

High Temperature Bipolar Hall Effect Position Sensor

General Description

The KH1205 is an integrated Hall effect latched sensor designed for electronic commutation of brush-less DC motor applications. The Device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt to provide switching hysteresis for noise rejection, and open-collector output. An internal band-gap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

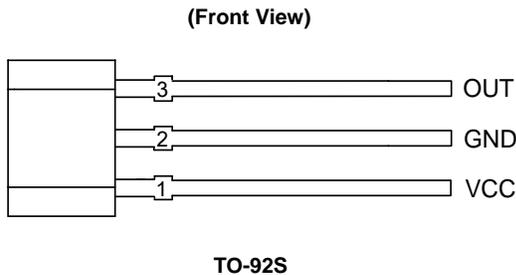
The KH1205 is designed to respond to alternating North and South poles. While the magnetic flux density is larger than operate point(B_{OP}), the output will be turned on(Low), the output is held until the magnetic flux density is lower than release point(B_{RP}), then turn off(High).

The KH1205 is available in TO-92S, SOT23-3 and SOT89-3 packages which are optimized for most applications.

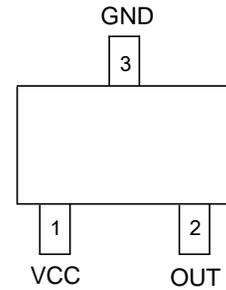
Features

- Bipolar Hall Effect Sensor
- 3.8V to 30V Wide Operating Voltage
- Open Collector Output Structure
- Integrated Power Reverse connection Protection
- Superior Temperature Stability: -40~+150 °C
- 50mA Output Sink Current
- TO-92S(SIP-3L), SOT23-3 and SOT89-3 package

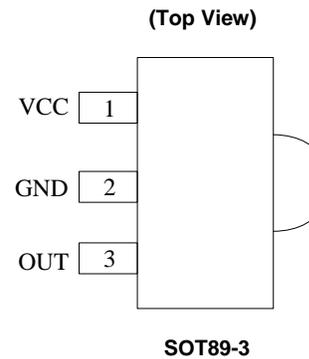
Pin Assignments



(Top View)



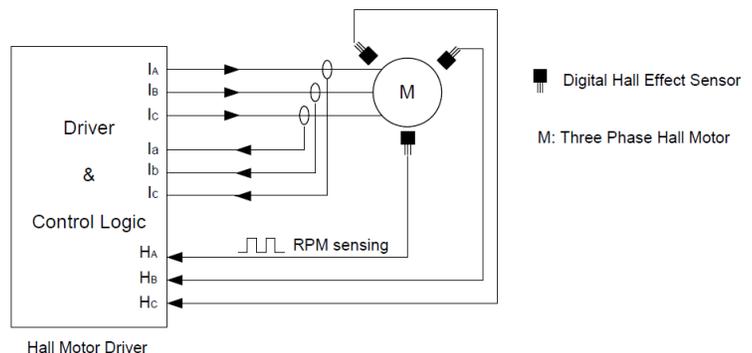
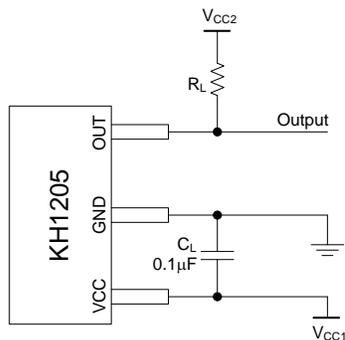
(Top View)



Applications

- Rotor Position Sensing
- Current Switch
- Encoder
- RPM Detection
- Brush-less DC Motor/Fan
- Revolution Counting
- Proximity Detection
- Speed measurement

