

CMOS, Latch, High Sensitive Hall-Effect Sensor With Pull-up Resistor

General Description

The KH1103 is an integrated Hall effect latched sensor with CMOS technology designed for electronic commutation of brush-less DC motor applications. The Device includes an on-chip Hall voltage generator with dynamic offset cancellation system for accurate magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt to provide switching hysteresis for noise rejection, and an output driver with a pull up resistor which connects to VDD. An internal band-gap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

The KH1103 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).

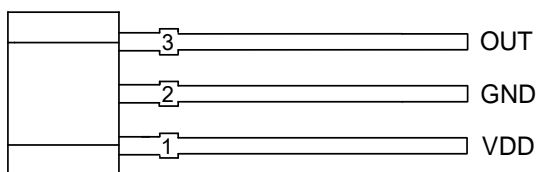
The KH1103 is available in TO-92S and SOT23-3 packages which are optimized for most applications.

Features

- CMOS technology Hall Effect Sensor
- 2.4V to 24V Wide Operating Voltage
- Built-in Pull-up resistor Structure
- Chopper-stabilized amplifier stage
- Superior Temperature Stability: $-40 \sim +125$ °C
- 25mA Output Sink Current
- High Magnetic Sensitivity: $B_{HYS}=60GS$ Typ.
- TO-92S(SIP-3L), and SOT23-3 package

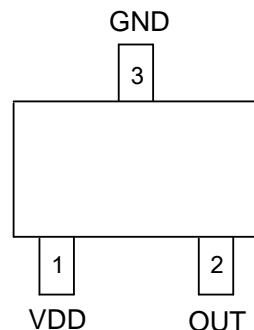
Pin Assignments

(Front View)



TO-92S

(Top View)

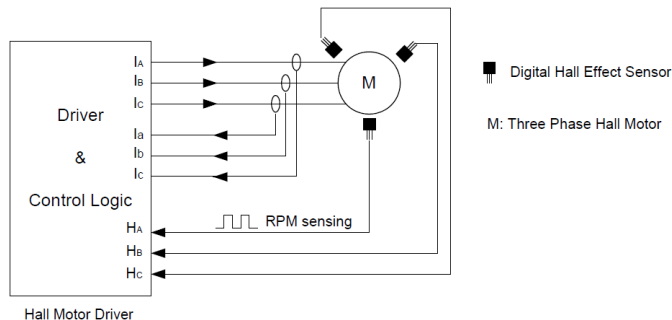
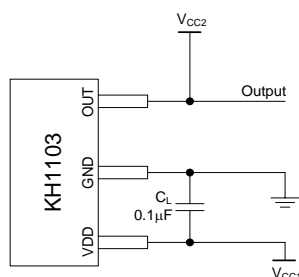


SOT23-3

Applications

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

Typical Applications Circuit

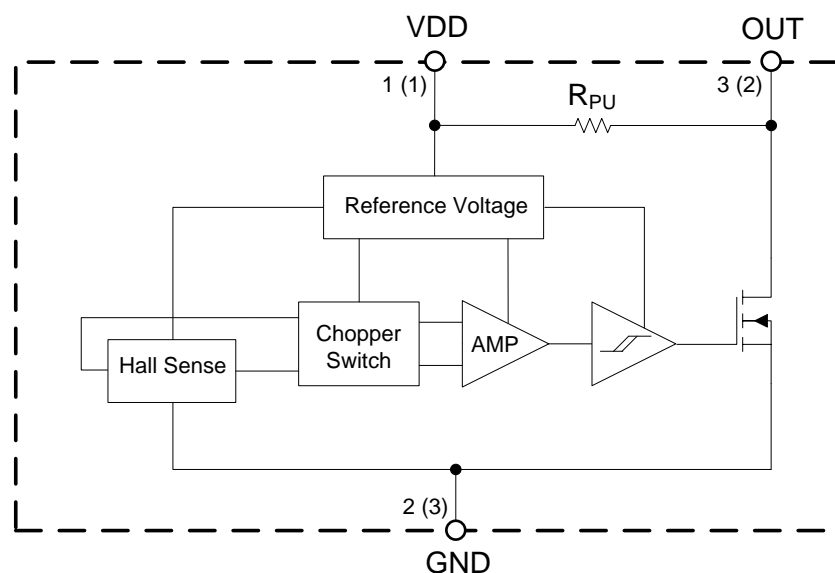


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Pin Descriptions

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

Functional Block Diagram



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

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

Symbol	Parameter		Rating	Unit
V_{DD}	Supply Voltage		28	V
I_{DD}	Supply Current (Fault)		50	mA
V_{OUT}	Output Voltage(OFF Condition Only)		28	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	
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.

