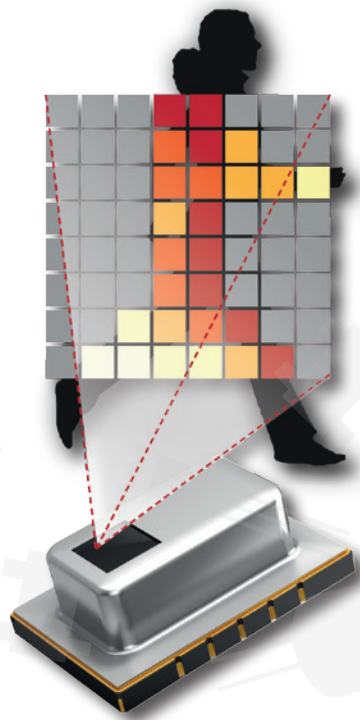


# endrich news

www.endrich.com

## Our Product of the Month Infrared-Array-Sensor GRID-EYE



- GRID-EYE – sensor array for contactless temperature measurement
- 8 × 8 element thermopile array
- Temperature and shape measurement of static and moving objects
- Up to 10 images/s via I<sup>2</sup>C-output

## Panasonic

Innovative Sensor Technologies

# LC-DISPLAYS, ALPHANUMERIC



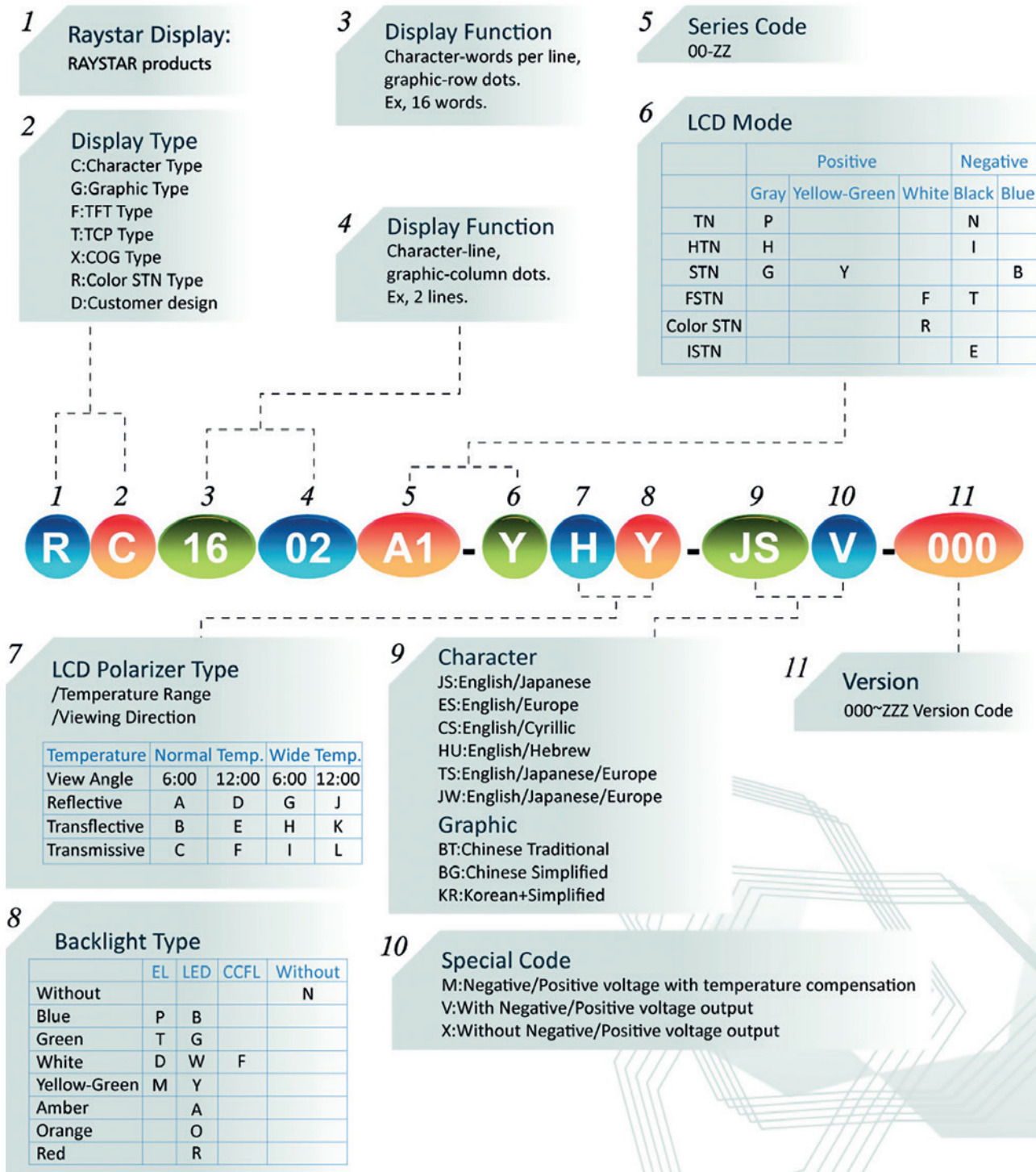
Standard alphanumeric LC displays are used in many industrial applications.

