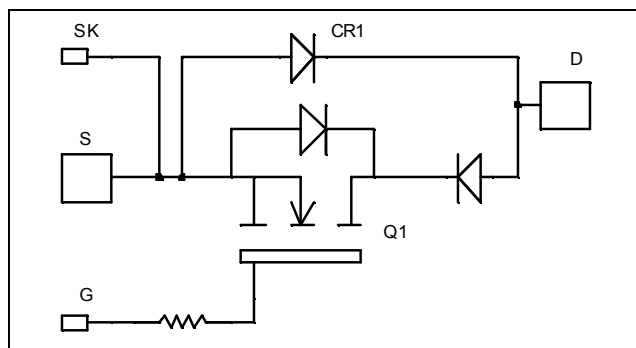


Single switch Series & parallel diodes MOSFET Power Module

$$V_{DSS} = 200V$$

$$R_{DSon} = 4m\Omega \text{ max @ } T_j = 25^{\circ}C$$

$$I_D = 417A \text{ @ } T_c = 25^{\circ}C$$



Application

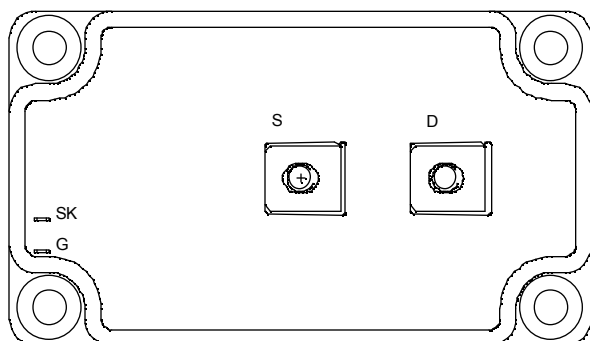
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Power MOS 7[®] MOSFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration
- AlN substrate for improved thermal performance

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	200	V
I_D	Continuous Drain Current	$T_c = 25^{\circ}C$ 417	A
		$T_c = 80^{\circ}C$ 310	
I_{DM}	Pulsed Drain current	1670	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	4	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^{\circ}C$ 1560	W
I_{AR}	Avalanche current (repetitive and non repetitive)	100	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	



CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
BV_{DSS}	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 500\mu A$	200			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 200V, T_j = 25^\circ\text{C}$			500	μA
		$V_{GS} = 0V, V_{DS} = 160V, T_j = 125^\circ\text{C}$			2000	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 208.5A$			4	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 10mA$	3		5	V
I_{GSS}	Gate - Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 200	nA

Dynamic Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$		28.8		nF
C_{oss}	Output Capacitance			9.32		
C_{rss}	Reverse Transfer Capacitance			0.58		
Q_g	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 100V$ $I_D = 417A$		560		nC
Q_{gs}	Gate - Source Charge			212		
Q_{gd}	Gate - Drain Charge			268		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 133V$ $I_D = 417A$ $R_G = 1.2\Omega$		32		ns
T_r	Rise Time			64		
$T_{d(off)}$	Turn-off Delay Time			88		
T_f	Fall Time			116		
E_{on}	Turn-on Switching Energy ❶	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 417A, R_G = 1.2\Omega$		3396		μJ
E_{off}	Turn-off Switching Energy ❷			3716		
E_{on}	Turn-on Switching Energy ❶	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 417A, R_G = 1.2\Omega$		3744		μJ
E_{off}	Turn-off Switching Energy ❷			3944		

❶ E_{on} includes diode reverse recovery.

❷ In accordance with JEDEC standard JESD24-1.

Series diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle $T_c = 85^\circ\text{C}$		360		A
V_F	Diode Forward Voltage	$I_F = 360A$		1.1	1.15	V
		$I_F = 720A$		1.4		
		$I_F = 360A, T_j = 125^\circ\text{C}$		0.9		
t_{rr}	Reverse Recovery Time	$I_F = 360A$ $V_R = 133V$ $di/dt = 1000A/\mu s$ $T_j = 25^\circ\text{C}$		31		ns
		$T_j = 125^\circ\text{C}$		60		
Q_{rr}	Reverse Recovery Charge	$I_F = 360A$ $V_R = 133V$ $di/dt = 1000A/\mu s$ $T_j = 25^\circ\text{C}$		360		nC
		$T_j = 125^\circ\text{C}$		1500		

