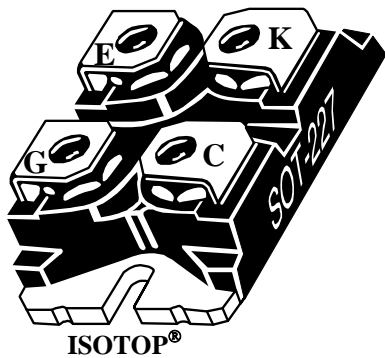
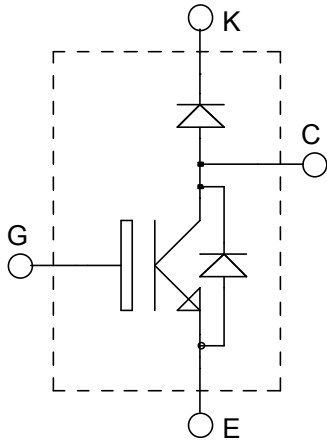


**ISOTOP<sup>®</sup> Boost chopper  
NPT IGBT  
SiC chopper diode**

**$V_{CES} = 1200V$   
 $I_C = 15A @ T_c = 90^{\circ}C$**



### Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction
- Brake switch

### Features

- **Non Punch Through (NPT) Fast IGBT**
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 50 kHz
  - Low leakage current
  - RBSOA and SCSOA rated
- **Chopper SiC Schottky Diode**
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature Independent switching behavior
  - Positive temperature coefficient on VF
- ISOTOP<sup>®</sup> Package (SOT-227)
- Very low stray inductance
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive  $T_C$  of  $V_{CESat}$
- RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	1200	V
$I_C$	Continuous Collector Current	$T_C = 25^{\circ}C$	30
		$T_C = 90^{\circ}C$	15
$I_{CM}$	Pulsed Collector Current	$T_C = 25^{\circ}C$	60
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^{\circ}C$	156
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^{\circ}C$	30A@1150V

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

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

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$			250	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$			500	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 15\text{A}$	$T_j = 25^\circ\text{C}$	2.5	3.2	3.7	V
			$T_j = 125^\circ\text{C}$		4.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1\text{mA}$	4		6	V	
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			400	nA	

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		1000		pF
$C_{oes}$	Output Capacitance			150		
$C_{res}$	Reverse Transfer Capacitance			70		
$Q_g$	Total gate Charge	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$		99		nC
$Q_{ge}$	Gate – Emitter Charge			10		
$Q_{gc}$	Gate – Collector Charge			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$ $R_G = 33\Omega$		60		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			315		
$T_f$	Fall Time			30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$ $R_G = 33\Omega$		60		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			356		
$T_f$	Fall Time			40		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$ $R_G = 33\Omega$	$T_j = 125^\circ\text{C}$		1.2	mJ
$E_{off}$	Turn-off Switching Energy				1	
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15\text{V}; V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}; T_j = 125^\circ\text{C}$		90		A

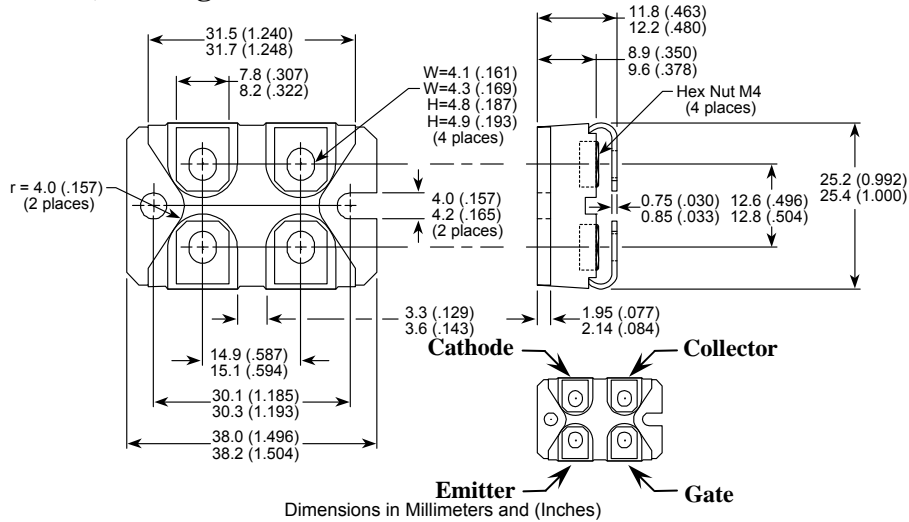
**Chopper SiC diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V	
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		32	200	$\mu\text{A}$
			$T_j = 175^\circ\text{C}$		56	1000	
$I_F$	DC Forward Current	$T_c = 125^\circ\text{C}$		10		A	
$V_F$	Diode Forward Voltage	$I_F = 10\text{A}$	$T_j = 25^\circ\text{C}$		1.6	1.8	V
			$T_j = 175^\circ\text{C}$		2.3	3	
$Q_C$	Total Capacitive Charge	$I_F = 10\text{A}, V_R = 600\text{V}$ $di/dt = 500\text{A}/\mu\text{s}$		40		nC	
C	Total Capacitance	$f = 1\text{MHz}, V_R = 200\text{V}$		96		pF	
		$f = 1\text{MHz}, V_R = 400\text{V}$		69			