Our delivery program of the manufacturer Raystar Optronics offers a large degree of flexibility: size, resolution and backlighting can be collected per display.

LC-DISPLAYS, ALPHANUMERIC (COB)												
RESOLUTION	MODEL NUMBER	MODULE OUTLINE SIZE B x H [mm]	ACTIVE AREA B x H [mm]	LCD COLOR							BACKLIGHTING	INTERFACE
				TN	STN grey	STN Y-G	STN blue	FSTN	None	LED		
8 x 2	RC0802A1	58.0 x 32.0	38.0 x 16.0	•	•	•	•	•	•	•	6800	
12 x 2	RC1202A	55.7 x 32.0	46.0 x 14.5	•	•	•	•	•	•	•	6800	
16 x 1	RC1601A	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 1	RC1601B	85.0 x 28.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 1	RC1601C	122.0 x 33.0	99.0 x 13.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602B	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602A	84.0 x 44.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602B1	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602B4	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	•	SPI	
16 x 2	RC1602B5	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	•	I <sup>2</sup> C	
16 x 2	RC1602C	85.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602D	85.0 x 30.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602E	122.0 x 44.0	99.0 x 24.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602F	85.0 x 32.6	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602G	85.0 x 25.2	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602G1	85.0 x 25.2	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602H	59.0 x 29.3	52.0 x 15.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602I	65.4 x 28.2	54.8 x 19.0	•	•	•	•	•	•	•	6800	
16 x 2	RC1602M2	66.7 x 23.3	61.0 x 15.9	•	•	•	•	•	•	•	6800	
16 x 2	RC1602O	80.0 x 36.0	66.0 x 16.0	•	•	•	•	•	•	•	6800	
16 x 4	RC1604A	87.0 x 60.0	62.0 x 26.0	•	•	•	•	•	•	•	6800	
16 x 4	RC1604A1	87.0 x 60.0	62.0 x 26.0	•	•	•	•	•	•	•	6800	
16 x 4	RC1604B	70.6 x 60.0	60.0 x 32.6	•	•	•	•	•	•	•	6800	
20 x 1	RC2001A	180.0 x 40.2	149.0 x 23.0	•	•	•	•	•	•	•	6800	
20 x 2	RC2002A	116.0 x 37.0	85.0 x 18.6	•	•	•	•	•	•	•	6800	
20 x 2	RC2002B	89.0 x 21.5	75.0 x 15.0		•	•		•		•	6800	
20 x 2	RC2002C	180.0 x 40.0	149.0 x 23.0	•	•	•	•	•	•	•	6800	
20 x 2	RC2002D	146.0 x 43.0	123.0 x 23.0	•	•	•	•	•	•	•	6800	
20 x 4	RC2004A	98.0 x 60.0	77.0 x 25.2	•	•	•	•	•	•	•	6800	
20 x 4	RC2004B	77.0 x 47.0	60.0 x 22.0	•	•	•	•	•	•	•	6800	
20 x 4	RC2004C	146.0 x 62.5	123.5 x 43.0	•	•	•	•	•	•	•	6800	
20 x 4	RC2004D	87.0 x 58.0	74.4 x 24.8		•					•	6800	
20 x 4	RC2004E	87.0 x 58.0	74.4 x 24.8		•					•	6800	
24 x 2	RC2402A	118.0 x 36.0	94.5 x 16.0	•	•	•	•	•	•	•	6800	
40 x 2	RC4002A	182.0 x 33.5	154.4 x 16.5	•	•	•	•	•	•	•	6800	
40 x 4	RC4004A	190.0 x 54.0	147.0 x 29.5	•	•	•	•	•	•	•	6800	