Typical Applications Circuit

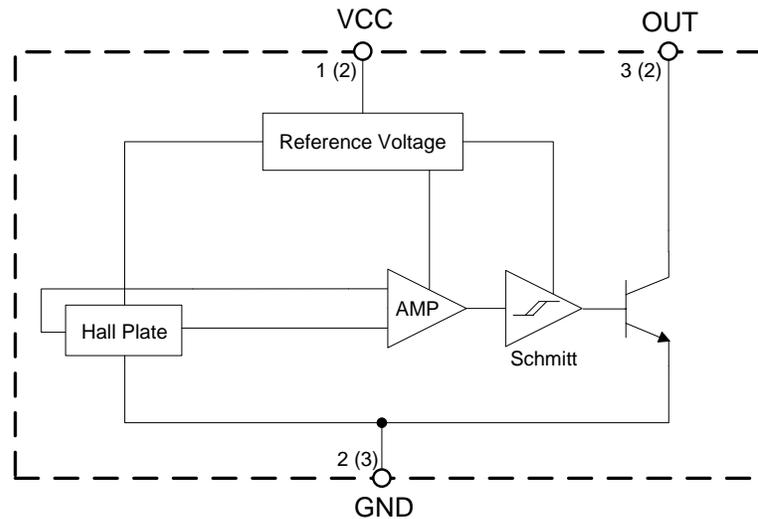


High Temperature Bipolar Hall Effect Position Sensor

Pin Descriptions

Pin Number			Pin Name	Function
TO-92S	SOT23-3	SOT89-3		
1	1	1	VCC	Supply voltage
2	3	2	GND	Ground pin
3	2	3	OUT	Output Pin

Functional Block Diagram



A(B)
 A for TO-92S and SOT89-3
 B for SOT23-3

Absolute Maximum Rates (@TA=+25°C, Note 1&2)

Symbol	Parameter		Rating	Unit
V _{CC}	Supply Voltage		-30 to 40	V
I _{CC}	Supply Current (Fault)		20	mA
V _{OUT}	Output Voltage(OFF Condition Only)		40	V
I _{OUT}	Output ON Current		50	mA
B	Magnetic Flux Density		Unlimited	Gauss
R _{TH}	Power Dissipation	TO-92S	230	°C/W
		SOT23-3	301	
		SOT89-3	230	
T _{STG}	Storage Temperature		-65 to +150	°C
T _J	Junction Temperature		+150	°C

- Notes: 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.
 2. Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

High Temperature Bipolar Hall Effect Position Sensor

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	3.8	30	V
T_{OP}	Operating Temperature	-40	+150	°C

Electrical Characteristics (@ $T_A=+25^{\circ}C$, $V_{CC}=12V$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	3.8	12	30	V
I_{CC}	Supply current	$V_{DD}=3.5$ to $24V$, Output Off	–	4.5	10	mA
I_{LE}	Output Leakage current	Released	–	–	10	uA
V_{SAT}	Saturation Voltage	$I_{OUT}=25mA$	–	150	250	mV
		$I_{OUT}=50mA$	–	400	500	mV
T_R	Rise Time	$R_L=820\Omega$, $C_L=20pF$	–	0.2	–	μs
T_F	Fall Time	$R_L=820\Omega$, $C_L=20pF$	–	0.5	–	μs
Fsw	Maximum Switching Frequency	–	–	–	100	kHz

Magnetic Characteristics (@ $T_A=+25^{\circ}C$, $V_{CC}=12V$, unless otherwise specified. Note 3)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
B_{OP}	Operating Point	$B > B_{OP}$, $V_{OUT}=low$ (output on)	–	50	120	Gauss
B_{RP}	Releasing Point	$B < B_{RP}$, $V_{OUT}=high$ (output off)	-120	-50	–	Gauss
B_{HYS}	Hysteresis	$ B_{OP} - B_{RP} $ (Note 4)	40	100	–	Gauss

Notes: 3. The specifications stated here are guaranteed by design. 1 Gauss=0.1mT
 4. B_{OP} =operating point (output turns on); B_{RP} =releasing point (output turns off)

