



PowerFlex[®] 750-Series Drives Enhanced Protection – Thermal Manager



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What is PowerFlex 750-Series Thermal Manager?

- Advanced thermal monitoring system to offer **enhanced productivity and uptime**
- Monitors three primary elements within the IGBTs
 - Temperature rate of rise
 - Temperature nears operational limits
 - Operation at low output frequency
- Automatic Operation without user interaction



Insulated Gate
Bipolar Transistor
(IGBT) Module

Why is PowerFlex 750-Series Thermal Manager Important?

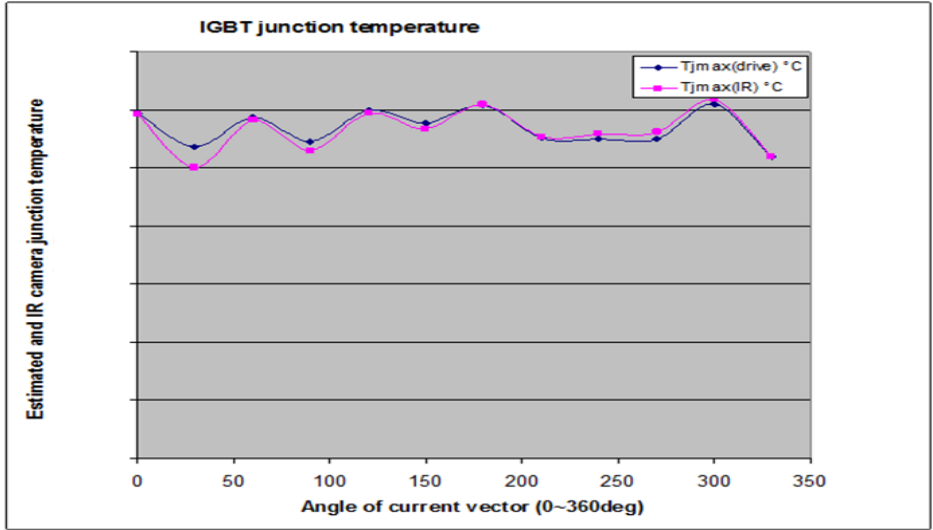
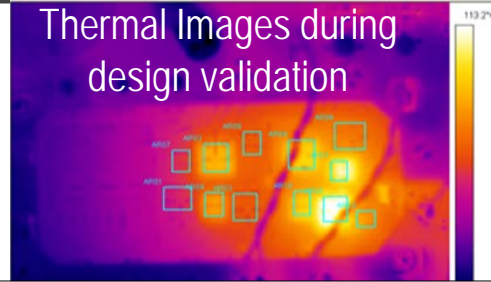
- Helps to improve production / process uptime
- Helps to improve longevity of the drive
 - Especially in heavy duty applications
 - Especially in operation of motors at slow speeds
- Cost savings to customers for maintenance and replacement costs
- Cost avoidance by reducing downtime



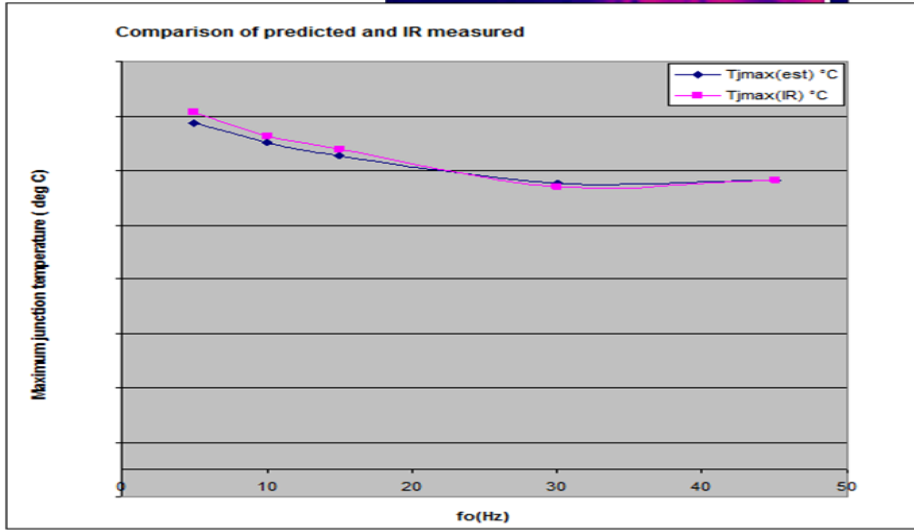
Accurate Temperature Modeling

- The junction temperature of each individual IGBT are calibrated to help ensure proper protection