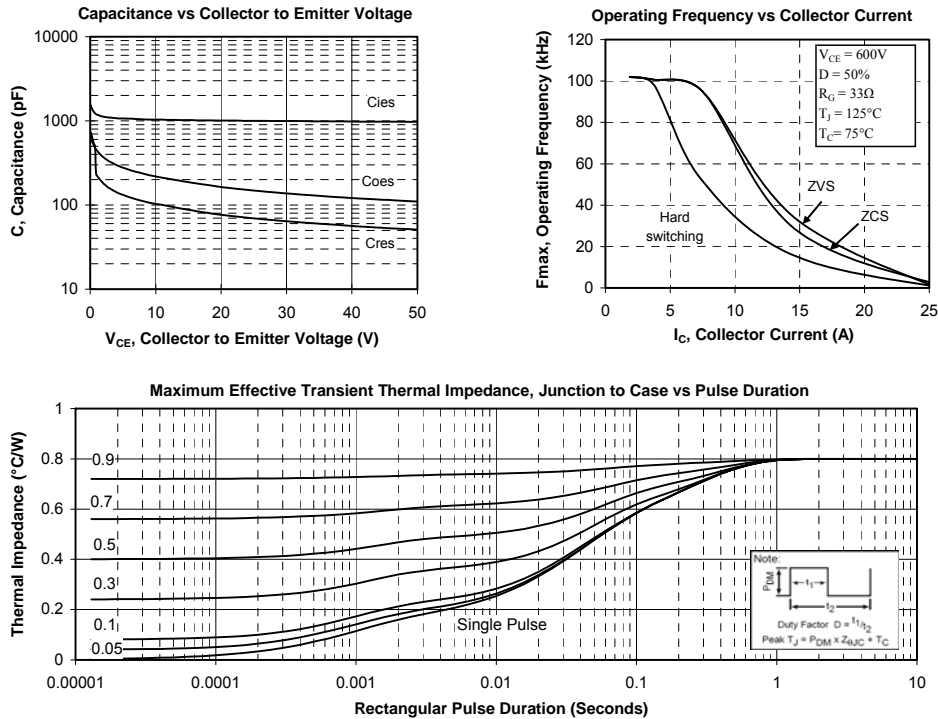
## Thermal and package characteristics

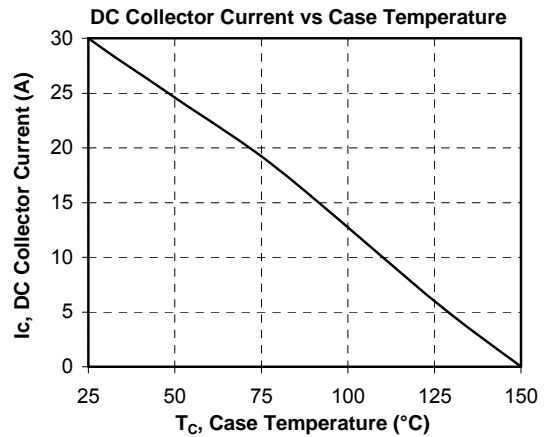
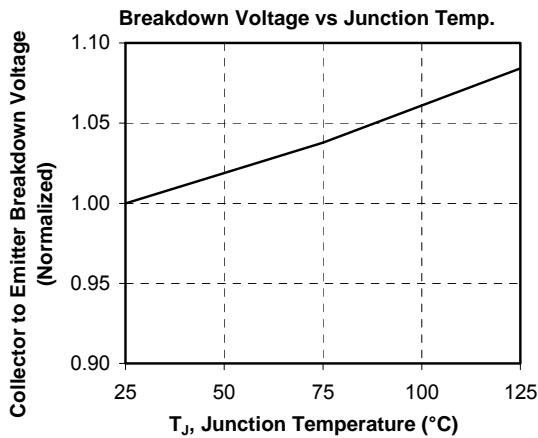
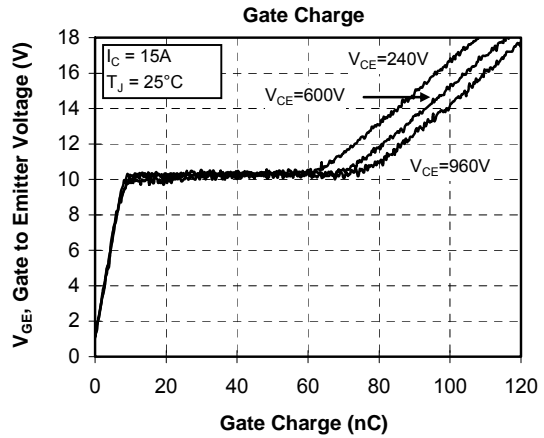
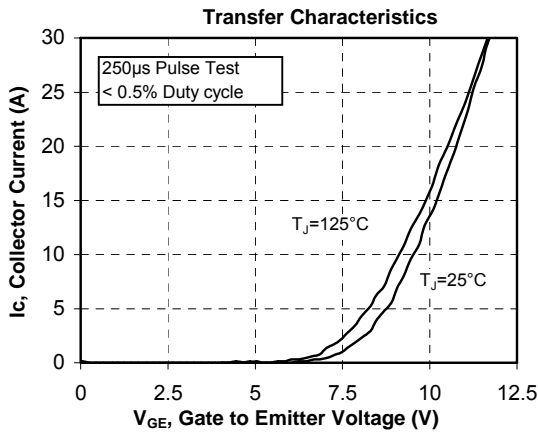
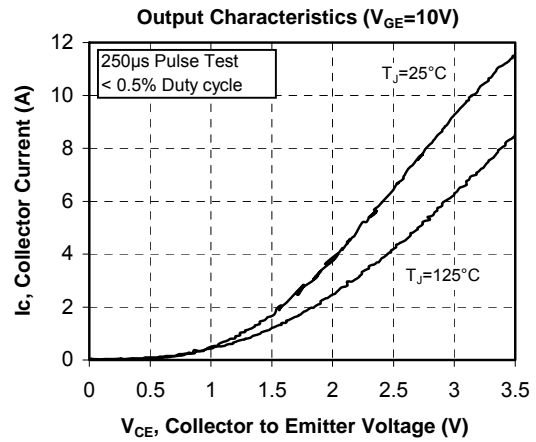
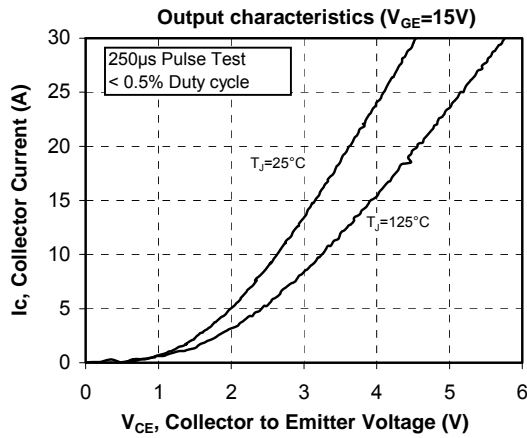
Symbol	Characteristic	Min	Typ	Max	Unit
$R_{thJC}$	Junction to Case Thermal Resistance	IGBT		0.8	°C/W
		SiC chopper Diode		1.65	
$R_{thJA}$	Junction to Ambient (IGBT & Diode)			20	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case t=1 min, I isol<1mA, 50/60Hz	2500			V
$T_J, T_{STG}$	Storage Temperature Range	-55		150	°C
$T_L$	Max Lead Temp for Soldering:0.063" from case for 10 sec			300	
Torque	Mounting torque (Mounting = 8-32 or 4mm Machine and terminals = 4mm Machine)			1.5	N.m
Wt	Package Weight		29.2		g

