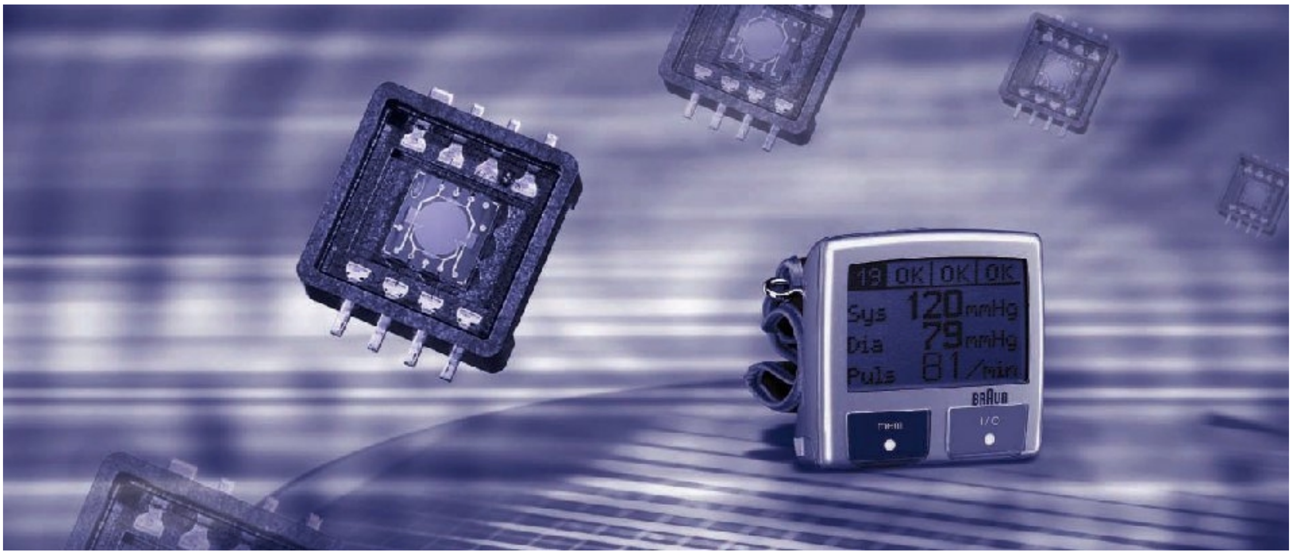
KP202-R
KP203-R

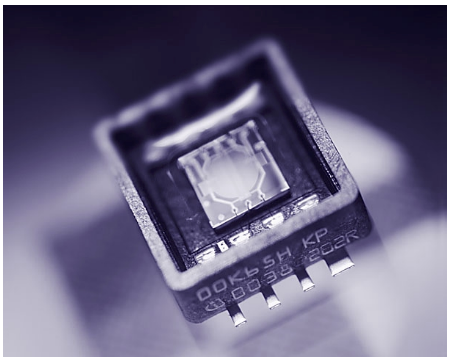


Sensory Thinking ....

KP20x-R- Series

Silicon Piezoresistive Relative Pressure Sensors

Low Cost Surface Mounted Version

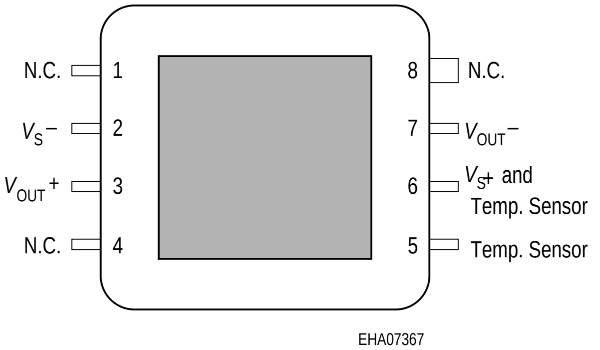


Features

- High sensitivity and linearity
- Fast response
- Very small dimensions
- Low cost
- Produced in qualified semiconductor fabrication lines
- SMD housing
- Built in silicon temperature sensor

Type	Marking	Ordering Code	Pressure Range	Package
KP 202-R	KP202R	Q62705K0424	0 … 60 kPa (0.6 bar)	P-DSOF-8-6
KP 203-R	KP203R	Q62705K0430	0 … 160 kPa (1.6 bar)	P-DSOF-8-6

Pin Configuration



KP 20x-R

Pin Definitions and Functions

Pin No.	Function
1	Not connected
2	V_S –
3	V_{OUT} +
4	Not connected
5	Temperature Sensor, typ. R_{25} = 2 kΩ
6	V_S + and Temperature Sensor
7	V_{OUT} –
8	Not connected

Electric Network

Four piezoresistors form a bridge circuit, providing a very accurate and linear output voltage, directly proportional to the applied pressure.

