Figures 5-7 show the typical current capability for this module at specified conditions. In all tests, the application board – the IRMCS1071-1-D reference board – was placed in a box to prevent cooling from ambient airflow. Figure 5 is derived from using a heat sink that maintains T_C at 125°C. Figures 6-7 represent current capability for the module as used without any heat sink. ΔT_{JA} represents the difference in temperature between the junction of the high-side V-phase IGBT and the ambient, measured 10cm above and 6cm away from the board. Ambient temperature kept within 28-29°C.

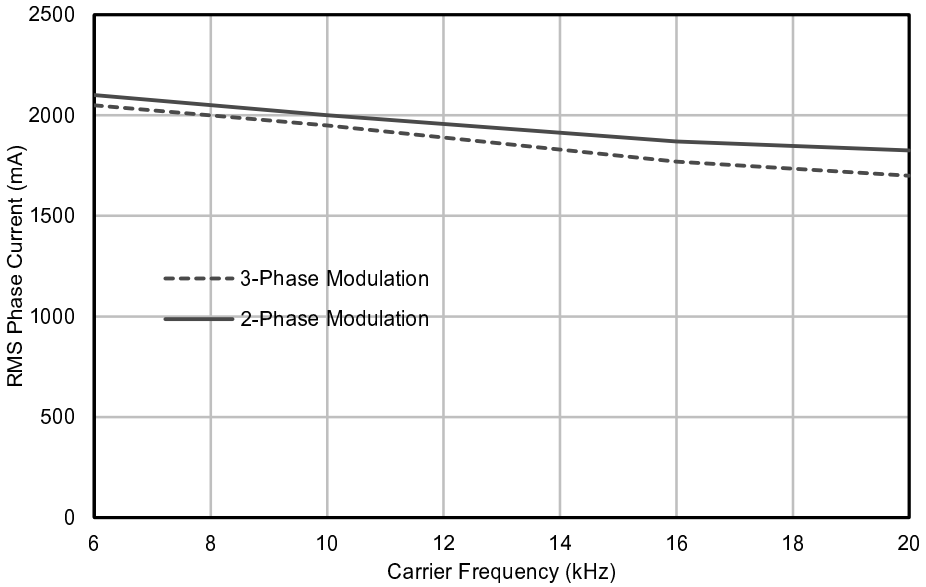

Figure 5: Maximum sinusoidal phase current vs PWM switching frequency with a heat sink.
Space Vector Modulation, V+=320V, T_A=28°C, T_J=150°C, T_C=125°C

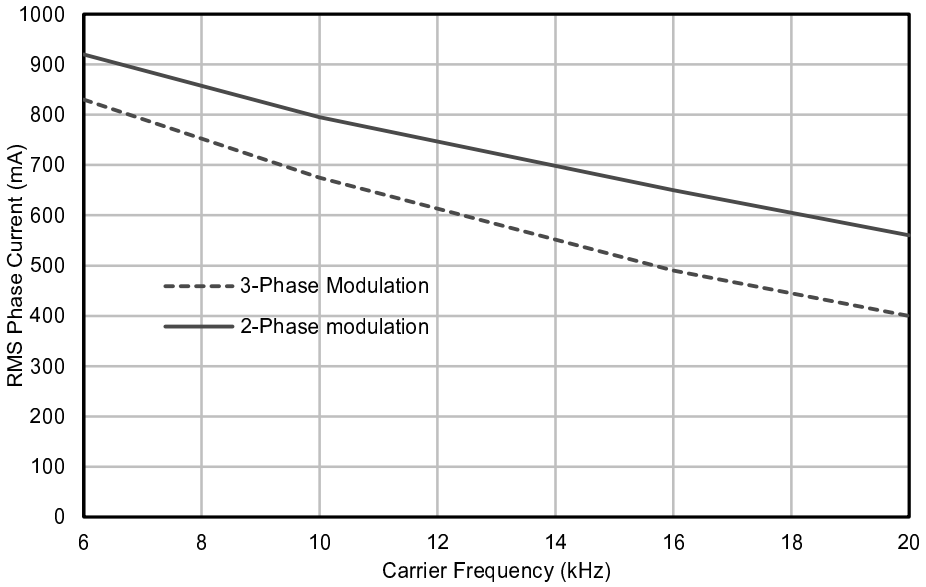

Figure 6: Maximum sinusoidal phase current vs PWM switching frequency, no heat sink.
Space Vector Modulation, V+=320V, T_A=28°C, T_J=128°C