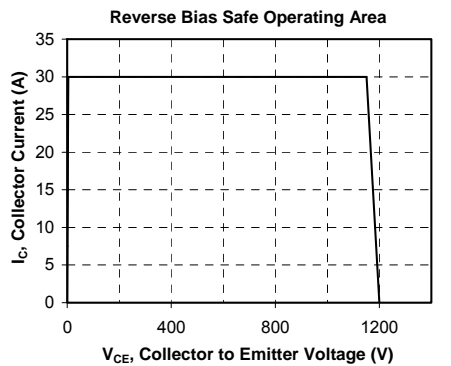
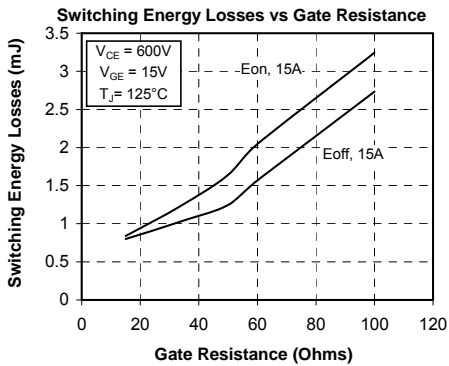
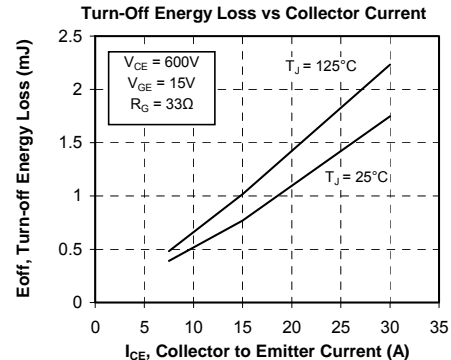
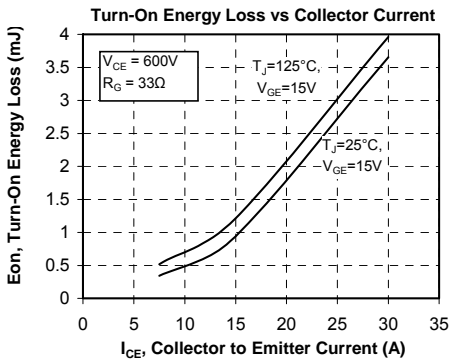
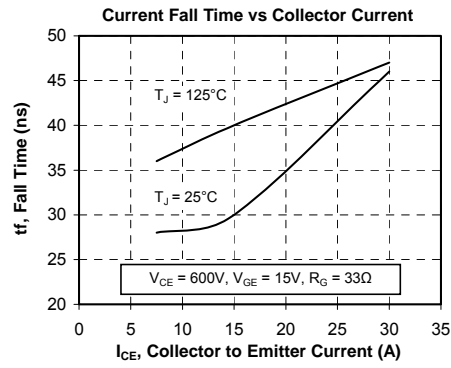
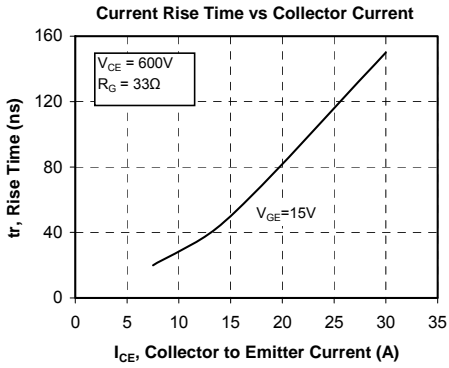
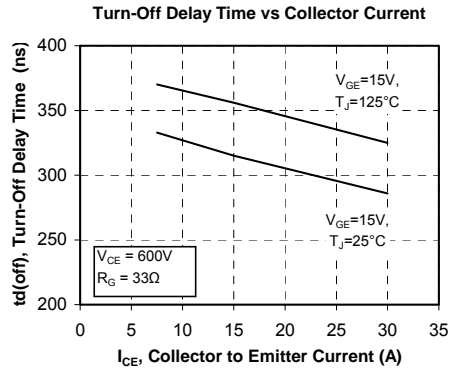
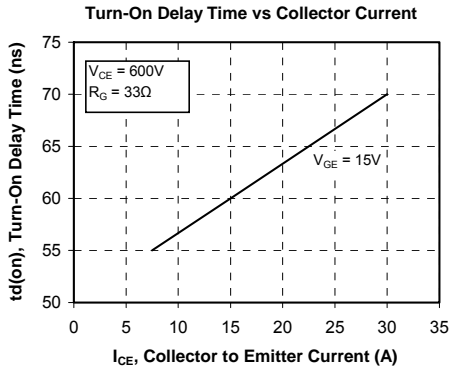
## SOT-227 (ISOTOP®) Package Outline