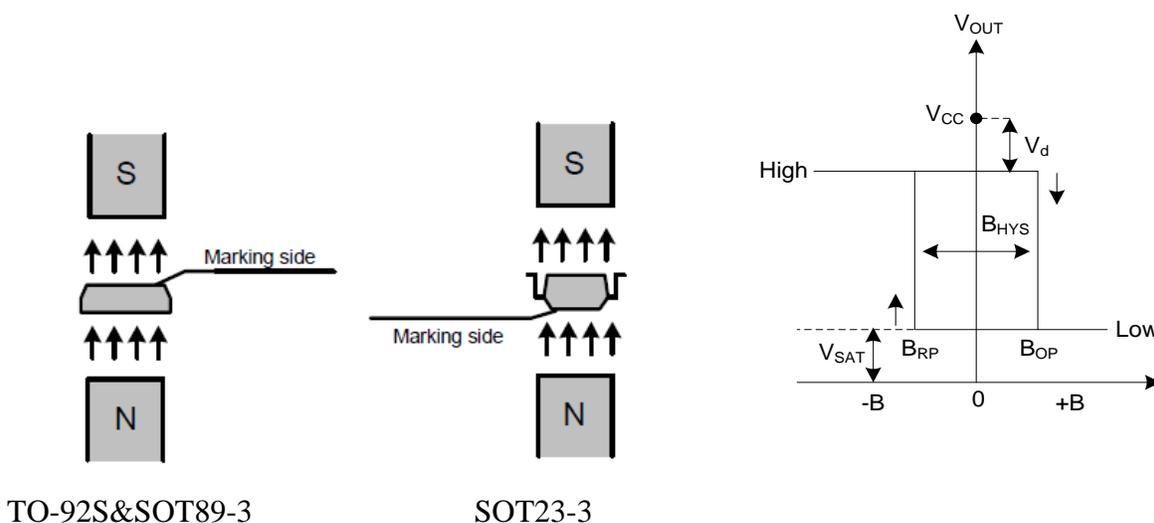
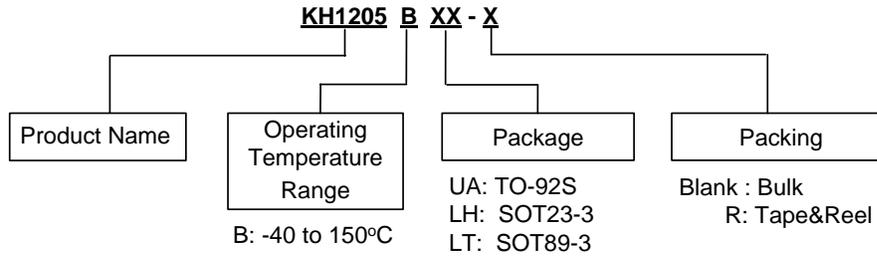


Figure 1. Output Voltage vs. Magnetic Flux Density

High Temperature Bipolar Hall Effect Position Sensor

Ordering Information



Package	Part Number	Marking ID	Packing Type
TO-92S	KH1205BUA	1205	1000/Bulk
SOT23-3	KH1205BLH-R	1205	3000/Tape&Reel
SOT89-3	KH1205BLT-R	1205	3000/Tape&Reel

Marking Informaiton

Package Type: TO-92S



First lines: Marking ID
 Second line: Date Code
 Y: Year 0 to 9
 WW: Week 00 to 52 (Work week of molding)
 X: Internal Code