Reserve technical changes!

# LC-DISPLAYS, ORDERING CODE



The code includes alphanumeric and graphic LCDs. The Chart graphic LCD models appear in the next issue of Endrich News.

Reserve technical changes!

# CUSTOM SEMITEC THERMISTORS: AUTOMOTIVE APPLICATIONS

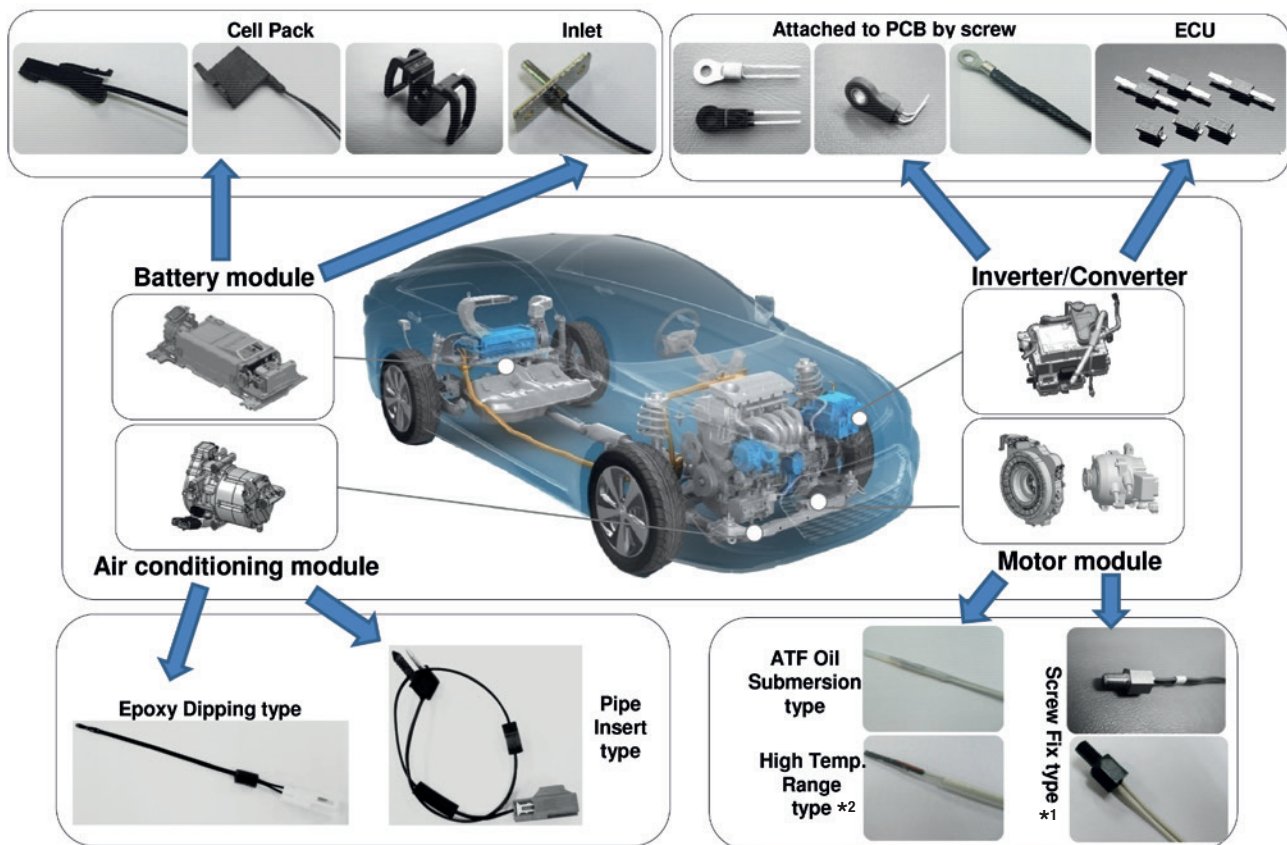
## FEATURES

- » Customized temperature sensors designed according to individual customer's and application requirements
- » Leading supplier for HV/EV application in Japan with >80% market share
- » Variety of metal and plastic housings and tubings designed for specific applications
- » Wide range of Resistance/Temperature characteristics

## APPLICATIONS

- » Engine management systems e.g. oil, fuel and coolant temperature
- » Exhaust gas and EGR temperature
- » Hybrid & electric vehicles e.g. temperature sensors for battery packs (Li-Ion, Ni-MH), eWheel drive, eMotor, control unit
- » DC/DC converter / inverter
- » Climate control units

## CUSTOM SEMITEC THERMISTORS –AUTOMOTIVE APPLICATIONS

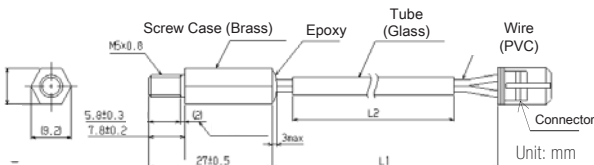


### MOTOR MODULE – Screw-Type-Pipe Sensor\*1



#### FEATURES

- » high accuracy and climate resistance
- »  $R_{25}$ : 10.0 k $\Omega$ ±0.5%
