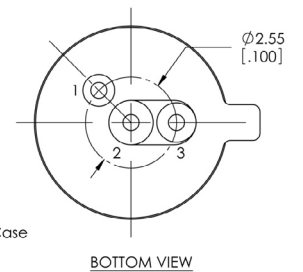
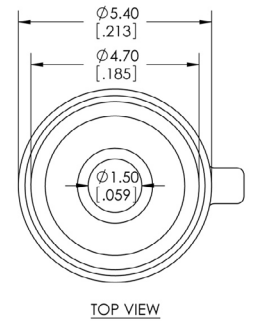
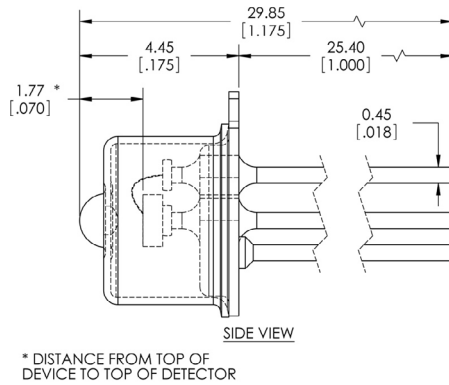


Package Drawings

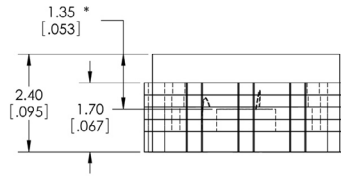
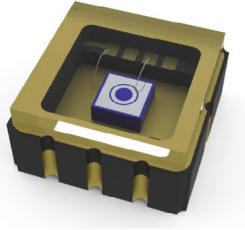
Package F3 TO-46 (with filter)



Package L3 TO-46 (with ball lens)

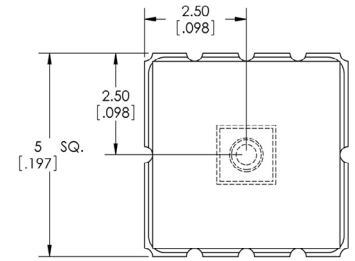


Package M8 SMD

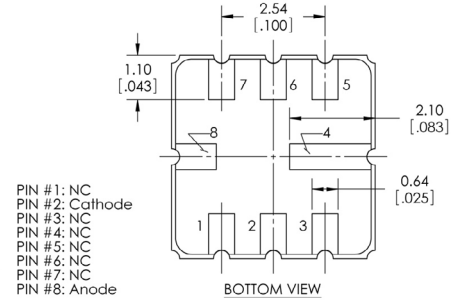


SIDE VIEW

\* DISTANCE FROM TOP OF DEVICE TO TOP OF DETECTOR

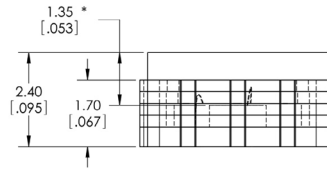
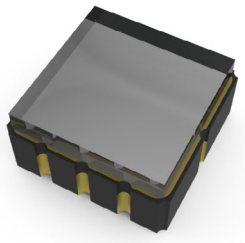