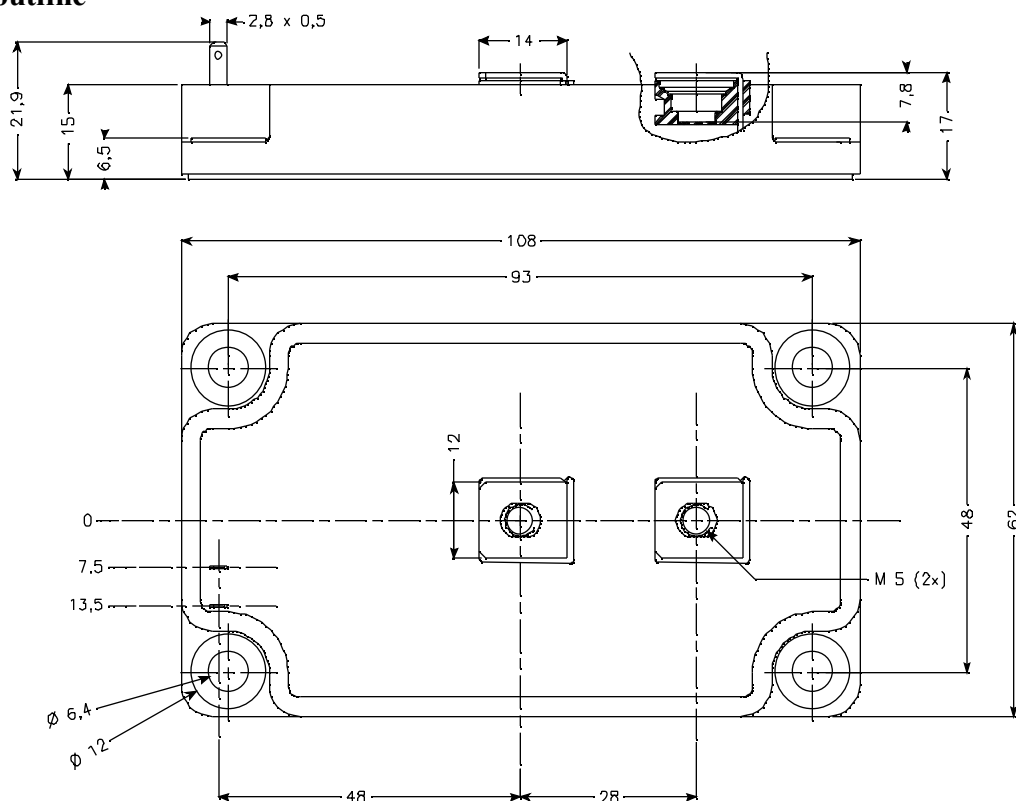
Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle	$T_c = 85^\circ\text{C}$		360		A
V_F	Diode Forward Voltage	$I_F = 360\text{A}$			1.1	1.15	V
		$I_F = 720\text{A}$			1.4		
		$I_F = 360\text{A}$	$T_j = 125^\circ\text{C}$		0.9		
t_{rr}	Reverse Recovery Time	$I_F = 360\text{A}$ $V_R = 133\text{V}$ $di/dt = 1000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		31		ns
			$T_j = 125^\circ\text{C}$		60		
Q_{rr}	Reverse Recovery Charge	$I_F = 360\text{A}$ $V_R = 133\text{V}$ $di/dt = 1000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		360		nC
			$T_j = 125^\circ\text{C}$		1500		