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Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{DD}	Supply Voltage	2.4	24	V
T_{OP}	Operating Temperature	-40	+125	°C

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	Supply Voltage	Operating	2.4	12	24	V
I_{DD}	Supply current	$V_{DD}=2.4$ to 24V , Output Off	–	2.0	5.0	mA
I_{OFF}	Output Leakage current	Released, Output Off	–	–	10	μA
$V_{DS_{on}}$	Saturation Voltage	$I_{OUT}=10\text{mA}$	–	150	300	mV
		$I_{OUT}=20\text{mA}$	–	350	500	mV
T_R	Rise Time	$R_L=820\Omega$, $C_L=20\text{pF}$	–	–	0.45	μs
T_F	Fall Time	$R_L=820\Omega$, $C_L=20\text{pF}$	–	–	0.45	μs
F_{SW}	Maximum Switching Frequency	–	–	10	–	kHz
R_{PU}	Internal Pull-up Resistor	–	24	27	30	Ω

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
B_{OP}	Operating Point	$B > B_{OP}$, $V_{OUT}=\text{low}(\text{output on})$	5	30	80	Gauss
B_{RP}	Releasing Point	$B < B_{RP}$, $V_{OUT}=\text{high}(\text{output off})$	-80	-30	-5	Gauss
B_{HYS}	Hysteresis	$ B_{OP} - B_{RP} $ (Note 4)	30	60	90	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)