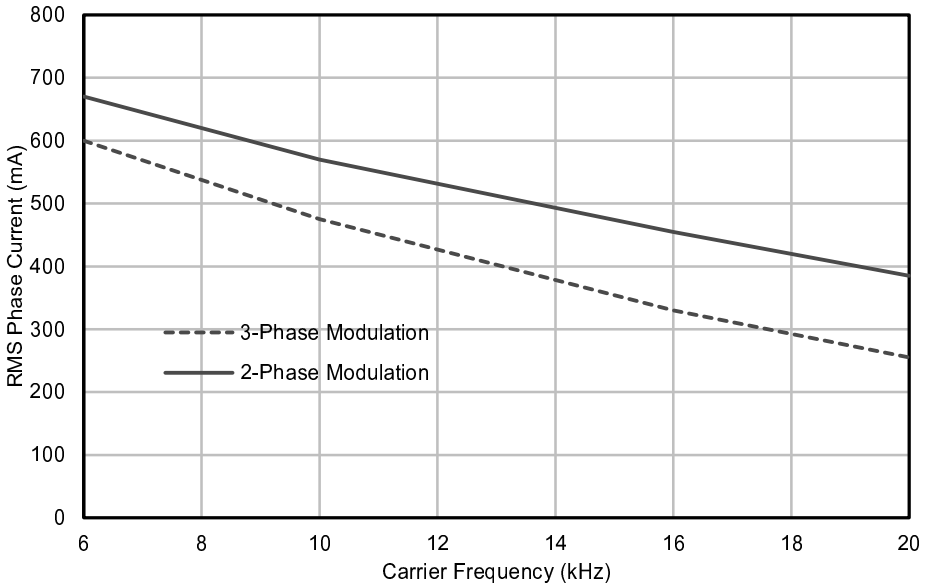

Figure 7: Maximum sinusoidal phase current vs PWM switching frequency, no heat sink.
Space Vector Modulation, V+=320V, T_A=28°C, T_J=98°C

The module contains an NTC – connected between COM and the V_{TH} pin – which can be used to monitor the temperature of the module. The NTC is effectively a resistor whose value decreases as the temperature rises. The NTC resistance can be calculated at any temperature as follows:

$R_{TH} = R_{25}e^{\left[B\left(\frac{1}{T_{TH}} - \frac{1}{T_{25}}\right)\right]}$, where $R_{25}$is 47kΩ and B is 4050K

An external resistor network is connected to the NTC, the simplest of which is one resistor pulled up to V_{CC} as shown in Figure 3. The V_{TH} vs NTC temperature, T_{TH} curve for this configuration is shown in Figure 8 below. The min, typical and max curves result from the NTC having a ±5% tolerance on its resistance and ±2% tolerance on the B-parameter.

Figure 9 shows the thermistor temperature, T_{TH} plotted against the high-side V-phase junction temperature, T_J for a module without a heat sink. It is thus advisable to shut down the module when T_{TH} reaches 125°C.