$V_{OUT} = V_O = V_{FIN} = V_S \times (R_1(p) \times R_3(p) - R_2(p) \times R_4(p))/[(R_1(p) + R_2(p)) \times (R_3(p) + R_4(p))]$

with

$R_1(0) \cong R_2(0) \cong R_3(0) \cong R_4(0) \cong R_B$

A temperature sensor chip R_T, that is built in the housing, can be used to compensate the temperature drift of the pressure sensor.

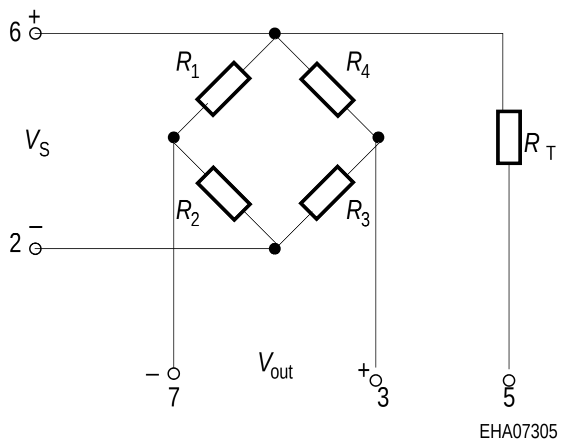


Figure 1 Sensor Schematic

Piezoresistors R_1 … R_4 denote the pressure sensitive resistors connected as a Wheatstone bridge. R_T is a KTY-series temperature dependent resistor with a positive TC.

Absolute Maximum Ratings

Parameter	Symbol	Limit Values	Unit
Supply voltage	$V_{S\ MAX}$	12	V
Overpressure[1)]	p_{MAX}	250	kPa
Burst Pressure KP 202-R, KP 203-R	p_{BURST}	 400 800	kPa
Operating temperature range	T_{OP}	– 40 … + 125	°C
Storage temperature range	T_{STG}	– 40 … + 125	°C
Mechanical shock survival	–	2000	g

1) Overpressure is limited to p_{max}, due to absorption of gas into the protective gel covering the sensor at higher pressures. Abrupt decrease of pressure from values higher than p_{max} to low pressures can cause in the gel to rupture.

Electrical Characteristics

at T_A= 25 °C and V_S = 5 V unless otherwise specified

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Pressure Range KP 202-R KP 203-R	P_N	 0 0	 – –	 60 160	kPa
Bridge Resistance	R_B	5.5	6.3	7.5	kΩ
Sensitivity KP 202-R KP 203-R	s	 0.24 0.11	 0.44 0.20	 0.74 0.30	 mV / V / kPa
Full Scale Span ($p = p_N$, V_S = 5 V) KP 202-R KP 203-R	V_{FIN}	 80 88	 132 160	 222 240	mV
Offset signal $p = p_0$	V_O	– 25	–	+ 25	mV
Linearity error (best fit straight line) $p = p_0 \dots p_N$ KP 202-R KP 203-R	F_L	 – –	 ± 3 ± 3	 – –	% V_{FIN}

Pressure Hysteresis	P_H				% V_{FIN}
KP 202-R		–	–	–	
KP 203-R		–	± 0.1	–	

Temperature Characteristics
at T_1= 25 °C, T_2 = 90 °C, T_3 = 25 °C and V_S = 5 V unless otherwise specified

Parameter	Sym-bol	Limit Values			Unit
		min.	typ.	max.	
Temperature Coefficient of Span[1)]	TC_{VFIN}	–	– 0.17	–	% K^{-1}
Temperature Coefficient of Offset[1)]	TC_{V0}				% K^{-1}
KP 202-R		–	± 0.01	–	
KP 203-R		–	± 0.01	–	
Temperature Coefficient of Bridge Resistance[2)]	TC_{RB}	–	+ 0.26	–	% K^{-1}
Temperature Hysteresis of Span[3)]	TH_{VFIN}				% K^{-1}
KP 202-R		–	± 0.4	–	
KP 203-R		–	± 0.3	–	
Temperature Hysteresis of Offset[3)]	TH_{V0}				% V_{FIN}^{-1}
KP 202-R		–	± 0.3	–	
KP 203-R		–	± 0.3	–	