- »  $B_{25/85}$ : 3435 K±0.5%
- » Temperature range: -40°C ... +150°C
- » Diel. strength voltage: 600V<sub>AC</sub> 1 s

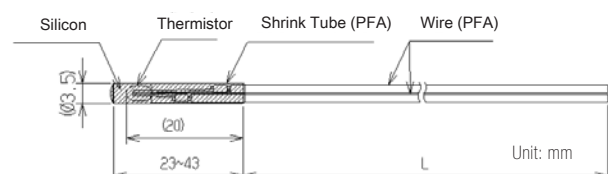


### MOTORMODUL – Teflon-Tube-Sensor \*2

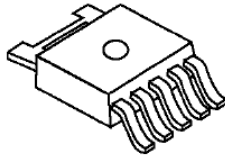


#### FEATURES

- » thin tip and excellent responsiveness
- »  $R_{100}$ : 1.0 k $\Omega$ ±5%
- »  $B_{0/100}$ : 3387 K±2%
- » Temperature range: -40°C ... +250°C
- » Diel. strength voltage: 1200V<sub>AC</sub> 1 s



# $I_o = 500 \text{ mA}$ LDO WITH RESET-FUNCTION – NJW4116



**NJW4116DL3**

## FEATURES

- » Wide operating voltage range: 4.0V ... 40V
- » Low current consumption: 55  $\mu\text{A}$  typ.
- » High precision output voltage:  $V_o \pm 1\%$  ( $T_a = 25^\circ\text{C}$ )  
 $V_o \pm 2\%$  ( $T_a = -40 \dots +125^\circ\text{C}$ )
- » High precision detection voltage:  $V_{\text{DET}} \pm 1\%$  ( $T_a = 25^\circ\text{C}$ )  
 $V_{\text{DET}} \pm 2\%$  ( $T_a = -40 \dots +125^\circ\text{C}$ )
- » Output current:  $I_o(\text{min.}) = 500 \text{ mA}$
- » Adjustable RESET output delay hold time with external capacitor
- » Correspond to low ESR capacitor (MLCC)
- » Thermal shutdown protection
- » Over current protection
- » Package Outline: TO-252-5

