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PERFORMANCE

For test purposes, all data taken using the following conditions:
- Performance as tested in the SGX IR-EK2 Evaluation Kit directly after calibration.
- SGX linearisation and temperature compensation algorithms applied; see Infrared Sensor Application Notes.
- IR Source Voltage 5V, square wave, at 4 Hz and 50% duty cycle. Running the IR Source at 3V will decrease performance due to lower output signals.
- Ambient temperature (20°C) and pressure (101 kPa).
- All gases diluted in dry nitrogen.
- Performance for the Hydrocarbons refers to Methane only. Most other hydrocarbons will have an improved performance.
- Performance data is the same for the supported IR Source variants ("_1" variants).
- Refer to Application Notes for more information.

Sensor type	**IR11BD**	**IR11xJ, IR11xM**	**IR11BR**	**IR12BD**	**IR12xJ, IR12xM**	**IR13BD**	**IR14BD**
Gas	Carbon Dioxide			Methane / Hydrocarbons [5]			Acetylene
Concentration Range	Refer to Configurations Table						
Warm-up Times	<20 sec to operate <60 sec for Zero ±1% of Full Scale, <30 min to full specification at 20 °C						
Maximum Response Time (T_{90}) [1]	20 sec						
Peak-to-Peak Outputs (in N_2) [2] **Active (mV):** **Reference (mV):**	 9 to 27 15 to 42	 12 to 36 9 to 29	 15 to 50 6 to 22	 9 to 43 15 to 42	 22 to 65 9 to 29	 20 to 60 15 to 42	 9 to 29 15 to 42
Sensitivity to Standard Test Gas [2] [3] **Minimum Absorbance:** **Maximum Absorbance:**	 0.25 0.60	 0.10 0.30	 0.06 0.12	 0.07 0.15	 0.07 0.15	 0.07 0.15	 0.08 0.12
Typical Sensitivity for Gas Range [3]	Refer to Fractional Absorbance Curves						
Minimum Detection Level [4]	2ppm CO_2	5ppm CO_2	50ppm CO_2	50ppm CH_4	30ppm CH_4	30ppm CH_4	50ppm C_2H_2
Maximum deviation from linearity (±) [6] **0 to 0.5%v/v Range:** **0 to 2%v/v Range:** **0 to 2.5%v/v Range:** **0 to 5%v/v Range:** **0 to 10%v/v Range:** **0 to 100%v/v Range:**	 0.01%v/v 0.05%v/v ------- 0.10%v/v ------- -------	 0.02%v/v 0.10%v/v ------- 0.20%v/v ------- -------	 ------- ------- ------- ------- 0.20%v/v 3%v/v	 ------- ------- ------- 0.15%v/v ------- 5%v/v	 ------- ------- ------- 0.15%v/v ------- 5%v/v	 ------- ------- ------- 0.15%v/v ------- 5%v/v	 ------- ------- 0.10%v/v ------- ------- 5%v/v
Temperature Variation (±ppm/°C) [7] **Zero and Concentration Range Maximum (-20°C to +55°C)** **Zero:** **0.5%v/v:** **2%v/v:** **2.5%v/v:** **5%v/v:** **10%v/v:** **100%v/v:**	 10 25 100 ------- 250 ------- -------	 15 30 125 ------- 300 ------- -------	 10 ------- ------- ------- ------- 500 2500	 25 ------- ------- ------- 200 ------- 2000	 25 ------- ------- ------- 200 ------- 2000	 20 ------- ------- ------- 150 ------- 1500	 25 ------- ------- 150 ------- ------- 2000
Short Term Stability (±) [8]: **Zero:** **0.5%v/v:** **2%v/v:** **2.5%v/v:** **5%v/v:** **10%v/v:** **100%v/v:**	 5 ppm 0.01%v/v 0.05%v/v ------- 0.10%v/v ------- -------	 10 ppm 0.01%v/v 0.05%v/v ------- 0.15%v/v ------- -------	 20 ppm ------- ------- ------- ------- 0.1%v/v 1%v/v	 0.01%v/v ------- ------- ------- 0.08%v/v ------- 2%v/v	 0.01%v/v ------- ------- ------- 0.08%v/v ------- 2%v/v	 0.01%v/v ------- ------- ------- 0.08%v/v ------- 2%v/v	 0.01%v/v ------- ------- 0.10%v/v ------- ------- 5%v/v