1) Change in value of TC V_{FIN} or TCV between 25 °C and 125 °C relative to V_{FIN} (25 °C)

2) Change in RB between 25 °C and 125 °C relative to RB (25 °C)

3) Change in V_0 (25 °C) or V_{FIN} (25 °C) after temp. cycle 25 °C → 125 °C → 25 °C relative to V_{FIN} (25 °C)

Temperature Compensation

Cost-effective temperature compensation can be achieved using standard ohmic resistors in combination with the built in temperature sensor.

With fixed values for R_V and R_L a temperature compensation error of the output signal (span plus offset) of typical less then ± 1% is achieved in the range 10 °C to 40 °C (see **Figure 2**).

A better temperature compensation is possible by measurement of the temperature coefficients of the sensor. In this case R_V is optimized as described in Chapter 3.10 (see Data Book).

Alternatively an ASIC can be used for calibration and compensation.

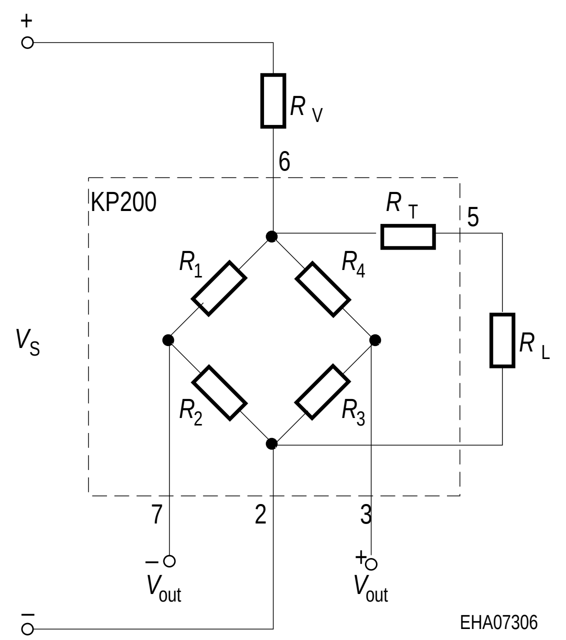


Figure 2 Electrical Circuit for Temperature Compensation

Broken line denotes sensor assembly. R_V and R_L need to be added externally.

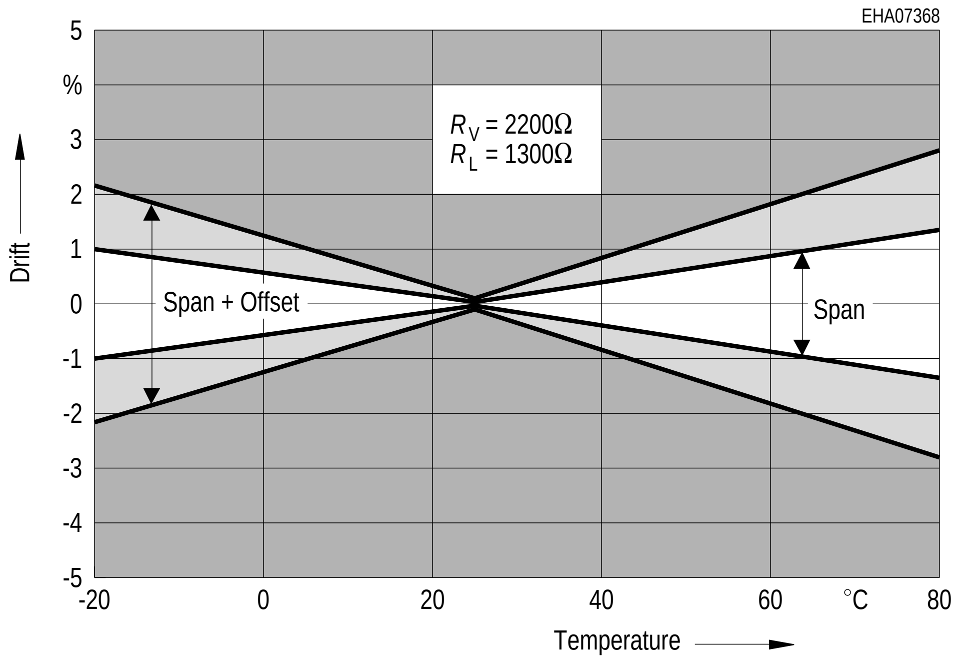


Figure 3 **Error Band of Typical Signal Drift after Temperature Compensation Using Fixed Values for R_V and R_L**

Using fixed resistor R_V = 2200 Ω and R_L = 1300 Ω. Graph shows typical results for compensated span + offset signals.