Package Type: SOT23-3



First lines: Marking ID

High Temperature Bipolar Hall Effect Position Sensor

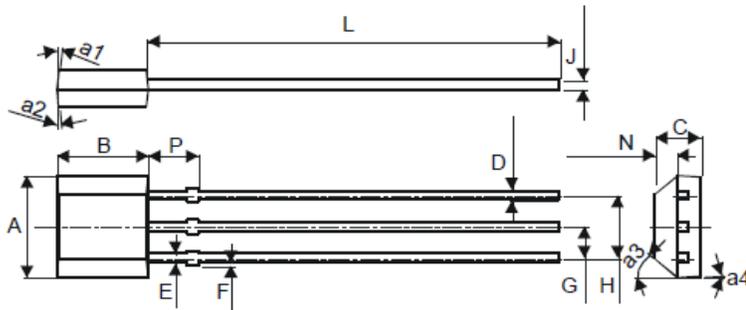
Package Type: SOT89-3



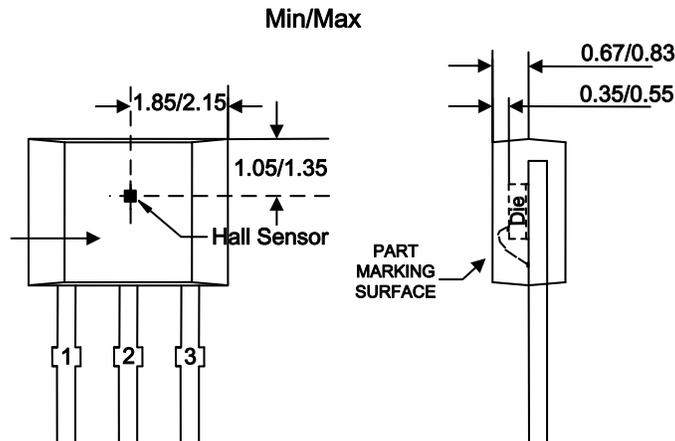
First lines: Marking ID
 Second line: Date Code
 Y: Year 0 to 9
 WW: Week 00 to 52 (Work week of molding)
 X: Internal Code

Package Outline Dimension

Package Type: TO-92S



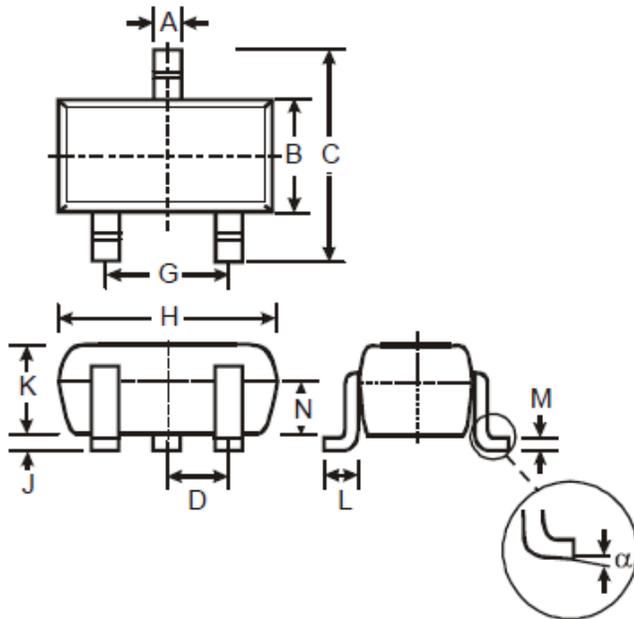
TO-92S		
Dim	Min	Max
A	4.0	4.2
a1	3° Typ	
a2	6° Typ	
a3	45° Typ	
a4	3° Typ	
B	3.08	3.28
C	1.48	1.68
D	0.36	0.56
E	0.44 Typ	
F	-0.05	0.20
G	1.27 Typ	
H	2.54 Typ	
J	0.38 Typ	
L	13.5	14.5
N	0.71	0.81
P	2.60	3.00
All Dimensions in mm		



