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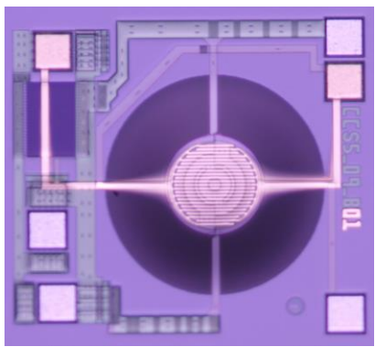
CAMBRIDGE CMOS SENSORS

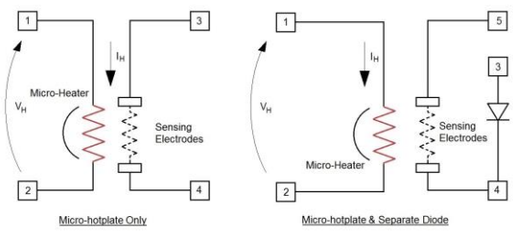
CCSMHx09x
MEMS Micro-hotplate

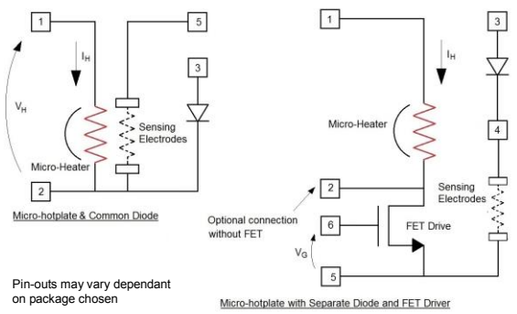
MICRO-HOTPLATE (250µm Diameter)

Benefits and Features	Sensing Applications	Packaging Options
High stability + High temperature	Resistive & Catalytic gases	Bare Die
Built-in FET & temp-sensing diode option	Medical	SMD
Gold electrodes option	Humidity	Micro TO
Fast thermal response <15ms	Flow	TO46
Lifetime @ 550°C >10 years	Multiple gases	TO39
Power consumption <0.12mW/°C *(without sensing material)*	Micro-heating element	Array versions also available.

MEMS CMOS Micro-Hotplate for Gas Sensing







Pin-outs may vary dependant on package chosen

Description

Basic high temperature micro-hotplate where the heater temperature can be controlled by appropriately adjusting the current or the supply voltage. The device is fabricated on a 1mm x 1mm silicon die as a single-chip solution and can incorporate a temperature-sensing diode and/or FET driver. Gold sensing electrodes are on top of the membrane.

Electrical/Optical specifications

Parameter	Nominal Value
Power Consumption(DC) at 600°C	72mW ± 7mW
Thermal Rise Time (t_{90})	15ms ± 5ms
Thermal Fall Time (t_{10})	30ms ± 5ms
Operating Temperature	600°C
Ambient Resistance (R_0)	40Ω ± 10Ω
Heater Resistance Note1 (R) @ 600°C	80Ω ± 20Ω
Heater Voltage (V_H) @ 600°C	2.4V ± 0.3V
Heater Current (I_H) @ 600°C	30mA ± 4mA
Diode Temp Coefficient (d) @ 65µA	1.3mV/K
Sensing Area	0.05mm^2 min
Life Time (MTTF) @ 600°C Note2	~ 50000 Hours

Note1

1: $R = (R_0\text{-}R_T)[1 + \alpha(T - T_0) + \beta(T - T_0)^2] + R_T$

R_T (Track Resistance) = 12Ω ± 0.5Ω @ 25°C, T_0 = 25°C
$\alpha = 2.05 \times 10^{-3}\ K^{-1}$, $\beta = 0.3 \times 10^{-6}\ K^{-2}$