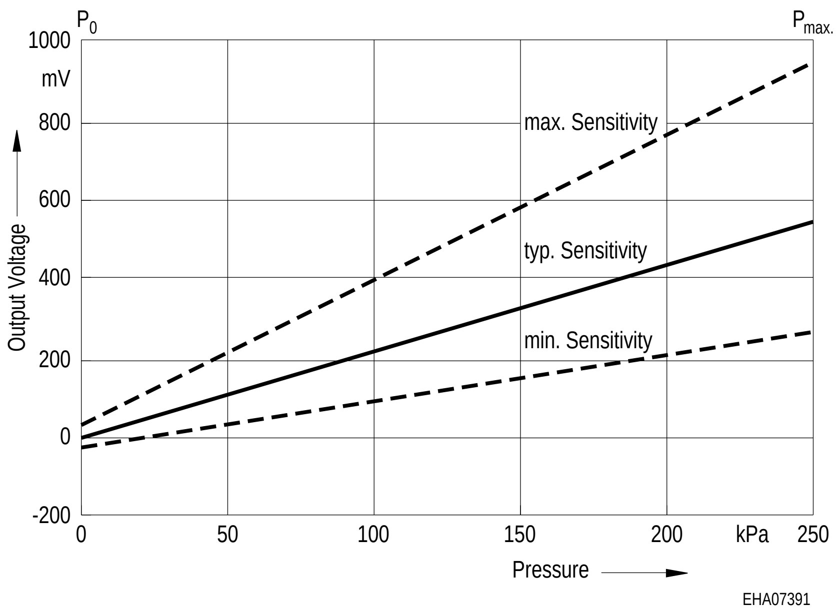


Figure 4 Output Voltage for Nominal and Maximal Pressure