## MODELS - MASS PRODUCTION

NJW4116DL3-A46-T1:  $V_{\text{OUT}} 5.0\text{V} / V_{\text{DET}} 4.6\text{V}$

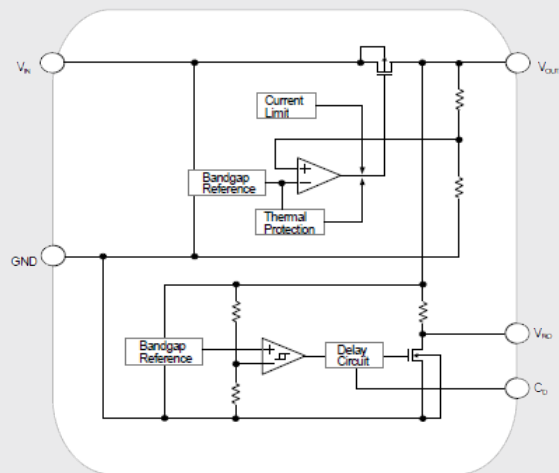
NJW4116DL3-A41-T1:  $V_{\text{OUT}} 5.0\text{V} / V_{\text{DET}} 4.1\text{V}$

## MODEL - PLAN

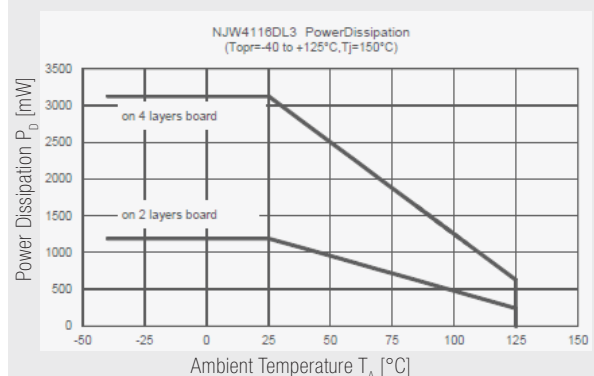
NJW4116DL3-B03-T1:  $V_{\text{OUT}} 3.3\text{V} / V_{\text{DET}} 3.0\text{V}$

The **NJW4116** is a 500 mA output low dropout voltage regulator with reset function monitoring output voltage. Reset Output Hold Time is adjustable by external capacitor. Because of wide operate voltage range and wide temperature range, the NJW4116 suits for high reliability application such as automotive application.

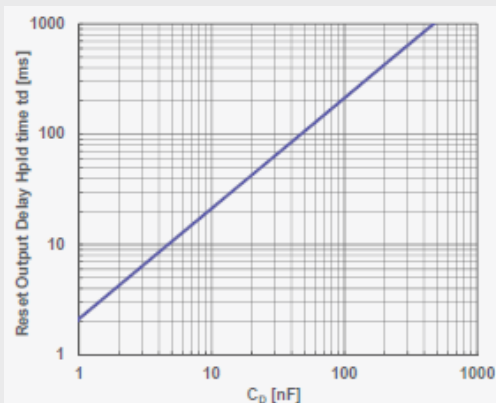
## BLOCK DIAGRAM



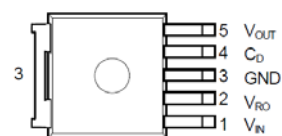
## POWER DISSIPATION VS. AMBIENT TEMPERATURE