Comparison traces of model versus measured values



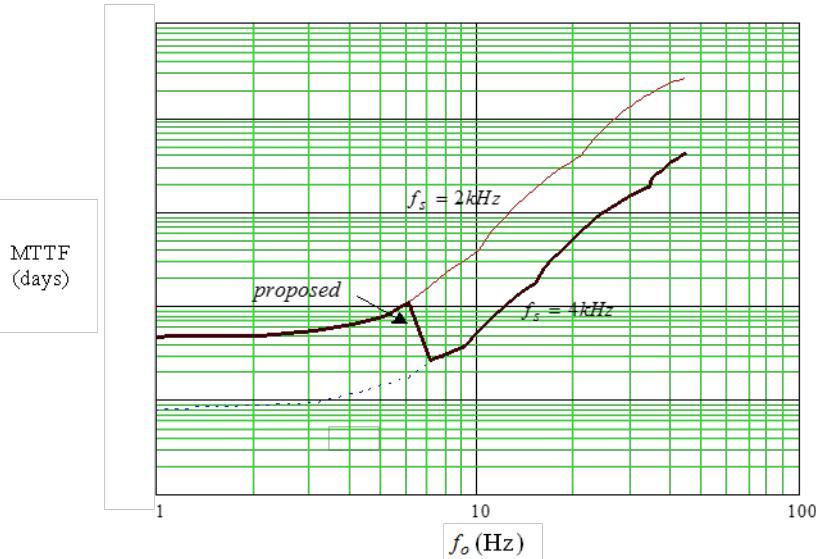
DC current 360 degree cycle



AC output condition

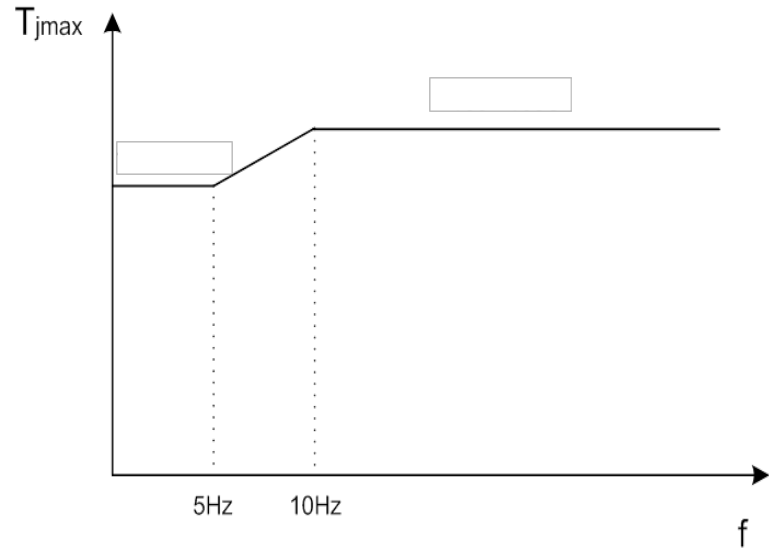
Lifetime Improvement for Low Speed

- Lowering carrier frequency improves lifetime of IGBT at low speed



Drive mean time to failure vs. output frequency

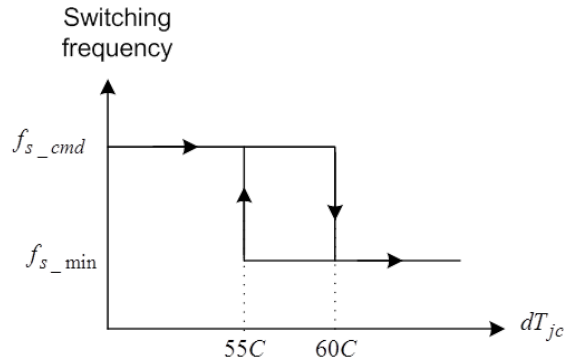
- Lowering IGBT temperature limit at low speed to allow longer life



Junction temp limit vs. output frequency

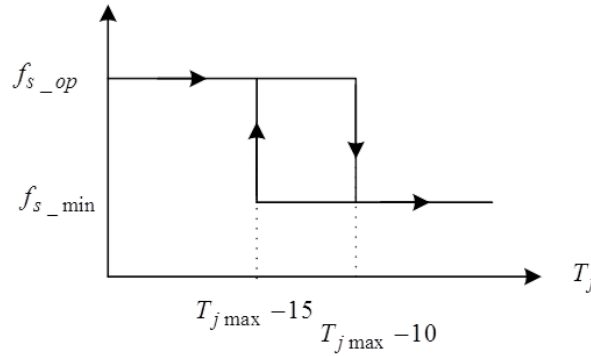
PowerFlex 750-Series Drive IGBT Temperature Protection Methodology

Three active monitoring algorithms help protect in two ways to improve uptime and increase IGBT life.



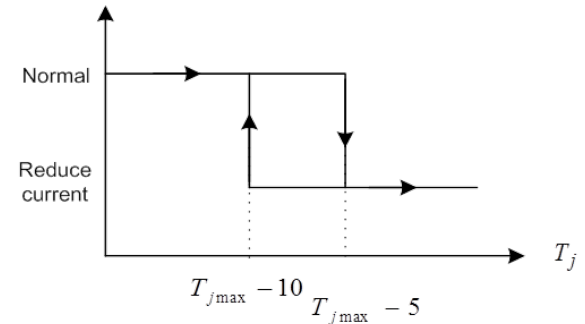
Rate of rise temp control

When a rapid rise in temperature occurs the switching frequency will be reduced lowering operating temperature of the IGBTs



Two steps of elevated of temperature control

When Temperature rise begins to approach the maximum the switching frequency will be reduced lowering the temperature of the IGBTs



If the temperature gets closer to the maximum allowable temperature the output current to the load will be reduced lowering the temperature of the IGBTs

PowerFlex 750-Series Thermal Manager Benefits

Rockwell
Automation

- R&D effort in PowerFlex 750-Series Development results:
 - Accurate IGBT thermal model developed and tested
 - Built thermal manager into product
 - Improved IGBT life during low speeds
 - Improved uptime and device life during elevated temperature events
 - Possible protection for clogged filters





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