Range KP 202-R

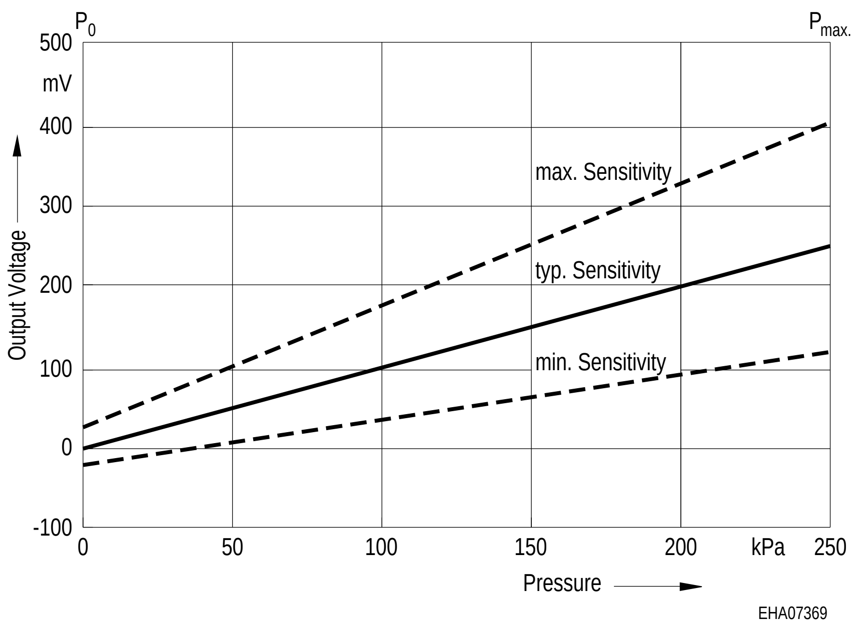
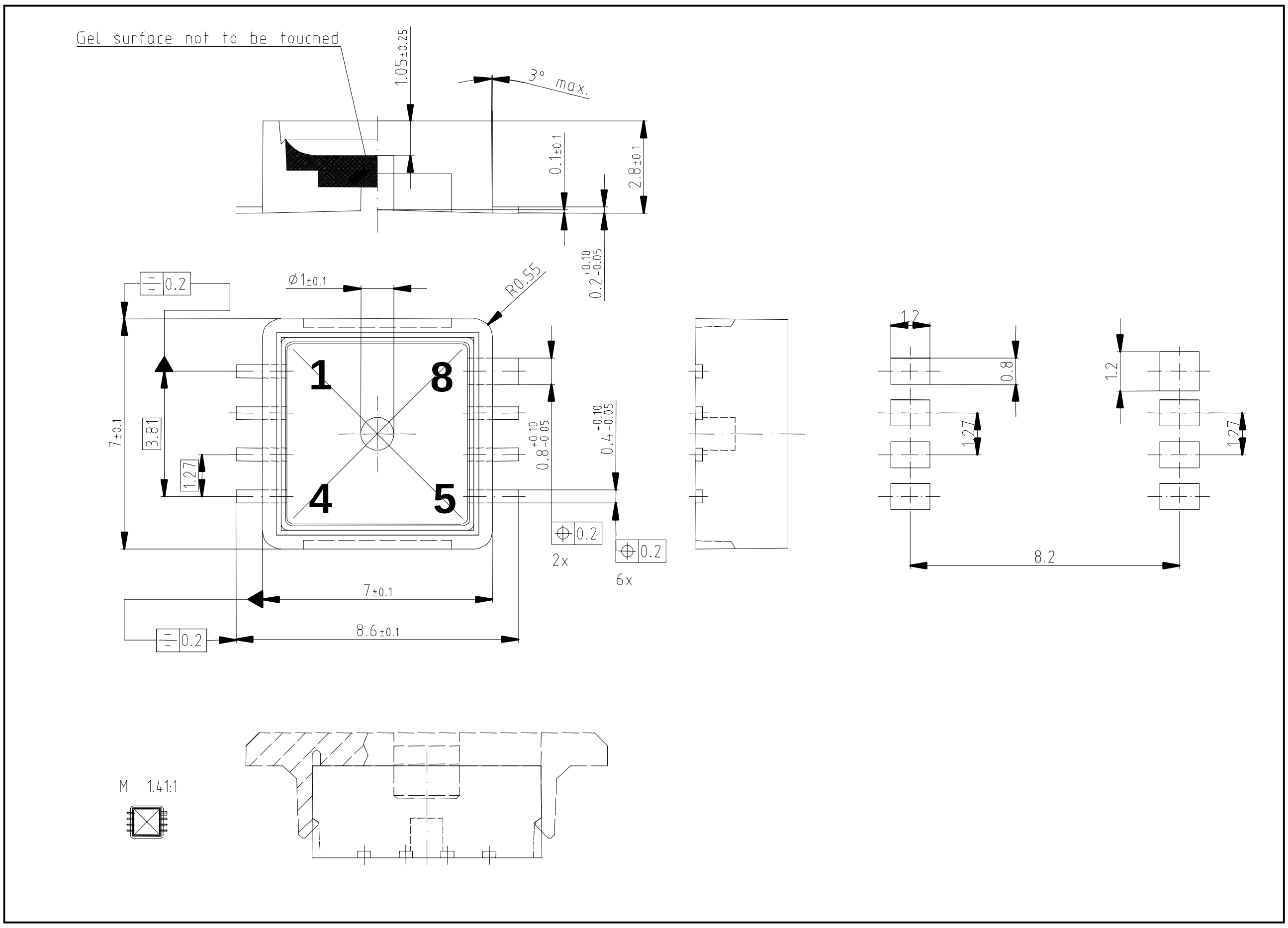