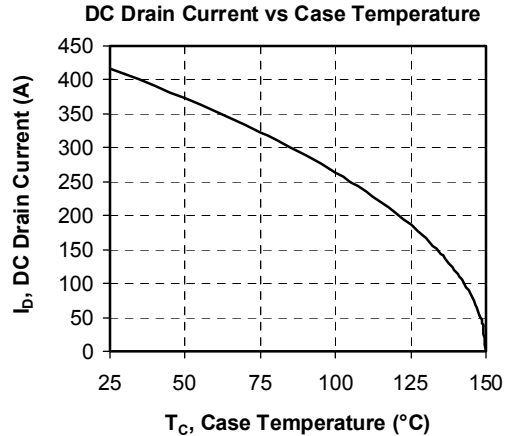
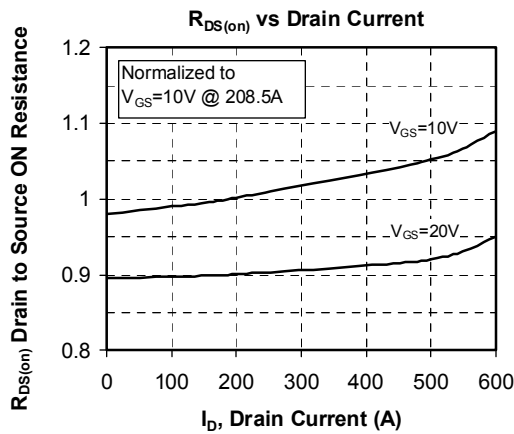
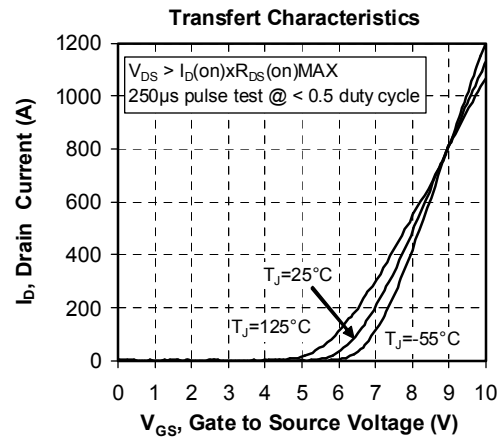
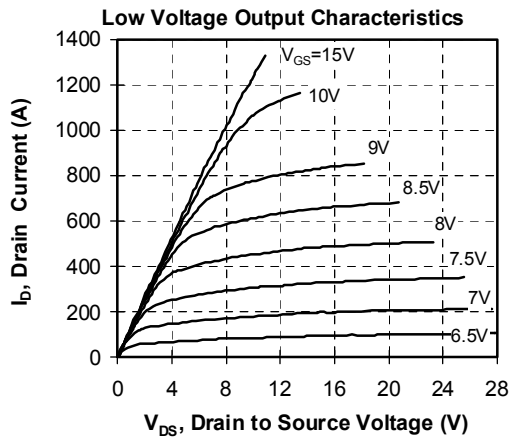
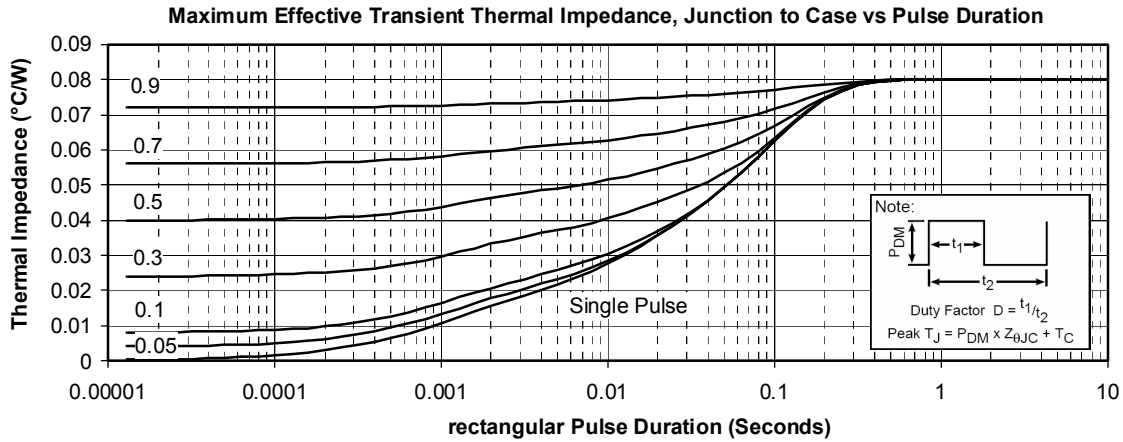
Thermal and package characteristics