Sensor Location

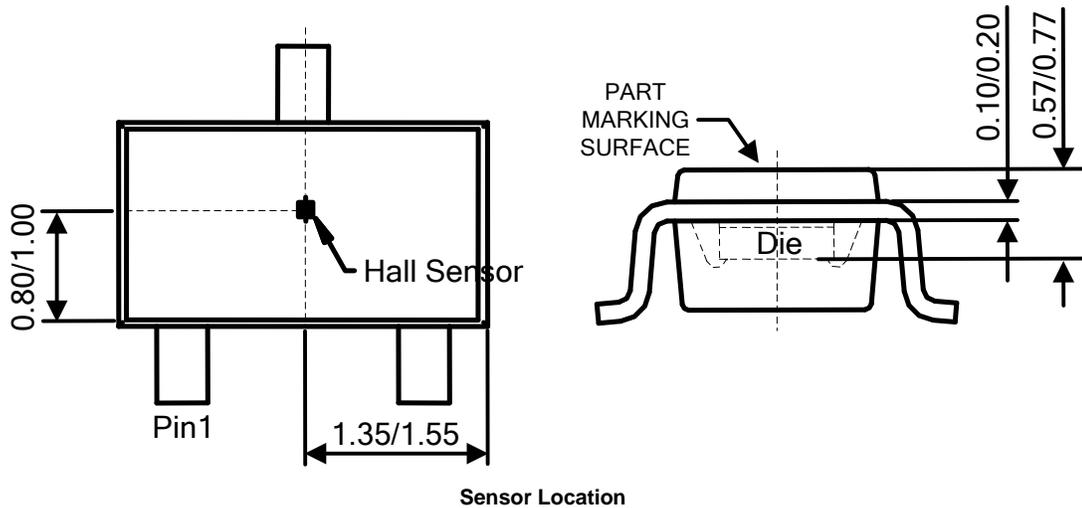
High Temperature Bipolar Hall Effect Position Sensor

Package Type: SOT23-3



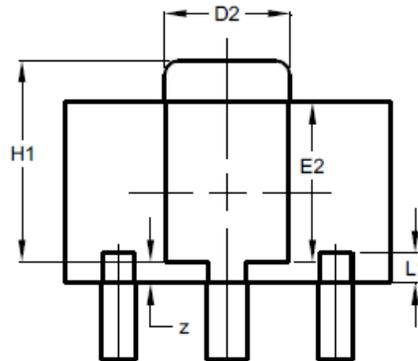
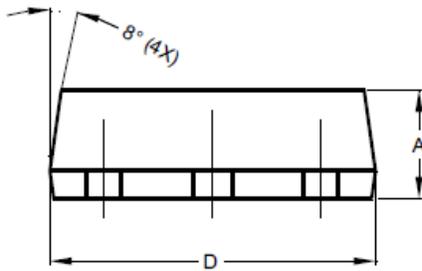
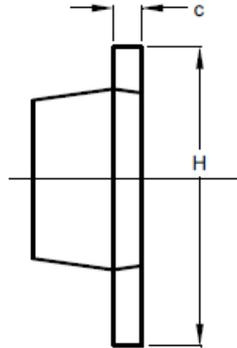
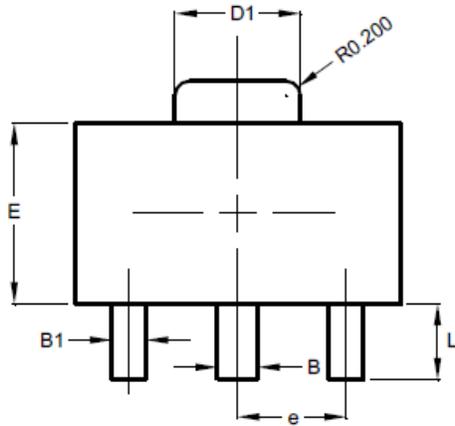
SOT23-3			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