Figure 5 Output Voltage for Nominal and Maximal Pressure Range KP 203-R

Package Outlines

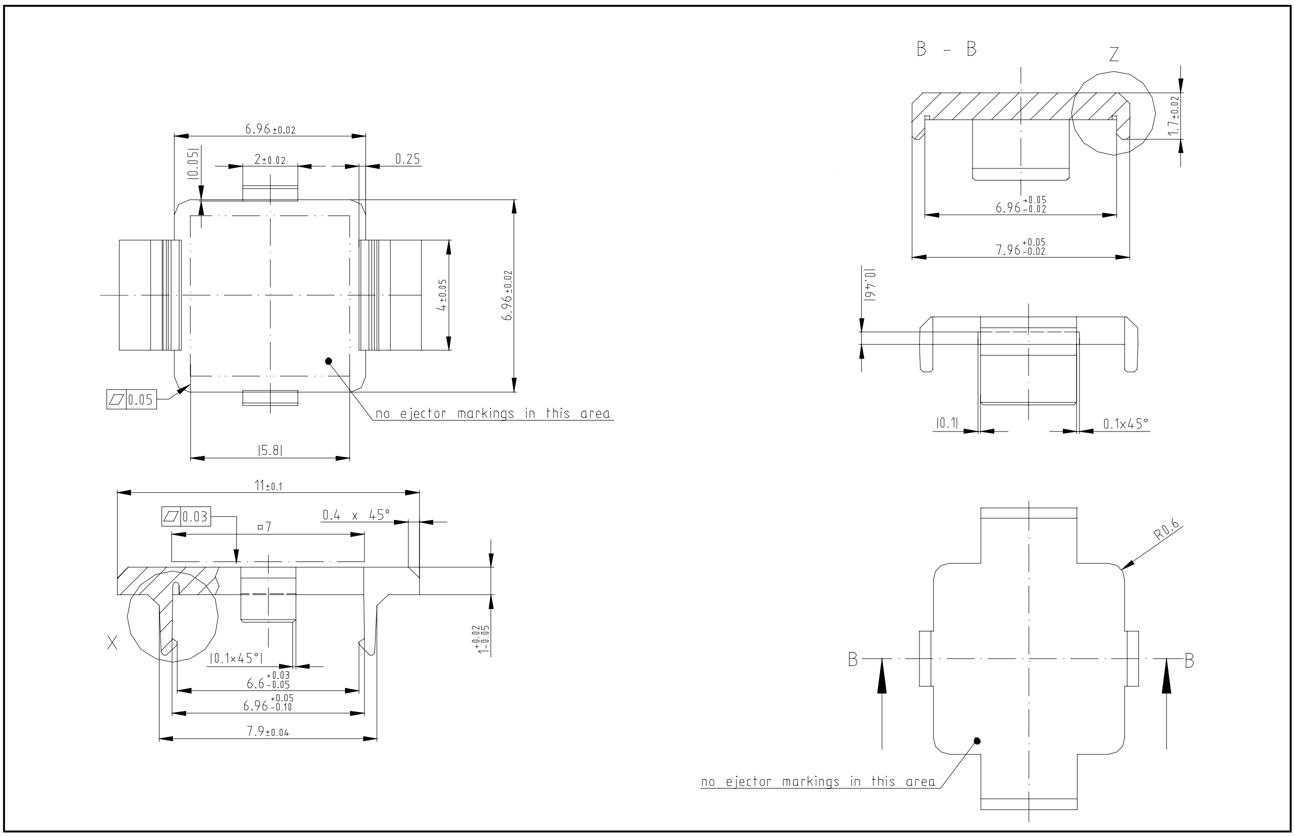
P-DSOF-8-6
(Plastic Dual Small Outline Flat Package)

Body:



Dimensions in mm

Cap:



Dimensions in mm

The package is made of a thermoplast housing and copper leadframe with NiPdAu finish. The chip is glued into the premolded plastic package using silicone glue, gold-wire bonded and covered with a protective gel. The pressure vent hole in the rear side of the package is 2.0 ± 0.3 mm in diameter. Finally the pressure port cap is mounted on the housing.

Sorts of Packing
Package outlines for tubes, trays etc. are contained in our Data Book “Package Information”.

Dimensions in mm

How To Reach Us:

http://www.infineon.com

Infineon Technologies AG
Richard-Strauss-Strasse 76
81679 München
Tel. (+49) 89-92 21 40 86
Fax (+49) 89-92 21 20 71

Infineon Technologies (AP) Pte Ltd
25 New Industrial Road
Singapore 536211
Tel. (+65) 8-40 05 91
Fax (+65) 8-40 00 76

Infineon Technologies Corp.
Suite 112, Sensors Marketing Group
21800 Haggerty Rd.
NORTHVILLE, (MI) 48167
Tel. (+1) 2 48-3 74 08 90
Fax (+1) 2 48-3 74 25 01

Published by
Infineon Technologies AG,
St.-Martin-Strasse 53,
81541 München