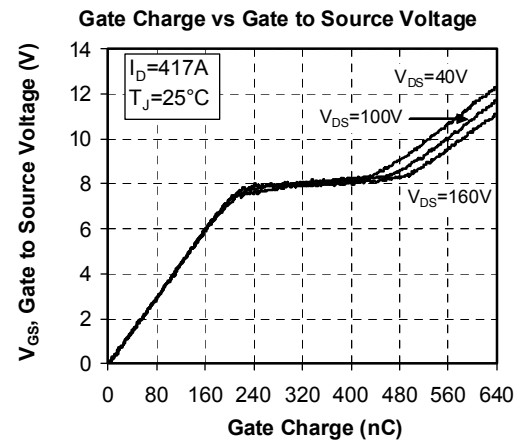
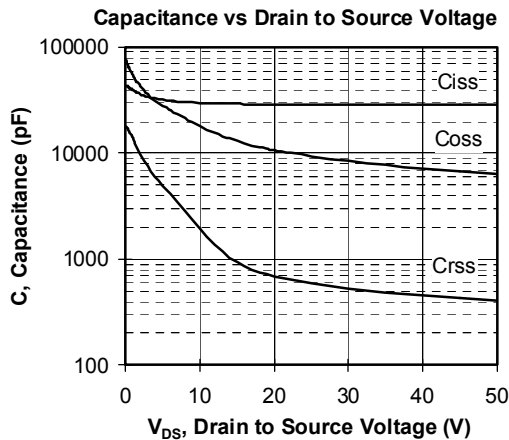
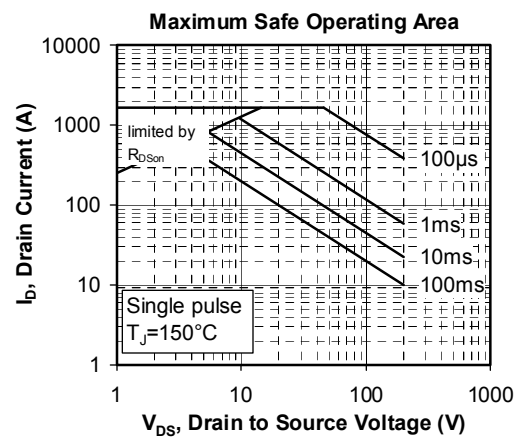
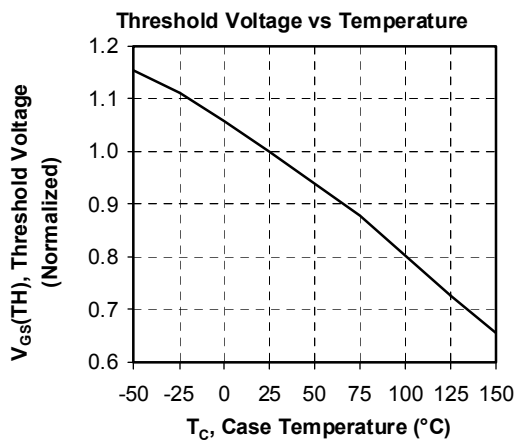
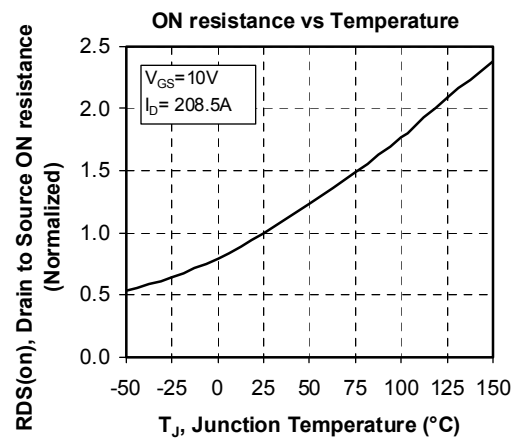
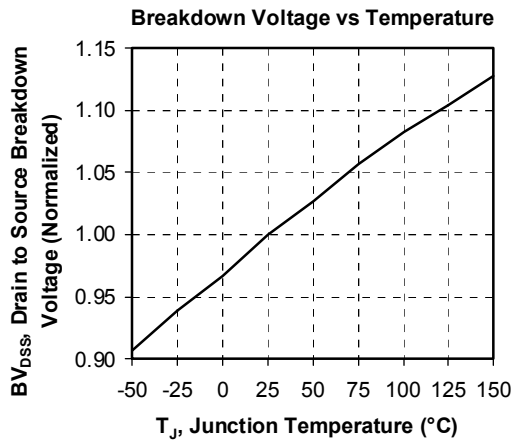
Mechanical and packaging characteristics				Min	Typ	Max	Unit
Symbol	Characteristic						
R _{thJC}	Junction to Case		Transistor			0.08	°C/W
			Series Diode			0.12	
			Parallel Diode			0.12	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, Isol<1mA, 50/60Hz			2500			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
		For terminals	M5	2		3.5	
Wt	Package Weight					280	g