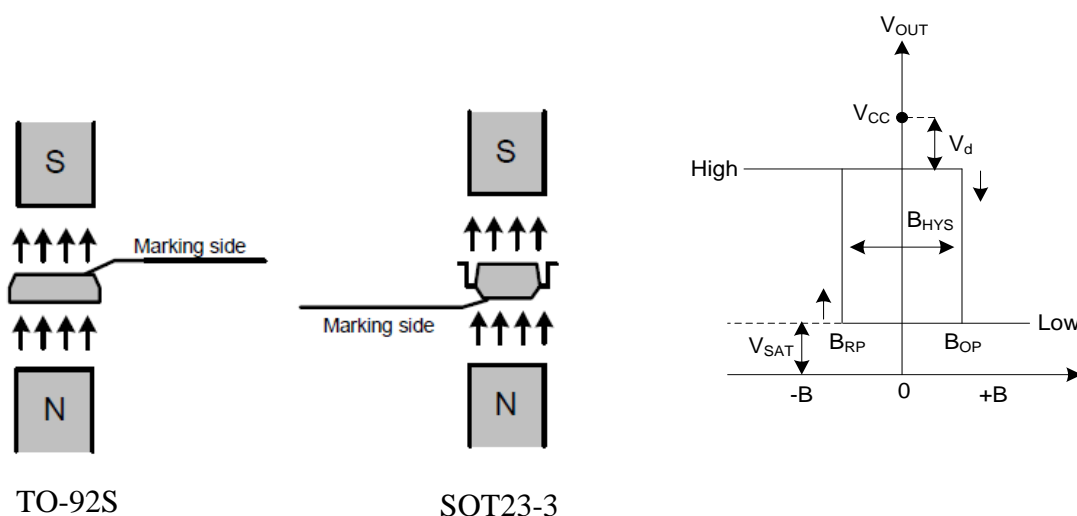


Figure 1. Output Voltage vs. Magnetic Flux Density

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Performance Characteristic

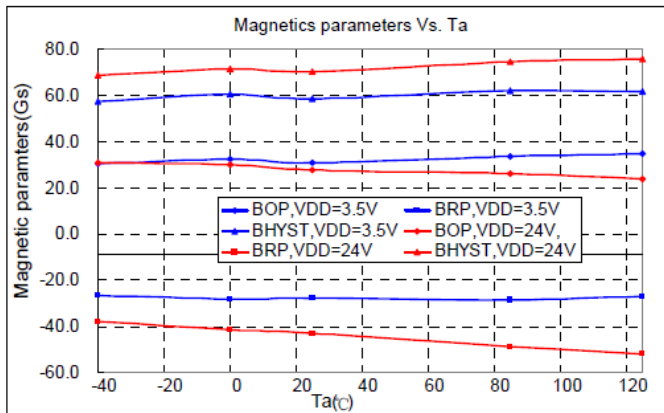


Figure 2. Magnetics Parameters vs. Ta

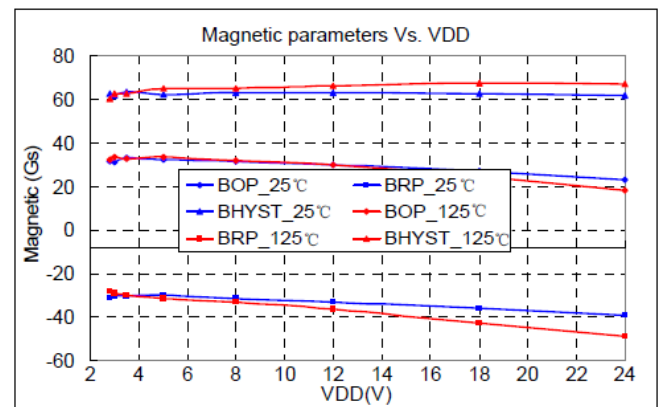


Figure 3. Magnetic Parameters vs. VDD

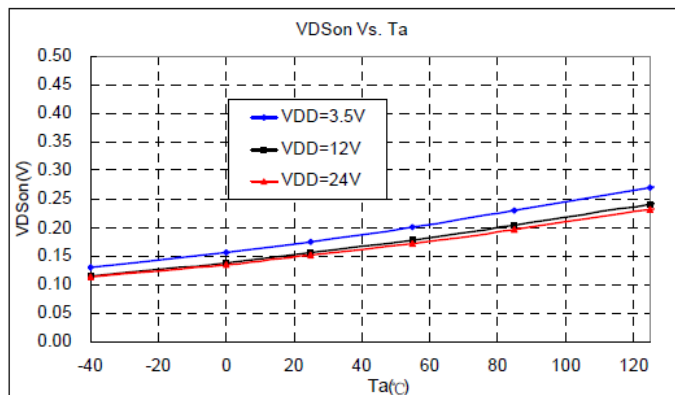


Figure 4. VDSon vs. Ta

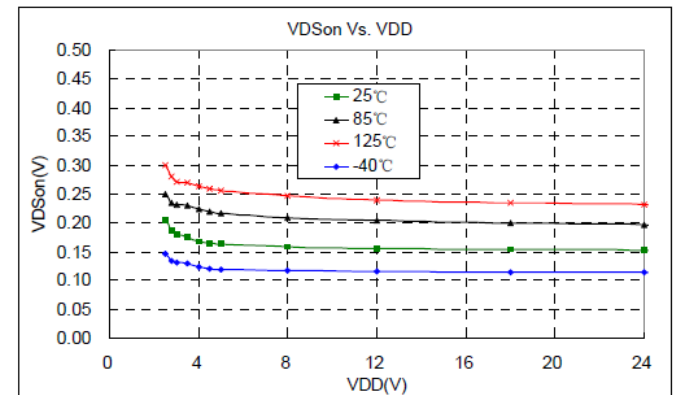


Figure 5. VDSon vs. Ta

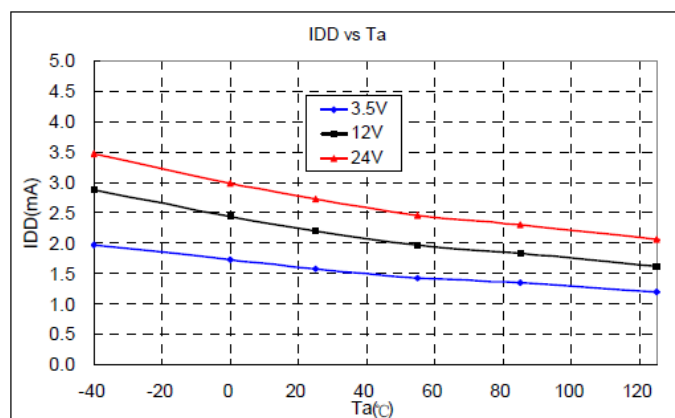


Figure 6. IDD vs. Ta

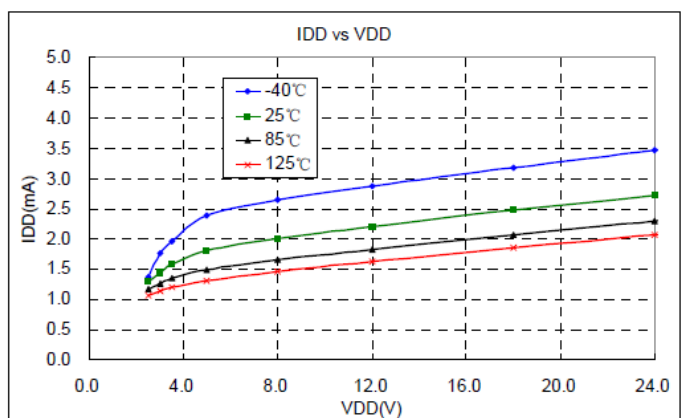


