

## EPCOS Product Brief 2015

# NTC Chip Thermistors, Bondable S860 Series

## Temperature Measurement in IGBT Modules

In order for IGBT modules to achieve their highest possible efficiency, they should be operated at a temperature near to their limit. For this purpose, precise monitoring of the temperature is required. The EPCOS S860 series of wafer-based NTC chip thermistors represents an ideal solution that ensures reliable and precise monitoring and reduced production costs.

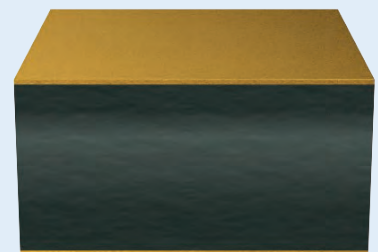
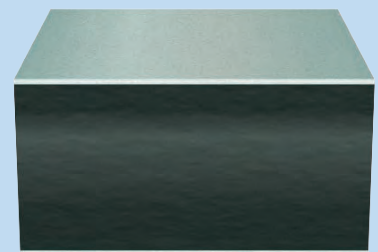
S860 NTC thermistors are manufactured from wafers. The electrical contacting pads are located on the top and bottom surfaces of the chip, with bottom side for soldering and sintering and the top side for bonding.

This design allows a planar connection to the semiconductor

substrate. The upper connection is contacted via conventional bonding technology, the standard technology for IGBT modules.

Another advantage of the S860 series of NTC chip thermistors is the tight tolerance near the junction temperature. These tolerances are achieved by resistant measurement at 100 °C.

Thanks to the S860 series extremely narrow tolerance of about  $\pm 2.0$  K at 120 °C, IGBT modules designed for a maximum of 125 °C must not be disconnected before a temperature of 123 °C is reached. Thus, the IGBT modules can operate optimally close to their power limit thanks to embedded NTC chip thermistors.

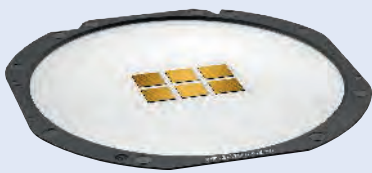


# NTC Chip Thermistors, Bondable S860 Series

## Features

- Gold or silver metallization
- Packaging on 8-inch frame
- Category temperature up to 150 °C

## NTC wafer and NTC chip thermistors



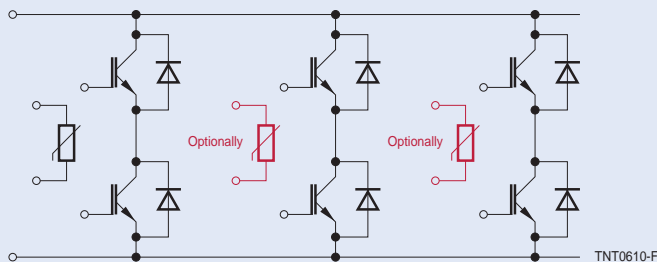
NTC wafer with 8-inch frame



NTC chip thermistors

Contact areas for bonding and for soldering and sintering are on the top and bottom surfaces of the chip, respectively.

## Typical implementation and thermal protection in IGBT modules



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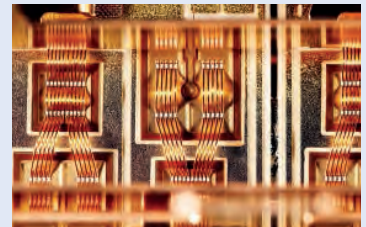
The IGBT must be disconnected when the junction temperature of 125 °C is reached. The temperature control is performed by an EPCOS S860 NTC chip thermistor. Recommended parts are listed below.

## Electrical specification and ordering codes

Ordering code	B <sub>25/100</sub> K	R <sub>25</sub> <sup>1)</sup> Ω	R <sub>125</sub> Ω	ΔT <sub>125</sub> ±K <sup>1)</sup>	Chip size mm	Bottom/ top metallization
B57860S0502J000	3988	5000	170.9	2.2	1.50 ... 1.70	Ag
B57860S0103J000	3625	10000	464.3	2.4	0.45 ... 0.60	Au
B57860S0223J000	3964	21511	742.7	2.2	1.25 ... 1.40	Ag
Upon request	3964	30000	1036.0	2.2	0.80 ... 1.10	Ag
B57860S0853J000	4092	85000	2639.0	2.1	0.45 ... 0.65	Au
Upon request	3964	100000	3453.0	2.2	0.50 ... 0.60	Au

<sup>1)</sup> Further resistance values and tighter tolerances on request.

## Example for typical application



Source: Danfoss silicon power – DBB technology

**Structure of ordering codes:** The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of EPCOS, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products.** Detailed information can be found on the Internet under [www.epcos.com/orderingcodes](http://www.epcos.com/orderingcodes).

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