Note2

Without sensing material

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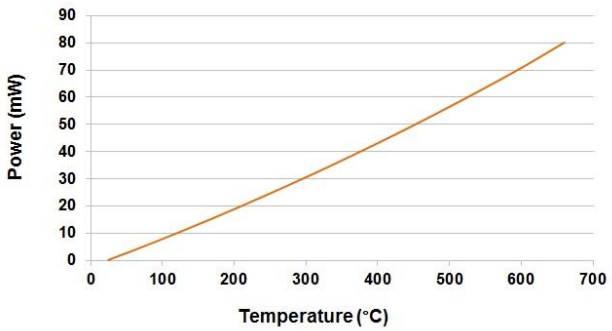
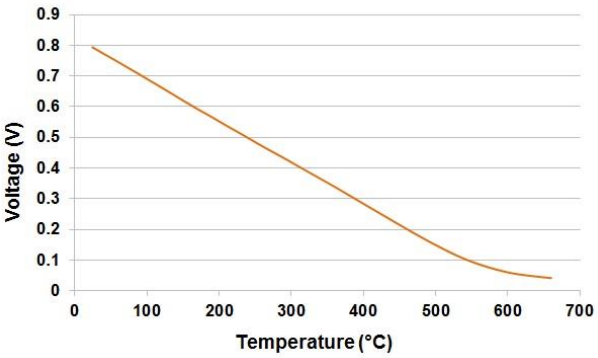
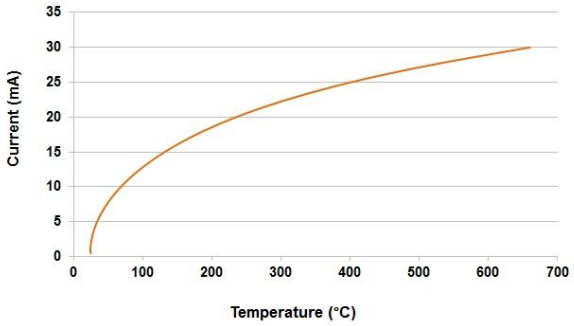
Power Consumption v Temperature



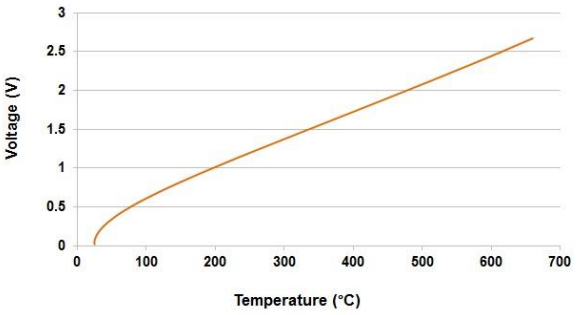
Diode characteristics



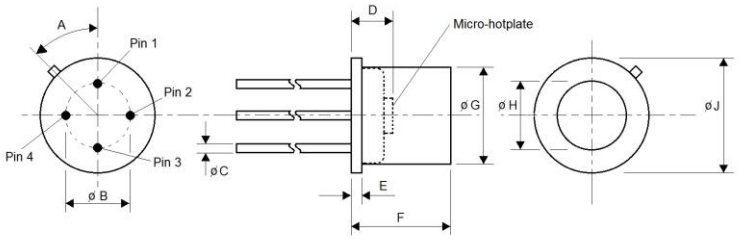
Current v Temperature



Voltage v Temperature

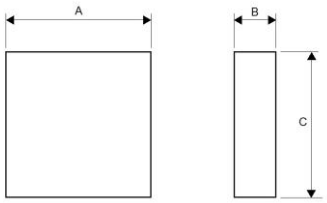


TO Package dimensions



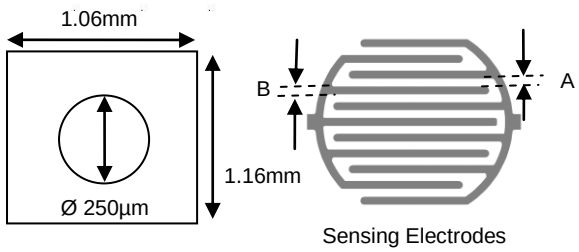
	A	B	C	D	E	F	G	H	J
TO39	45°	5.08	0.45	1.92	0.38	4.35	8.31	5.30	9.20
TO46	45°	2.54	0.45	1.55	0.25	2.70	4.70	2.55	5.40
Micro TO	-	1.80	0.30	1.28	0.38	2.30	3.10	1.80	4.10

SMD Package dimensions



	A	B	C
LCC	3.80	1.45	3.80
QFN	3.00	0.84	3.00

Various pin-outs available



Options	A(µm)	B(µm)	Thickness (nm)	Aspect Ratio
1	5	5	400	800
2	10	10	400	170

Measured Resistance = Material Sheet Resistance / Aspect Ratio