Figure 7. IDD vs. VDD

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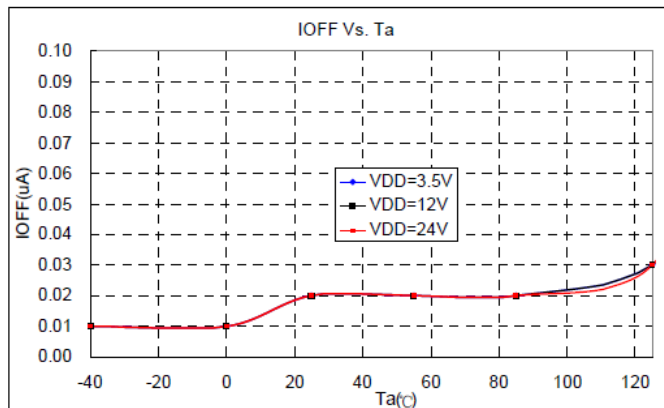


Figure 8. IOFF vs. Ta

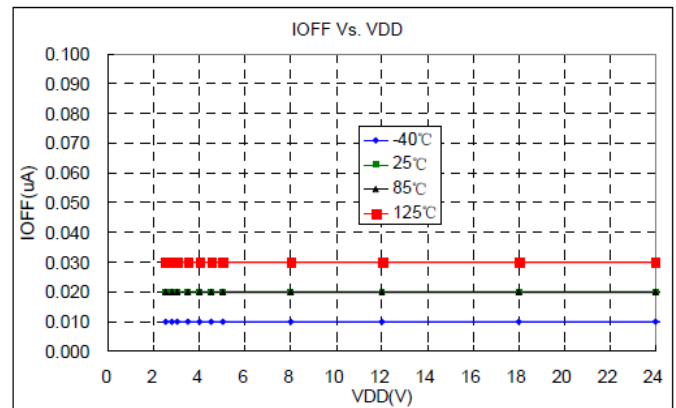
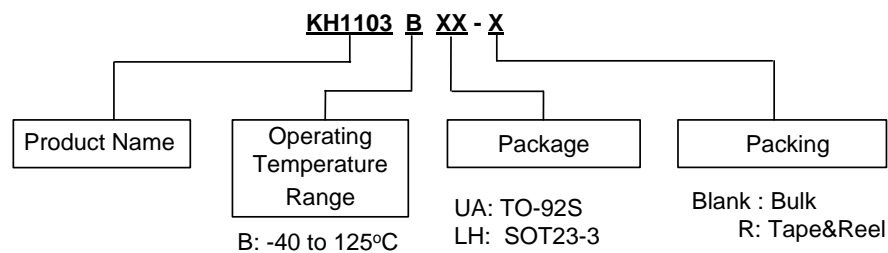


Figure 9. IOFF vs. VDD

Ordering Information



Package	Part Number	Marking ID	Packing Type
TO-92S	KH1103BUA	1103	1000/Bulk
SOT23-3	KH1103BLH-R	1103	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

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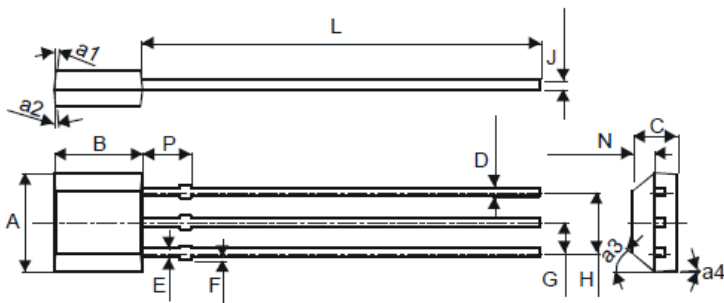
Package Type: SOT23-3



