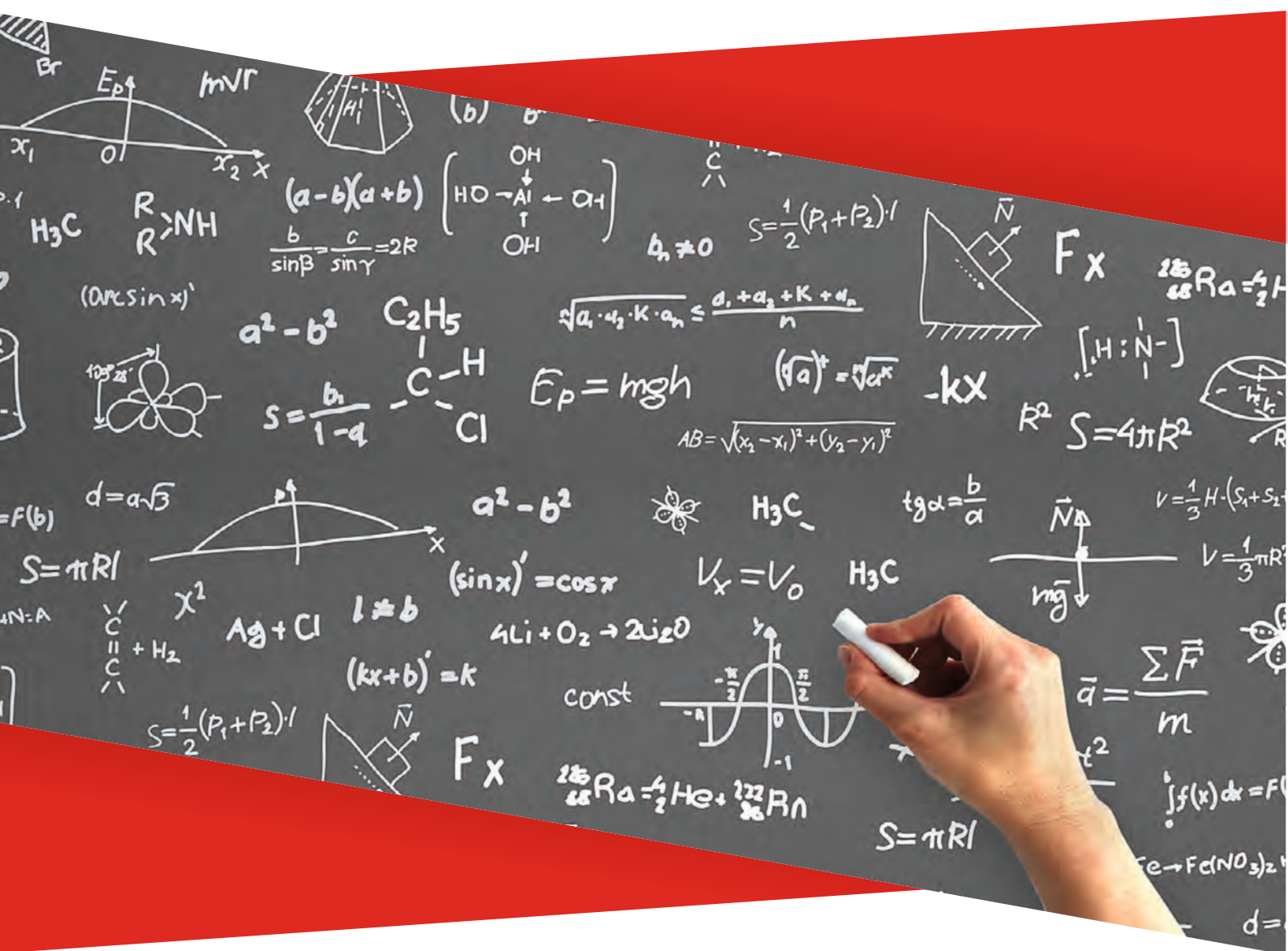


Appendix

Symbols and recommended literature



Appendix

6.1 Index of Symbols

Description	Formula symbol	Unit
Voltage responsivity	R_V	$\frac{V}{W}$
Current responsivity	R_I	$\frac{A}{W}$
Specific detectivity	D^*	$\frac{cm\sqrt{Hz}}{W}$
Noise Equivalent Power	NEP	μW
Area of the pyroelectric chip	A_P	mm^2
Thickness of the pyroelectric chip	d_P	μm
Heat capacity of the pyroelectric chip	H_P	$\frac{Ws}{K}$
Thermal conductivity	G_{th}	$\frac{W}{K}$
Temperature (absolute)	T	K
Temperature	θ	$^{\circ}C$
Radiation flux	Φ	μW
Dielectric constant	$\epsilon_0 \epsilon_r$	$\frac{As}{V m}$
Relative dielectric constant of the pyroelectric material	ϵ_r	1
Pyroelectric coefficient of the pyroelectric material	P	$\frac{As}{m^2 K}$
Specific heat capacity of the pyroelectric material	c_P	$\frac{J}{kg K}$
Mass density of the pyroelectric material	ρ_P	$\frac{kg}{m^3}$
Loss factor	$\tan(\delta)$	1
Signal voltage	u_S	V
Noise voltage (effective value)	$\tilde{u}_N$	V
Standardised noise density	N	$\frac{V}{\sqrt{Hz}}$
Voltage gain	A_V	1

Appendix

Description	Formula symbol	Unit
Source resistance	R_S	$k\Omega$
Gate resistance	R_G	$G\Omega$
Feedback resistance	R_{fb}	$G\Omega$
Capacitance of the pyroelectric chip	C_P	pF
Capacitance in the feedback path	C_{fb}	pF
Transconductance of the JFET	g_{fs}	$\frac{A}{V}$
Gate leakage current of the JFET	i_G	pA
Voltage noise density of the JFET	e_N	$\frac{V}{\sqrt{Hz}}$
Drain current of the JFET	I_D	μA
Saturation current of the JFET	I_{DSS}	mA
Optical absorptance of the system consisting of black layer and pyroelectric chip	A_S	1
Optical transmittance of an IR filter	T_F	1