TOP VIEW



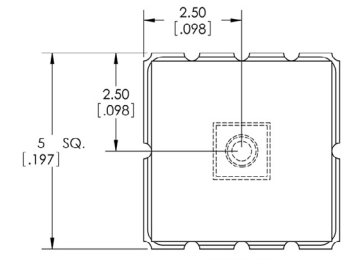
BOTTOM VIEW

Package M8F SMD with 905 nm filter

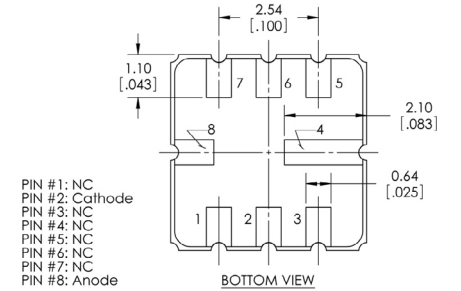


SIDE VIEW

\* DISTANCE FROM TOP OF DEVICE TO TOP OF DETECTOR

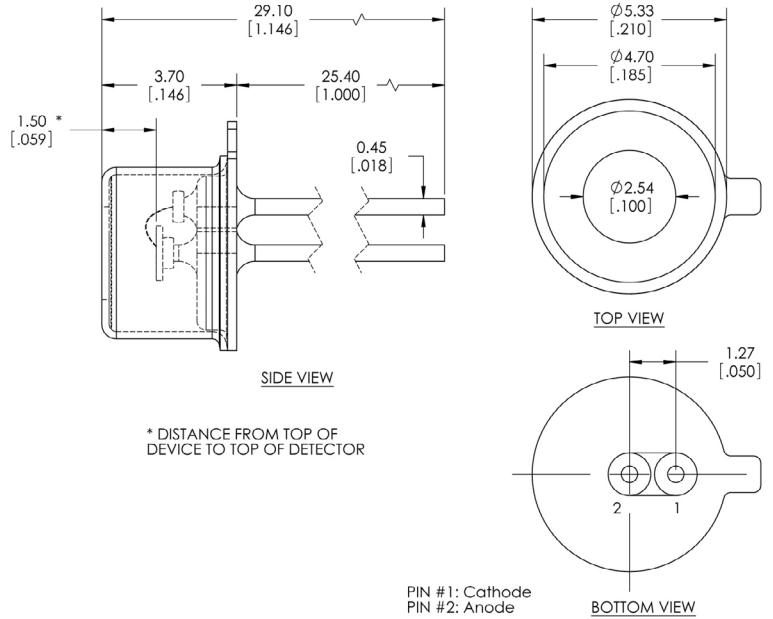


TOP VIEW

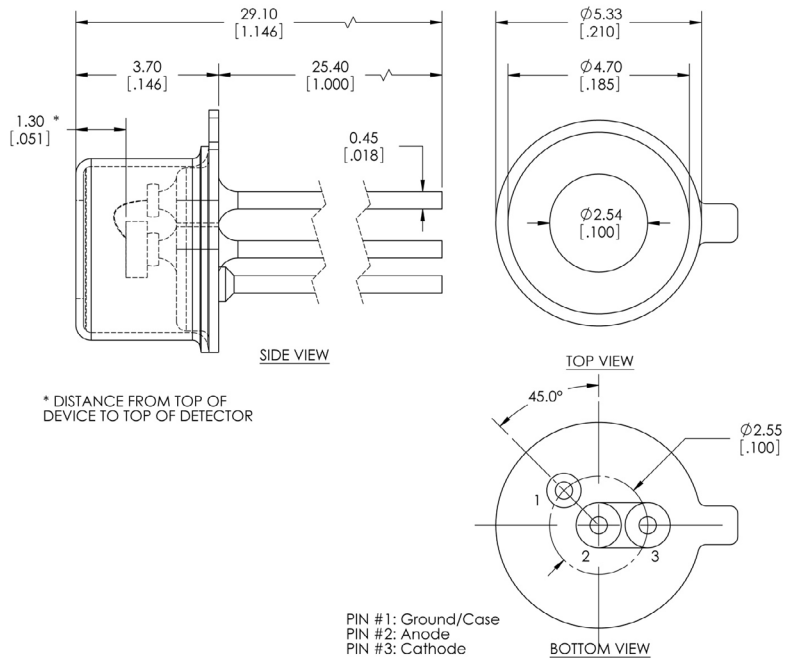


BOTTOM VIEW

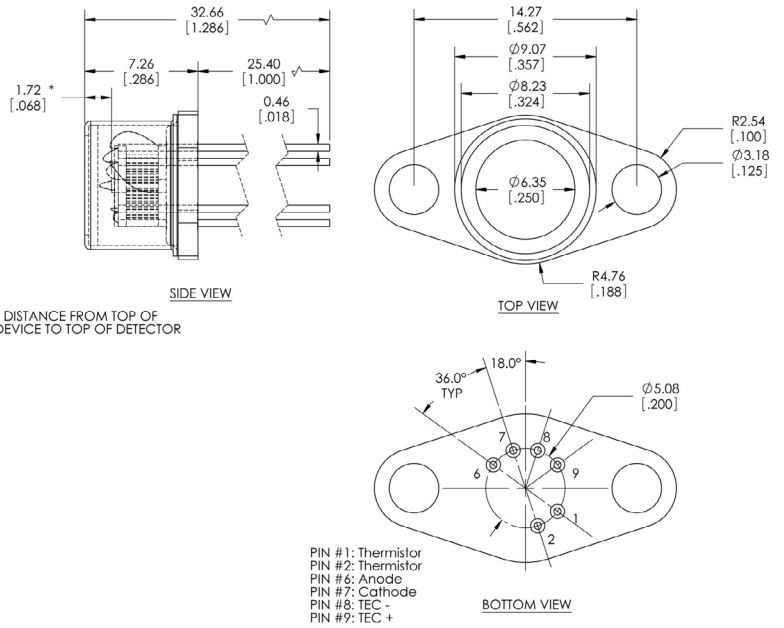
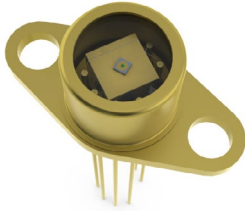
Package S2 TO-46 (2-pin)



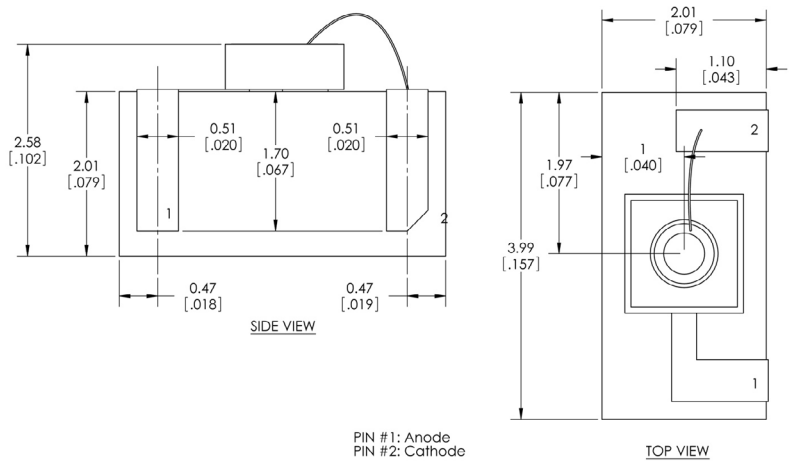
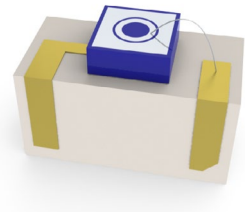