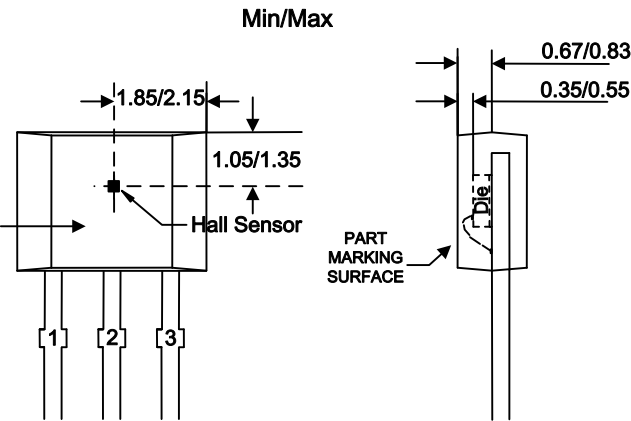
First lines: Marking ID

Package Outline Demension

Package Type: TO-92S

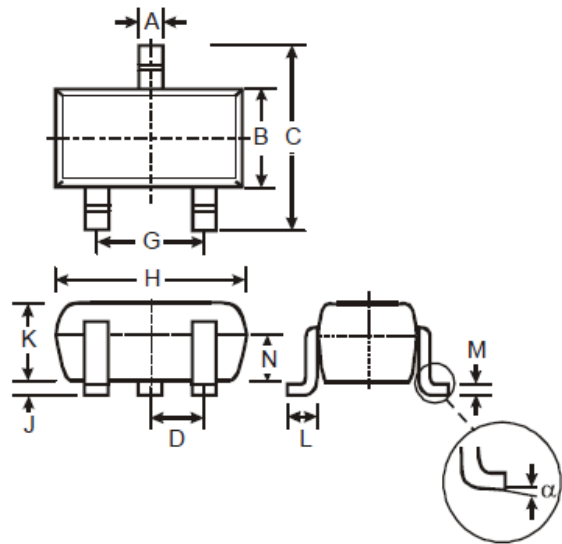


TO-92S		
Dim	Min	Max
A	4.0	4.2
a1	3° Typ	
a2	6° Typ	
a3	45° Typ	
a4	3° Typ	
B	3.08	3.28
C	1.48	1.68
D	0.36	0.56
E	0.44 Typ	
F	-0.05	0.20
G	1.27 Typ	
H	2.54 Typ	
J	0.38 Typ	
L	13.5	14.5
N	0.71	0.81
P	2.60	3.00
All Dimensions in mm		



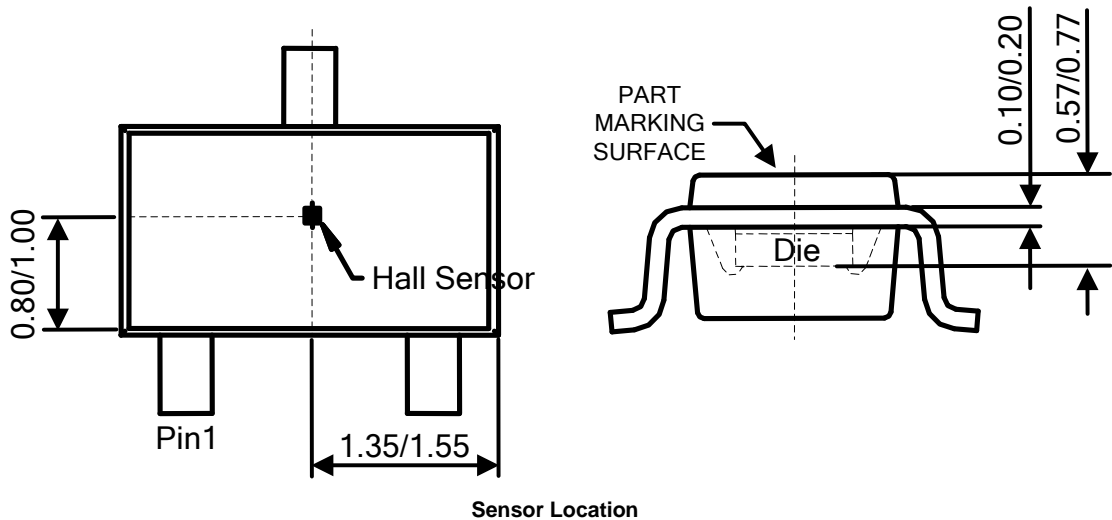
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Package Type: SOT23-3



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



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