

Automotive H-Bridge Driver

Thermal Addendum

Introduction

This thermal addendum is provided as a supplement to the MC33186 technical datasheet. The addendum provides thermal performance information that may be critical in the design and development of system applications. All electrical, application, and packaging information is provided in the datasheet.

Package and Thermal Considerations

The MC33186 is offered in a 20 terminal HSOP exposed pad, single die package. There is a single heat source (P), a single junction temperature (T_J), and thermal resistance (R_{θJA}).

$$\{ T_J \} = [R_{\theta JA}] \cdot \{ P \}$$

The stated values are solely for a thermal performance comparison of one package to another in a standardized environment. This methodology is not meant to and will not predict the performance of a package in an application-specific environment. Stated values were obtained by measurement and simulation according to the standards listed below.

Standards

Table 1. Thermal Performance Comparison

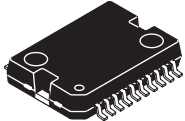
Thermal Resistance	[°C/W]
R _{θJA} ^{(1), (2)}	29
R _{θJB} ^{(2), (3)}	9.0
R _{θJA} ^{(1), (4)}	69
R _{θJC} ⁽⁵⁾	2.0

Notes:

1. Per JEDEC JESD51-2 at natural convection, still air condition.
2. 2s2p thermal test board per JEDEC JESD51-5 and JESD51-7.
3. Per JEDEC JESD51-8, with the board temperature on the center trace near the center lead.
4. Single layer thermal test board per JEDEC JESD51-3 and JESD51-5.
5. Thermal resistance between the die junction and the exposed pad surface; cold plate attached to the package bottom side, remaining surfaces insulated.

33186DH

**20-TERMINAL
 HSOP-EP**



**DH1 SUFFIX
 VW1 SUFFIX (PB-FREE)
 98ASH70273A
 20-TERMINAL HSOP-EP**

Note For package dimensions, refer to the 33186 data sheet.

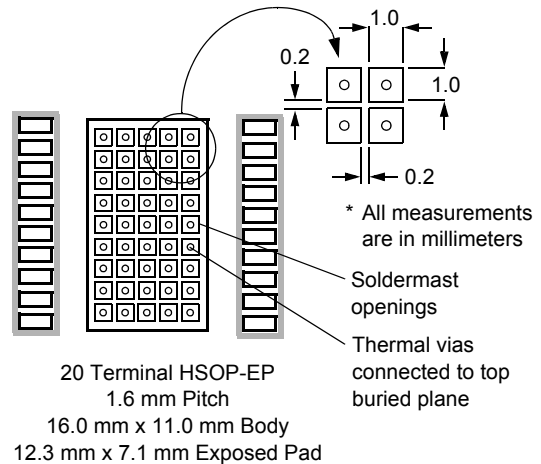


Figure 1. Thermal Land Pattern for Direct Thermal Attachment According to JESD51-5