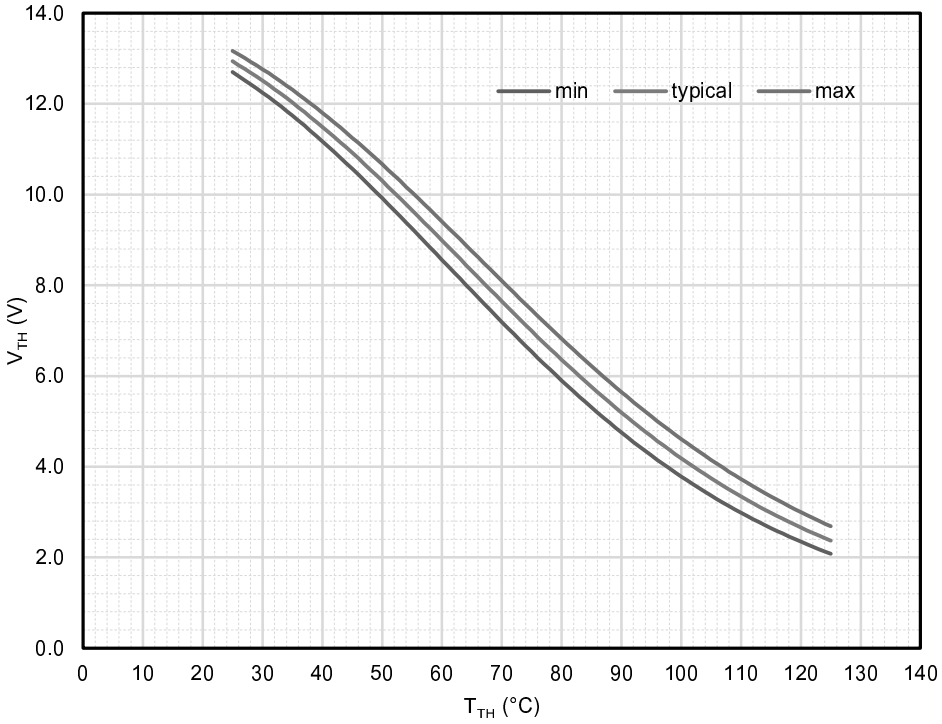

Figure 8: V_{TH} vs T_{TH} with V_{TH} pin pulled up to V_{CC} with a 7.50kΩ (1%, 100ppm) resistor. A 15V, 1% variation in V_{CC} is assumed.

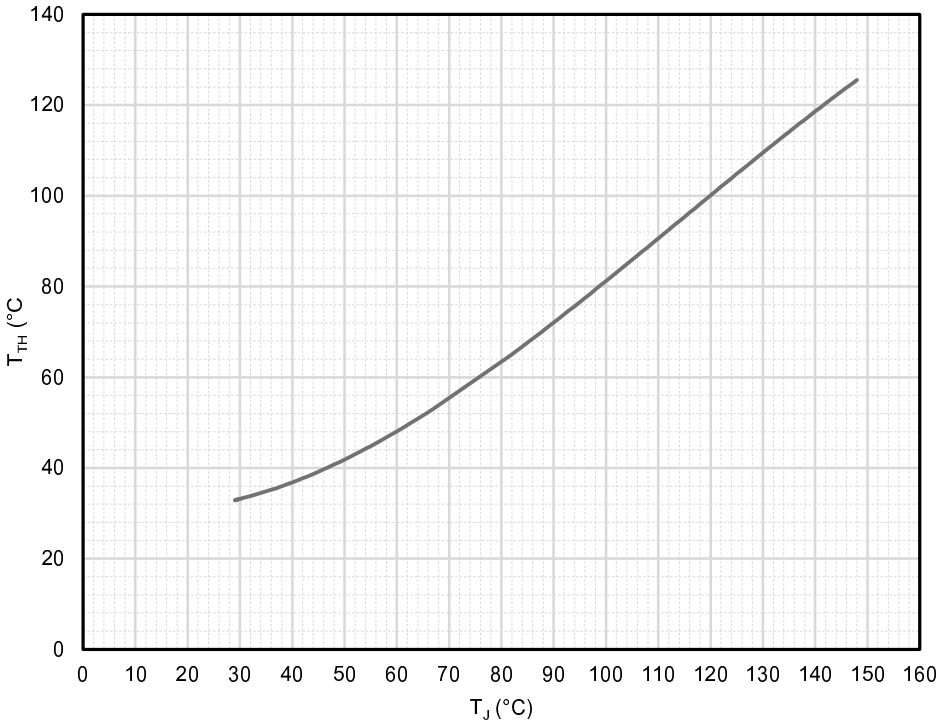

Figure 9: T_{TH} vs T_J for a module without a heat sink. V_{CC}=15.4V, R=7.50kΩ