Package S3 TO-46 (3 pin)



Package T6 TO-37 (with TEC)

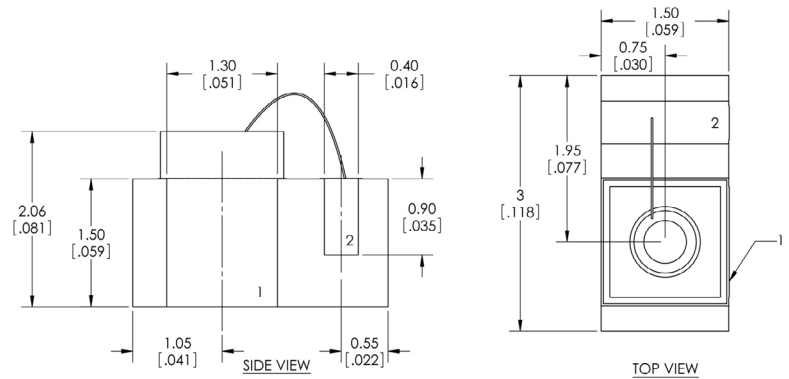
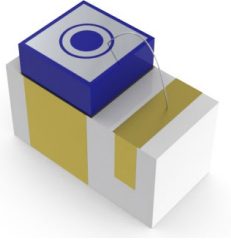


Package Y1 Ceramic Submount





## Package Y2 Ceramic Submount



## Product Changes

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No liability is assumed as a result of their use or application.

## Ordering Information

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Custom designed products are available on request.