## RESET OUTPUT DELAY HOLD TIME

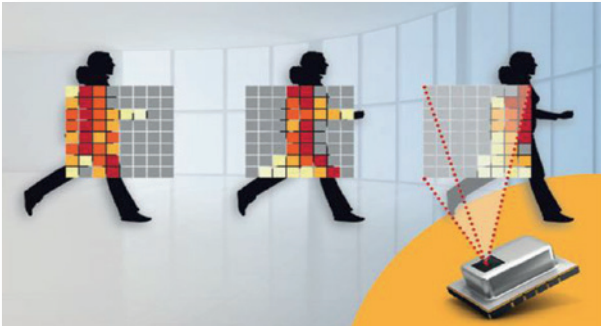


## PIN CONFIGURATION



1.  $V_{\text{IN}}$  Input Voltage Pin
2.  $V_{\text{RO}}$  Reset Output Pin
3. GND GND Pin
4.  $C_D$  External Capacitor Pin for setting RESET Output Delay Hold Time
5.  $V_{\text{OUT}}$  Output Voltage Pin

# INFRARED-ARRAY-SENSOR – GRID-EYE



**GRID-EYE** is a thermopile array sensor that features 64 thermopile elements in an 8x8 grid format. Contrary to conventional thermal sensors that only measure temperature of a certain point-of-contact, Grid-EYE, based on Panasonic's MEMS technology, can measure temperature of the entire specified area without any contact; in other words, it is a "contactless thermopile array sensor". 64 pixels yield accurate temperature measurement over a viewing angle of 60° provided by a silicon lens. Grid-EYE uses an I<sup>2</sup>C communication interface, enabling temperature measurements at speeds of 1 or 10 frames/sec. An interrupt function is also available.

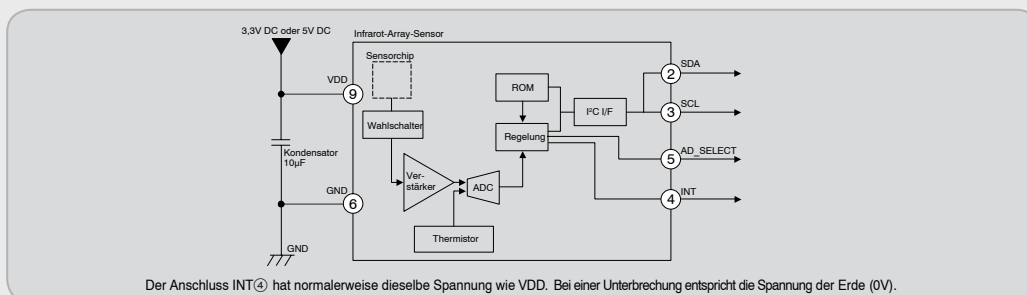
With an array of detection elements Grid-EYE can use passive infrared detection to determine temperature differentiation allowing it to detect multiple objects simultaneously. Grid-EYE is able to measure actual temperature and temperature gradients, providing thermal images and identifying direction of movement. Compared to single thermopile sensors or pyroelectric sensors, Grid-EYE offers immense benefits:

## FEATURES

- » Dimensions: 11,6 mm×4,3 mm×8,0 mm (L×H×W)
- » Operating voltage: 3,3V or 5,0V
- » Current consumption: Typ. 4,5 mA (Normal mode); 0,8 mA (Stand-by mode), 0,2 mA (Sleep mode)
- » Temperature range of measuring object:  
With amplification factor High gain: 0°C up to 80°C,  
Low gain: -20°C up to 100°C
- » Field of view: 60° (vertical and horizontal)
- » Number of thermopiles: 64 (vertical 8 x horizontal 8)
- » External interface: I<sup>2</sup>C (Fast mode)
- » Frame rate: 1 or 10 Bilder/s
- » Absolute temperature accuracy: Typ. ±2,5 °C

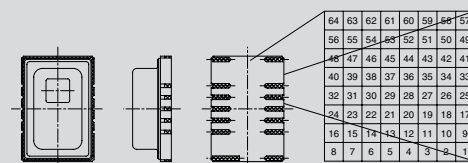
- » Digital output (I<sup>2</sup>C)
- » SMD package (reflow compatible)
- » 8×8 (64) pixel range
- » Frame rate: 10 frames/s or 1 frame/s

## INTERNAL CIRCUIT



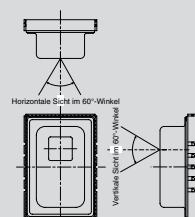
### 1. Pixelbereich

Der Pixelbereich von 1 bis 64 ist nachstehend dargestellt.