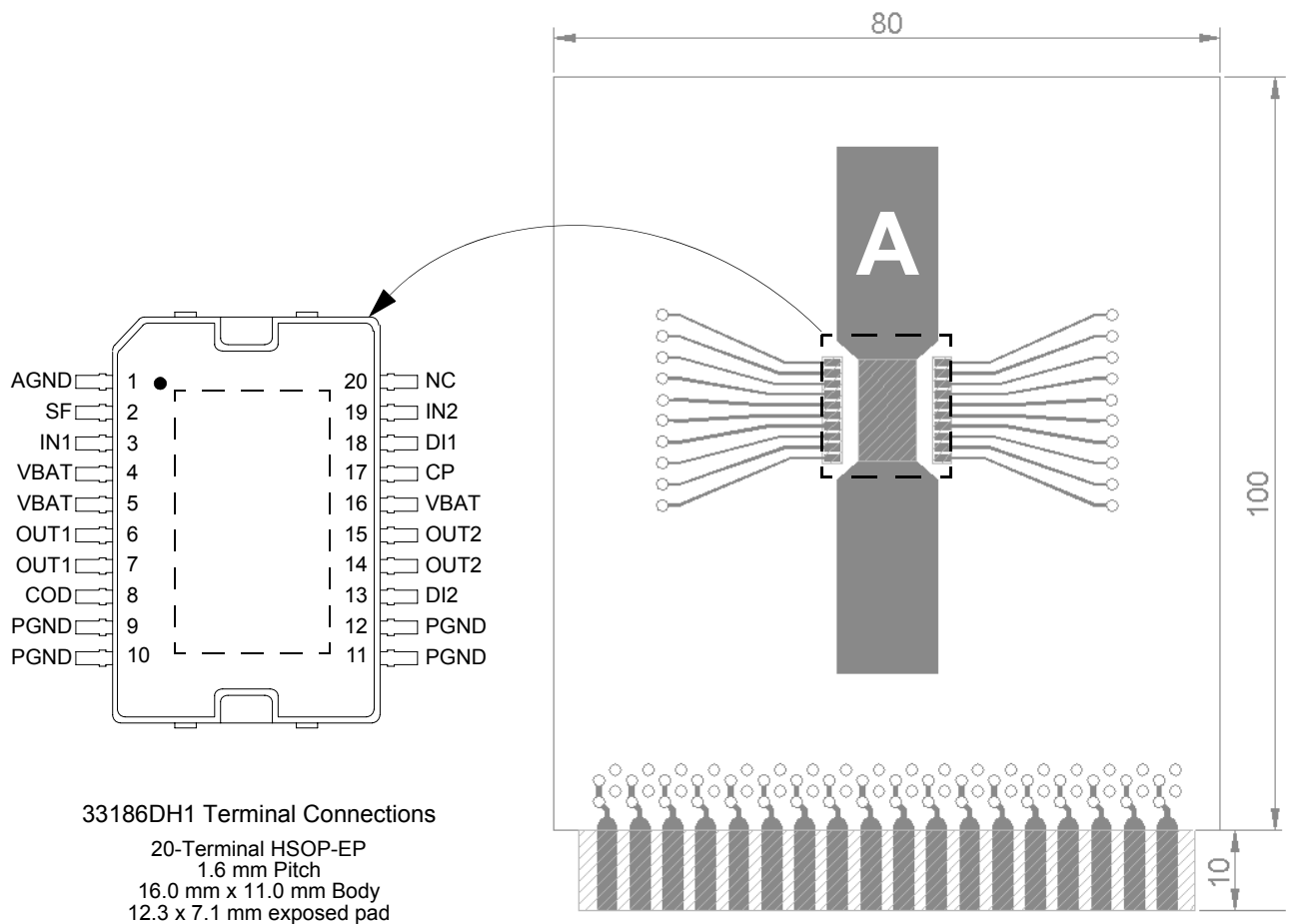


Figure 2. Thermal Test Board

Device on Thermal Test Board

- Material: Single layer printed circuit board
FR4, 1.6 mm thickness
Cu traces, 0.07 mm thickness
- Outline: 80 mm x 100 mm board area,
including edge connector for
thermal testing
- Area A: Cu heat-spreading areas on board
surface
- Ambient Conditions: Natural convection, still air

Table 2. Thermal Resistance Performance

A [mm ²]	R _{θJA} [°C/W]
0	70
300	49
600	47

R_{θJA} is the thermal resistance between die junction and ambient air.

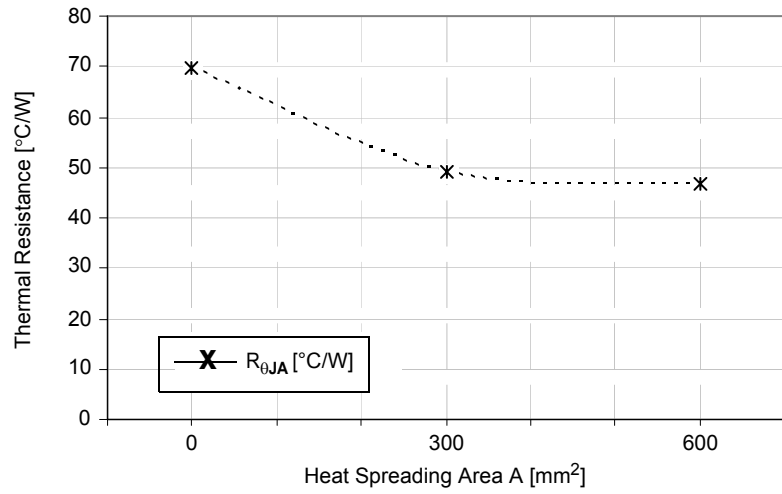


Figure 3. Device on Thermal Test Board $R_{\theta JA}$

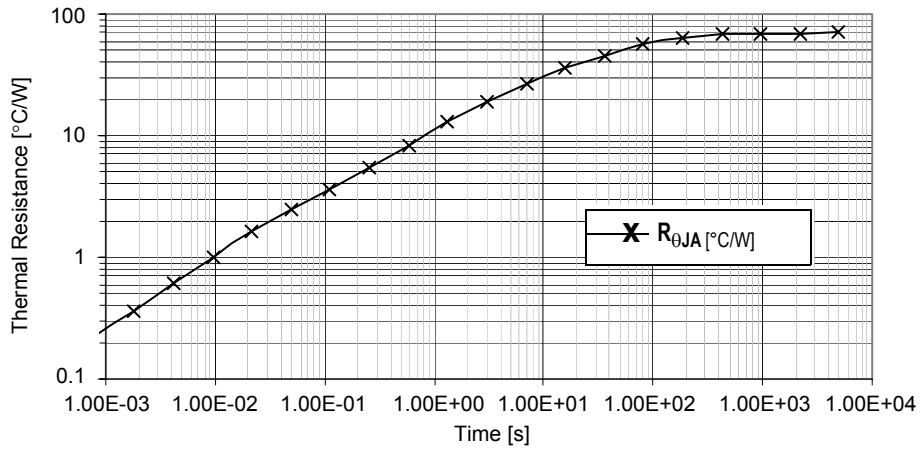


Figure 4. Transient Thermal Resistance $R_{\theta JA}$
1 W Step Response, Device on Thermal Test Board Area A = 600 (mm²)

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