Vibration voltage of the unconnected pyroelectric chip	u_{vib}	μV
Vibration response	R_{vib}	$\frac{V}{W}$
Microphonic Equivalent Power (MEP)	MEP	$\frac{W}{g}$
Acceleration	$\ddot{a}$	$\frac{m}{s^2}$
Electrical time constant	τ_{el}	ms
Electrical corner frequency	f_{el}	Hz
Thermal time constant	τ_{th}	ms
Thermal corner frequency	f_{th}	Hz
Frequency (of the input variable)	f	Hz
Angular frequency	ω	s^{-1}

Appendix

Description	Formula symbol	Unit
Boltzmann constant	k_B	$\frac{J}{K}$
Stefan-Boltzmann constant	σ	$\frac{W}{m^2 K^4}$

Appendix

6.2 Recommended Literature

Pyroelectric Detectors

1. Rogalski, A.: Infrared detectors. CRC Press, 2000. ISBN 978-9-056-99203-3
2. Budzier, H. und Gerlach, G.: Thermische Infrarotsensoren: Grundlagen für Anwender. Weinheim: Wiley-VCH-Verlag, 2010. ISBN 978-3-527-40960-0.
3. Walter, L. Infrarotmesstechnik. Berlin: Verlag Technik Berlin, 1981. ASIN: B002A6JERW.

Physical Basics

4. Kleber, W., Bautsch, H.-J., Bohm, J., Klimm, D.: Einführung in die Kristallographie. München: De Gruyter Oldenbourg, 2010. ISBN 978-3-486-59075-3

Electronic Circuitry

5. Tietze, U., Schenk, C.: Electronic Circuits: Handbook for Design and Application. Berlin; Heidelberg: Springer Vieweg, 2012. ISBN 978-3-540-00429-5

Gas Measurement Technology

6. Wong, J.Y., Anderson, R.L.: Non-Dispersive Infrared Gas Measurement. Ifsa Publishing, 2012. ISBN 978-8-461-59732-1
7. Wiegand, G.: Gasesmesstechnik in Theorie und Praxis: Messgeräte, Sensoren, Anwendungen. Wiesbaden: Springer Vieweg, 2016. ISBN 978-3-658-10686-7
8. Jessel, W.: Gase – Dämpfe – Gasesmesstechnik. Lübeck: Dräger Safety, 2001. ISBN 3-9808076-0-6