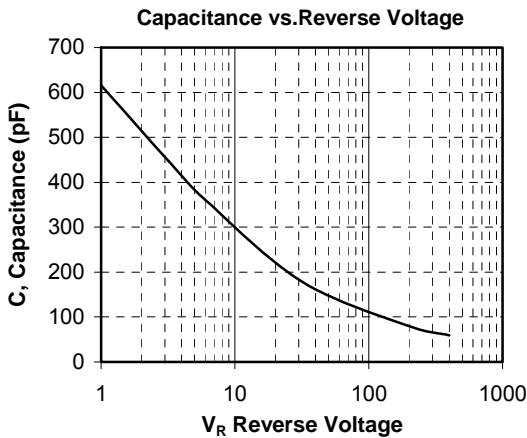
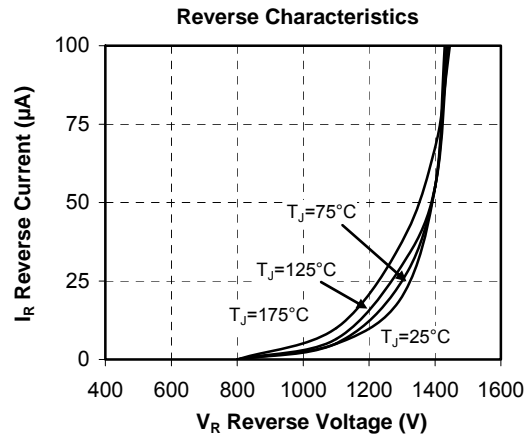
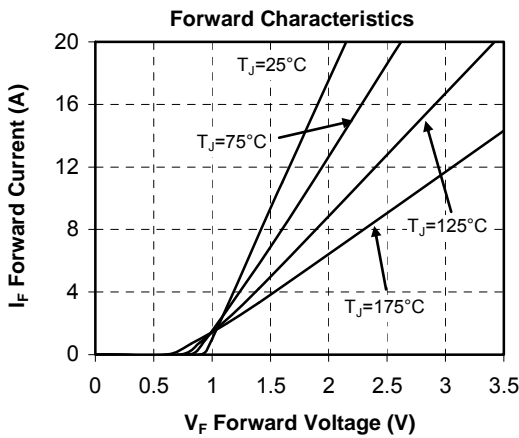
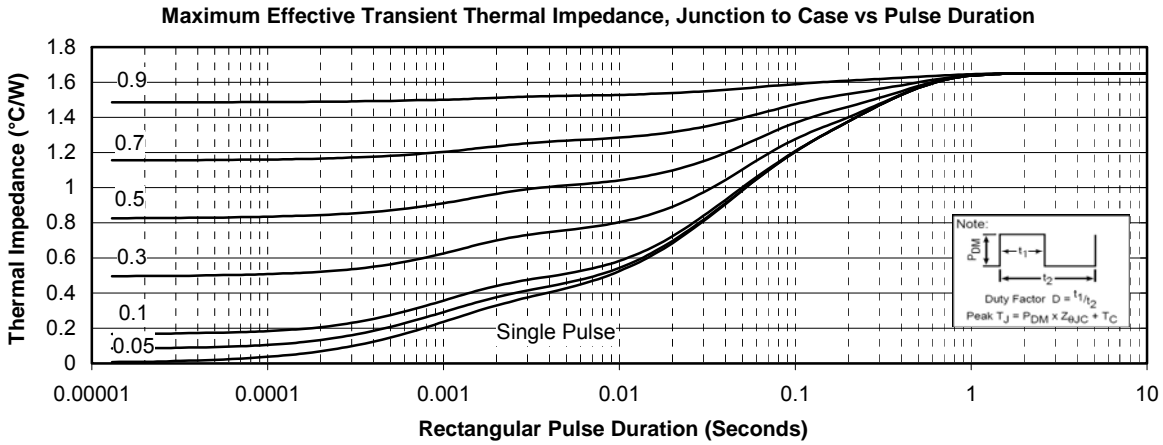
## Typical IGBT Performance Curve







## Typical SiC chopper diode Performance Curve



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Microsemi'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 6,939,743 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.