Testing and Analysing of 256×256 MOS Resistor Array for IR Scene Projector

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***Abstract*—The CMOS composite film microbridge-structured resistor array is mainly used for chip design and machining; to our knowledge, there is no detailed report on the analysis of its thermo-electric characteristics and the testing of its performance. Therefore, the paper presented the structure of the chip of the resistor array developed by using semiconductor polycrystalline silicon as its main materials，the microelectronic machining（MEMS) and the anisotropic etching. It also discussed the thermal resistance, thermal conduction, transient response characteristics and emissivity of the composite film microbridge that affect the major performance of a resistor array. Finally it tested its major performances; the test results are in agreement with the thermo-electric characteristics analysis results and show that: (1) the effectiveness of pixels of the 256×256 resistor array reaches over 99.9% and its medium-wave infrared (MWIR) apparent temperature is from 27 to 310° C; (2) with respect to the response characteristics of the resistor array, the time for radiation increase is 4 ms and its time for radiation decrease is 1.6 ms; (3) its high frame rate reaches 200 Hz and its spectral radiation waveband is 2 to 14 μm. The test results verify the correctness and effectiveness of the thermoelectric model and show that the composite film microbridge is suitable for highly dynamic electric to thermal conversion and provides an analysis method and test data for studying the thermoelectric characteristics of a microbridge-structured resistor array, thus having some engineering application values.**

***Keywords*— CMOS resistor array; equivalent blackbody temperature; thermoelectric characteristic; micro-radiator; infrared scene simulation**

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