### 2. Blickwinkel

Der normale Blickwinkel des Sensors ist nachstehend dargestellt.

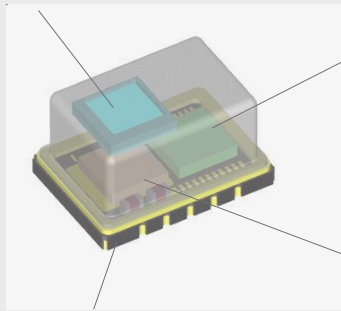


## INFRARED-ARRAY-SENSOR – GRID-EYE

### COMPONENTS AND FUNCTIONS

#### Silicon lens

- image formation



#### Ceramic package

- Air tightness
- Radio shielding
- Reflow solderable

#### Mixed signal processing IC

- 64-Pixels signal readout
- Analog amplification
- Analog to Digital conversion
- Sensitivity correction
- Correction for temperature effects
- Digital communication

#### IR detector

- 8 × 8 pixels
- Thermal insulation structure using MEMS technology
- Infrared absorption
- Thermoelectric conversion

### APPLICATIONS

Grid-EYE opens the door to a whole world of applications, ranging from energy savings in the lighting industry (commercial and public places as well as residential spaces) to household applications (air conditioners, microwave ovens, etc.), from security systems (automatic doors, elevators, ATMs, kiosks, etc.) to the medical industry (patient detection and positioning), and many more.

- » **Security:** Occupancy detection, People counting, multiple person detection
- » **Household:** Cooking stoves, Microwave ovens, Air conditioners, Heating systems
- » **Medical:** Patient detection, Movement detection, Thermal imaging, Position detection
- » **Lighting control:** Energy savings, Detection without movement
- » **Industrial temperature measurement:** Industrial process management and control, Preserving maintenance, Contact-less temperature measurement

**Are you interested in an evaluation-board?**

**Please contact us! Available at Endrich!**

### DESCRIPTION OF THE GRID-EYE EVALUATION-KIT

Panasonic Automotive & Industrial Systems is launching a Grid-EYE Infrared (IR) Array sensor Evaluation Kit this autumn that combines its "nanopower" PAN1740 Bluetooth Smart module and a microcontroller on one PCB. By combining its new IR sensor technology with Bluetooth technology and software for IR detection of people and objects on one board, Panasonic enables customers to develop rapid prototypes and quickly build their own wireless sensor "Internet of Things" applications.

With the launch of Grid-EYE evaluation kit Panasonic make the state-of-the-art Grid-EYE sensor along with an innovative IR people detection software (including basic API and image processing) available for the first time to the end customer. They have developed a PC software and a smartphone app to be provided to the customers to test our sensor in different ways with various applications. This paves the way for designers to use the advantages of Grid-EYE in combination with Bluetooth Technology and we are expecting to see some very innovative wireless IoT applications being developed by our customer base, thanks to the speed and simplicity offered by our new evaluation kit.

Compared to pyroelectric sensors, it is not only possible to detect

moving people and objects but also the position and presence of motionless people and objects, the direction of movements and the accurate surface temperature from -20°C up to +100°C. With this wide range of temperature measurement Panasonic is able to reach a NETD (Noise equivalent temperature difference) of  $\pm 0.5^\circ\text{C}$  at room temperature.