Min/Max

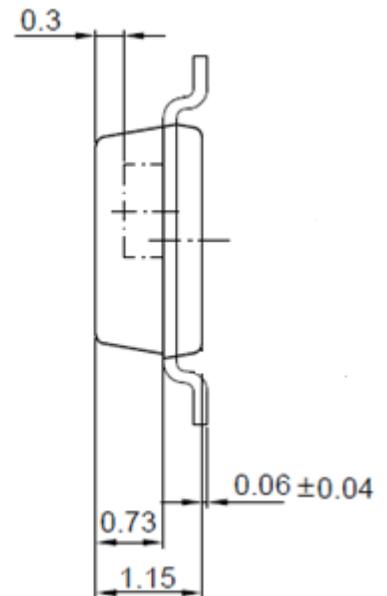
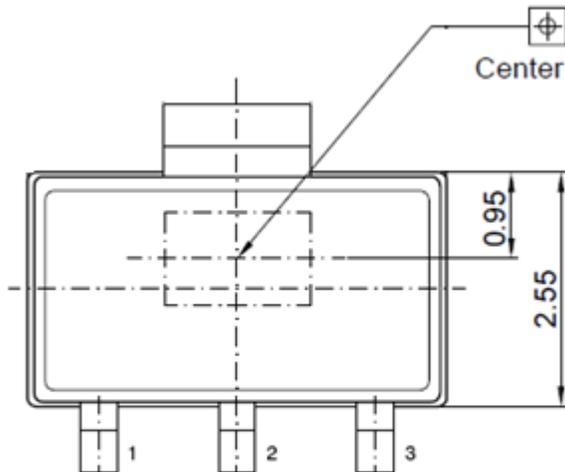


High Temperature Bipolar Hall Effect Position Sensor

Package Type: SOT89-3



SOT89-3			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			



Sensor Location

High Temperature Bipolar Hall Effect Position Sensor

IMPORTANT NOTICE

THE KOMPASS SYSTEM MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION). THE INFORMATION AND DATA CONTAINED IN THIS DOCUMENT ARE BELIEVED TO BE ACCURATE AND RELIABLE. THE SOFTWARE AND PROPRIETARY INFORMATION CONTAINED HEREIN MAY BE PROTECTED BY COPYRIGHT, PATENT TRADEMARK AND/OR OTHER INTELLECTUAL PROPERTY RIGHTS OF KOMPASS SYSTEM. ALL RIGHTS NOT EXPRESSLY GRANTED REMAIN RESERVED BY KOPASS SYSTEM.

KOMPASS SYSTEM AND ITS SUBSIDIARIES RESERVE THE RIGHT TO REVIEW THIS DOCUMENT AND TO MAKE MODIFICATIONS, ENHANCEMENTS, IMPROVEMENTS, CORRECTIONS OR OTHER CHANGES AT ANY TIME WITHOUT OBLIGATION TO NOTIFY ANY PERSON OR ENTITY OF SUCH REVISION OR CHANGES DESCRIBED HEREIN. FOR FURTHER ADVICE PLEASE CONTACT US DIRECTLY.

KOMPASS SYSTEM DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF THIS DOCUMENT OR ANY PRODUCT DESCRIBED HEREIN; NEITHER DOES KOMPASS SYSTEM CONVEY ANY LICENSE UNDER ITS PATENT OR TRADEMARK RIGHTS, NOR THE RIGHTS OF OTHERS. ANY CUSTOMER OR USER OF THIS DOCUMENT OR PRODUCTS DESCRIBED HEREIN IN SUCH APPLICATIONS SHALL ASSUME ALL RISKS OF SUCH USE AND WILL AGREE TO HOLD KOMPASS SYSTEM AND ALL THE COMPANIES WHOSE PRODUCTS ARE REPRESENTED ON KOMPASS SYSTEM WEBSITE, HARMLESS AGAINST ALL DAMAGES.

ANY INFORMATION AND DATA WHICH MAY BE PROVIDED IN THE DOCUMENT CAN AND DO VARY IN DIFFERENT APPLICATIONS, AND ACTUAL PERFORMANCE MAY VARY OVER TIME. ALL OPERATING PARAMETERS MUST BE VALIDATED FOR EACH CUSTOMER APPLICATION BY CUTOMERS' TECHNICAL EXPERTS. ANY NEW ISSUE OF THIS DOCUMENT INVALIDATES PREVIOUS ISSUES.