Package outline

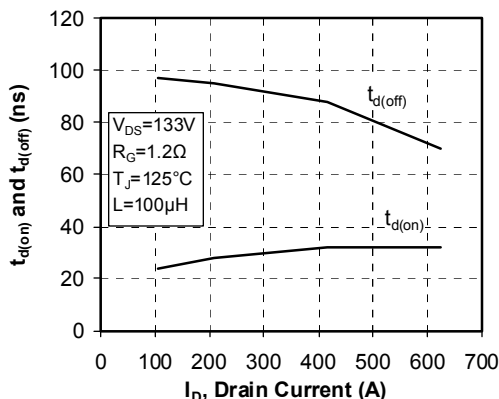


Typical Performance Curve

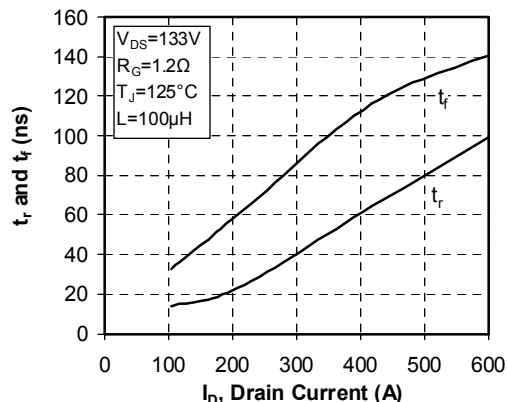




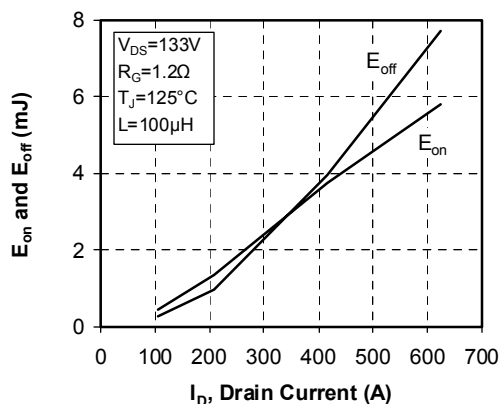
Delay Times vs Current



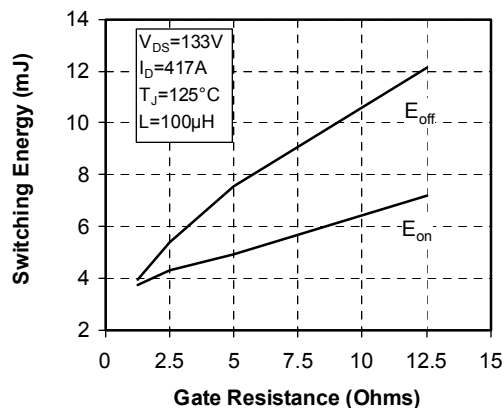
Rise and Fall times vs Current



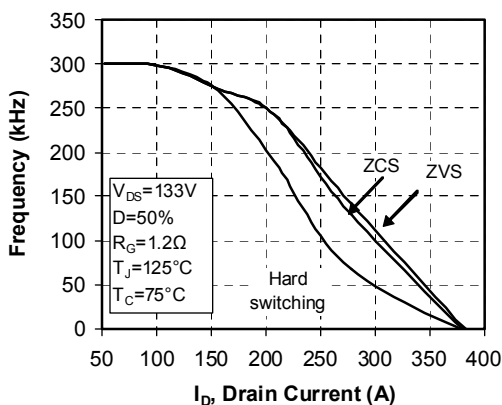
Switching Energy vs Current



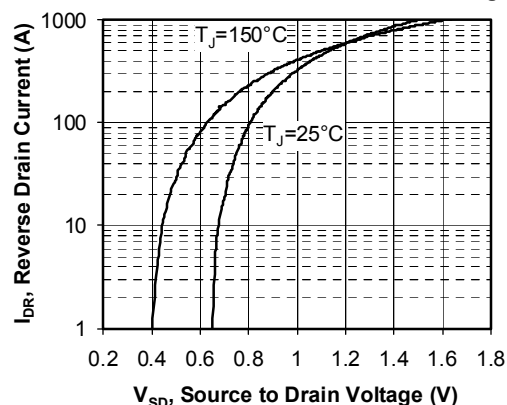
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



APT reserves the right to change, without notice, the specifications and information contained herein

APT's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.