Grid-EYE is also able to detect people and effectively differentiate them from other heat sources such as displays or heaters. Moreover as Grid-EYE is an infrared sensor, detection of people is measured almost independent of ambient light conditions. Another significant advantage of Grid-EYE sensor is that its use does not intrude on personal privacy, unlike cameras. The integrated Bluetooth module in the evaluation kit, PAN1740 is a single-mode Bluetooth Smart system-on-chip module optimized for low power (only 4.9mA in transmit or receive) and small size (only 9.0mm × 9.5mm × 1.8mm). The SMD component benefits from a fully shielded case, chip antenna, and integrated crystal oscillators. The low 4.9mA power consumption allows the use of coin cell batteries and decreases battery requirements by up to 50% when compared to other BLE devices currently on the market.

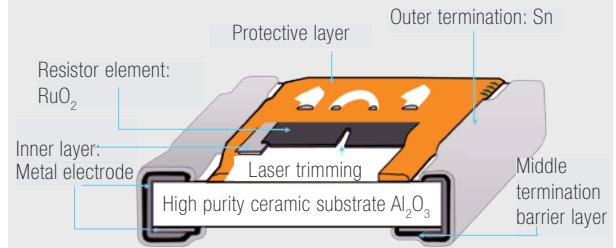
# HIGH-VOLTAGE RESISTORS WITH UL CERTIFICATION – FVS SERIES



**UL**  
UL Certified No. E358325

The **FVS-Serie** by manufacturer PDC is certified according to the safety standards „UL/IEC 60950 2,5 kV pulses“ and „UL/IEC 60065 10 kV pulses“. The special material used to achieve the high dielectric strength, has a typical VCR value of  $\pm 300$  ppm/V. It is suitable for applications in all industrial, automotive and medical fields, in which high safety standards are demanded in reference to dielectric strength. The FVS series is listed under File No. E358325 UL.

## CONSTRUCTION OF FVS SERIES



## SPECIFICATIONS

	TYPE	SMD SIZE [INCH]	POWER @70°C	MAX. WORKING VOLT.	MAX. OVERVOLTAGE	RESIS. TOLERANCE	TEMP. COEFF. [ppm/°C]	RESISTANCE RANGE	RESISTANCE SERIES
FVS03	0603	1/10W	200V	400V	$\pm 1\%$ (F) $\pm 5\%$ (J)	$\pm 100$ $\pm 200$	100 k $\Omega$ ...10M $\Omega$ 100 k $\Omega$ ...22M $\Omega$	E96/E24 E24	
FVS05	0805	1/8W	400V	800V	$\pm 1\%$ (F) $\pm 5\%$ (J)	$\pm 100$ $\pm 200$	100 k $\Omega$ ...10M $\Omega$ 100 k $\Omega$ ...22M $\Omega$	E96/E24 E24	
FVS06	1206	1/4W	800V	1600V	$\pm 1\%$ (F) $\pm 1\%$ (F) $\pm 5\%$ (J)	$\pm 100$ $\pm 200$ $\pm 200$	100 k $\Omega$ ...10M $\Omega$ 11 M $\Omega$ ...22M $\Omega$ 100 k $\Omega$ ...100M $\Omega$	E96/E24 E24 E24	
FVS20	2010	1/2W	2000V	3000V	$\pm 1\%$ (F) $\pm 1\%$ (F) $\pm 5\%$ (J)	$\pm 100$ $\pm 200$ $\pm 200$	100 k $\Omega$ ...10M $\Omega$ 11 M $\Omega$ ...22M $\Omega$ 100 k $\Omega$ ...100M $\Omega$	E96/E24 E24 E24	
FVS25	2512	1W	3000V	4000V	$\pm 1\%$ (F) $\pm 1\%$ (F) $\pm 5\%$ (J)	$\pm 100$ $\pm 200$ $\pm 200$	100 k $\Omega$ ...10M $\Omega$ 11 M $\Omega$ ...22M $\Omega$ 100 k $\Omega$ ...100M $\Omega$	E96/E24 E24 E24	

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