KOMPASS SYSTEMS DOES NOT WARRANT OR ACCEPT ANY LIABILITY WHATSOEVER IN RESPECT OF ANY PRODUCTS PURCHASED THROUGH UNAUTHORIZED SALES CHANNEL.

SHOULD CUSTOMERS PURCHASE OR USE KOMPASS SYSTEM PRODUCTS FOR ANY UNINTENDED OR UNAUTHORIZED APPLICATION, CUSTOMERS SHALL INDEMNIFY AND HOLD KOMPASS SYSTEM AND ITS REPRESENTATIVES HARMLESS AGAINST ALL CLAIMS, DAMAGES, EXPENSES, AND ATTORNEY FEES ARISING OUT OF, DIRECTLY OR INDIRECTLY, ANY CLAIM OF PERSONAL INJURY OR DEATH ASSOCIATED WITH SUCH UNINTENDED OR UNAUTHORIZED APPLICATION.

PRODUCTS DESCRIBED THEREIN MAY BE COVERED BY ONE OR MORE UNITED STATES, INTERNATIONAL OR FOREIGN PATENTS PENDING. PRODUCT NAMES AND MARKINGS NOTED THEREIN MAY ALSO BE COVERED BY ONE OR MORE UNITED STATES, INTERNATIONAL OR FOREIGN TRADEMARKS.

THIS DOCUMENT IS WRITTEN IN ENGLISH BUT MAY BE TRANSLATED INTO MULTIPLE LANGUAGES FOR REFERENCE. ONLY THE ENGLISH VERSION OF THIS DOCUMENT IS THE FINAL AND DETERMINATIVE FORMAT RELEASED BY KOMPASS SYSTEM.

LIFE SUPPORT

DO NOT USE OUR PRODUCTS IN LIFE-SUPPORTING SYSTEMS, MILITARY, AVIATION, OR AEROSPACE APPLICATIONS! UNLESS EXPLICITLY AGREED TO OTHERWISE IN WRITING BETWEEN THE PARTIES, KOMPASS SYSTEM'S PRODUCTS ARE NOT DESIGNED, INTENDED OR AUTHORIZED FOR USE AS COMPONENTS IN SYSTEMS INTENDED FOR SURGICAL IMPLANTS INTO THE BODY, OR OTHER APPLICATIONS INTENDED TO SUPPORT OR SUSTAIN LIFE, OR FOR ANY OTHER APPLICATION IN WHICH THE FAILURE OF THE PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH COULD OCCUR.

CUSTOMERS REPRESENT THAT THEY HAVE ALL NECESSARY EXPERTISE IN THE SAFETY AND REGULATORY RAMIFICATIONS OF THEIR LIFE SUPPORT DEVICES OR SYSTEMS, AND ACKNOWLEDGE AND AGREE THAT THEY ARE SOLELY RESPONSIBLE FOR ALL LEGAL, REGULATORY AND SAFETY-RELATED REQUIREMENTS CONCERNING THEIR PRODUCTS AND ANY USE OF KOMPASS SYSTEM PRODUCTS IN SUCH SAFETY-CRITICAL, LIFE SUPPORT DEVICES OR SYSTEMS, NOTWITHSTANDING ANY DEVICES- OR SYSTEMS-RELATED INFORMATION OR SUPPORT THAT MAY BE PROVIDED BY KOMPASS SYSTEM. FURTHER, CUSTOMERS MUST FULLY INDEMNIFY KOMPASS SYSTEM AND ITS REPRESENTATIVES AGAINST ANY DAMAGES ARISING OUT OF THE USE OF KOMPASS SYSTEM PRODUCTS IN SUCH SAFETY-CRITICAL, LIFE SUPPORT DEVICES OR SYSTEMS.

COPYRIGHT © 2015, KOMPASS SYSTEM

www.kompassys.com