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Sensor type	IR11BD	IR11xJ, IR11xM	IR11BR	IR12BD	IR12xJ, IR12xM	IR13BD	IR14BD
Humidity Response (+) [9] **Zero:** **0.5%v/v:** **2%v/v:** **2.5%v/v:** **5%v/v:** **10%v/v:** **100%v/v:**	Negligible			0.10%v/v ------- ------- ------- 0.25%v/v ------- 2%v/v	0.10%v/v ------- ------- ------- 0.25%v/v ------- 2%v/v	0.15%v/v ------- ------- ------- 0.30%v/v ------- 2%v/v	0.20%v/v ------- ------- 0.50%v/v ------- ------- 4%v/v
Pressure Effects [10]	Sensors shall meet specification within a ±5% change in ambient pressure from the ambient pressure during calibration						
MTBF (IR Source only)	>10 years for 5 V operation, >20 years for 3 V operation						
Vibration	Conforms to EN 60079-29-1						
Ingress Protection	Requires extra protection depending on application						

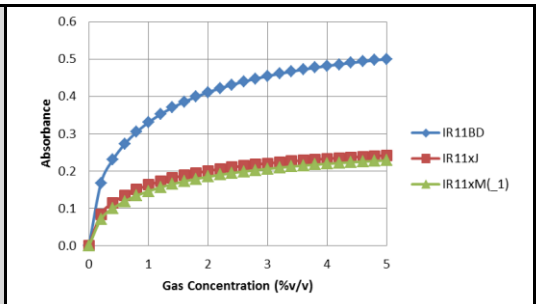
(1) Based upon an immediate step change in concentration at the aperature of the sensor.
(2) Production Test Limits, using standard test gases of Dry Nitrogen, 2%v/v Carbon Dioxide, 5%v/v Methane and 1.15%v/v Acetylene, where appropriate.
(3) A 0.30 absorbance is equivalent to a 30% decrease in the Active peak-to-peak output.
(4) The minimum detection level is the smallest detectable change in concentration based upon a 2 sigma variantion. The best detectable change occurs at 0% gas concentration due to the non-linear output of the detector (see Fractional Absorbance Curves).
(5) Performance for most hydrocarbons will be better than for methane for equiavlent concentrations, as methane is one of the lower sensitive gases compared to other hydocarbons.
(6) After linearisation using the recommended method of linearisation and based upon a calibration gas with a concentration >75% of the full-scale.
(7) Using average Alpha and Beta coefficients based upon test data from the instrument in which the sensor is being tested. Refer to Application Notes for information on calculating Alpha and Beta coefficients. Accuracy can be improved by measuring each sensor over temperature to define specific Alpha or Alpha & Beta coefficients.
(8) After sensor stabilisation and over a period of 8 hours.
(9) Difference in response when changed from 0 %RH to 90 %RH.
(10) Sensors can be used over a greater ambient pressure using pressure compensation of the concentration. An external pressure sensor will be requred for this.

FRACTIONAL ABSORBANCE CURVES

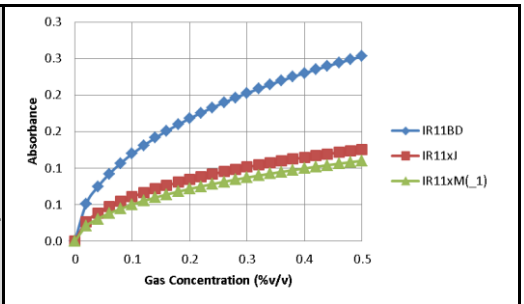
These show the typical sensitivity versus concentration before linearisation for the range of gases. For further explanation, refer to the Infrared Sensor Application Notes.

Primary Target Gases

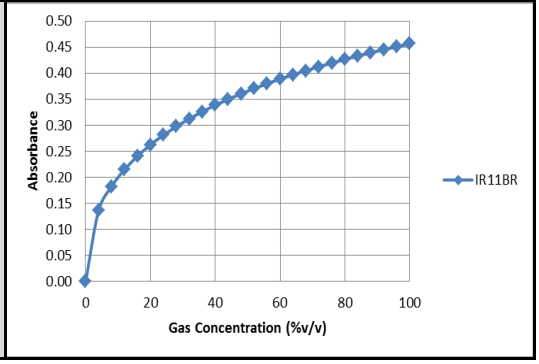
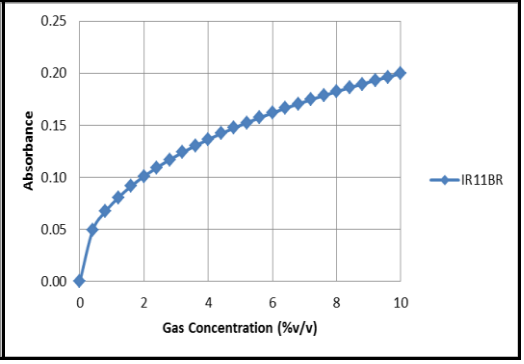
IR11BD IR11EJ IR11EM IR11GJ IR11GM IR11GM_1
0 - 5% Carbon Dioxide



IR11BD IR11EJ IR11EM IR11GJ IR11GM IR11GM_1
0 - 0.5% Carbon Dioxide



IR11BR
0 - 100% Carbon Dioxide



IR11BR
0 - 10% Carbon Dioxide