AN10882

Dependency of BLF578 gate bias voltage on temperature

Rev. 01 — 17 December 2009 Application note

Document information

Info	Content
Keywords	BLF578, HV LDMOS
Abstract	This application note describes the dependency of the BLF578 transistor gate bias voltage on junction temperature

Revision history

Rev	Date	Description
01	20091217	Initial version

Contact information

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1. Introduction

The BLF578 is a 50 V push-pull transistor using NXP Semiconductor's sixth generation of HV LDMOS technology. The BLF578 has a high degree of ruggedness, critical for successful broadcasting, due to the carefully designed high voltage fabrication process.

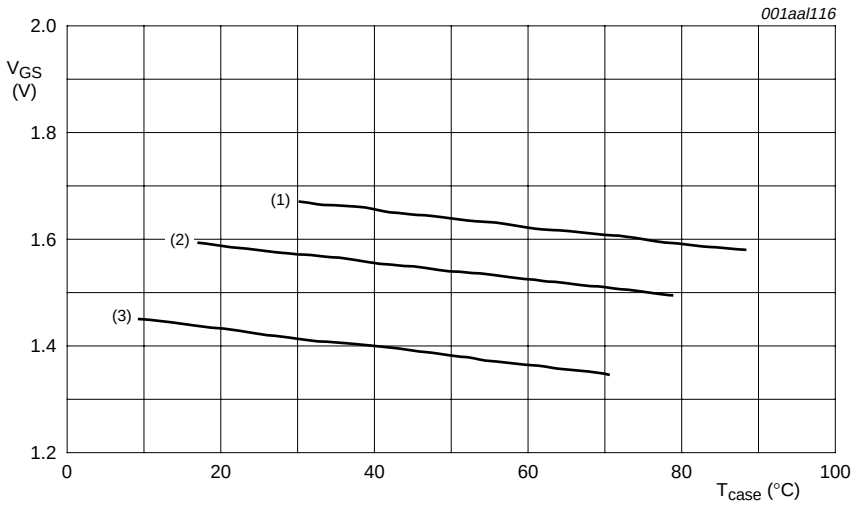
Within the BLF578 package, the two push-pull modules are completely independent of each other and the gates are protected by the integrated ElectroStatic Discharge (ESD) diode.

The BLF578 is unmatched and designed for use in applications where very high power and efficiency are required. At full operating power, the BLF578 can withstand a 13:1 VSWR for all phase angles. Typical uses are FM/VHF broadcasting, laser, and Industrial Scientific and Medical (ISM) applications.

This application note describes the dependency of gate bias voltage on the BLF578 transistor junction temperature. This dependency can be used by a temperature compensated bias circuit to ensure that the quiescent drain current remains constant during RF operation.

2. Measurement results

To determine the dependency of gate-bias voltage on temperature, the BLF578 case temperature (T_{case}) was allowed to reach 70 °C and gradually water cooled to 5 °C. Over this temperature range the gate-source voltage (V_{GS}) was adjusted to maintain a constant quiescent current (I_{Dq}) and the values of V_{GS} and T_{case} were recorded. The measurements were performed for I_{Dq} values of 0.2 A, 1 A and 2 A at a supply voltage (V_{DS}) of 50 V as shown in Figure 1.



(1) I_{Dq} = 2 A.
(2) I_{Dq} = 1 A.
(3) I_{Dq} = 0.2 A.

Fig 1. Gate-source voltage as a function of case temperature

The values of the three quiescent currents used in the measurements were chosen to represent typical quiescent currents found in NXP Semiconductor applications.

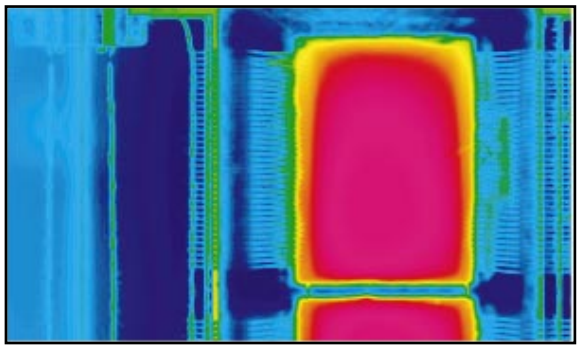
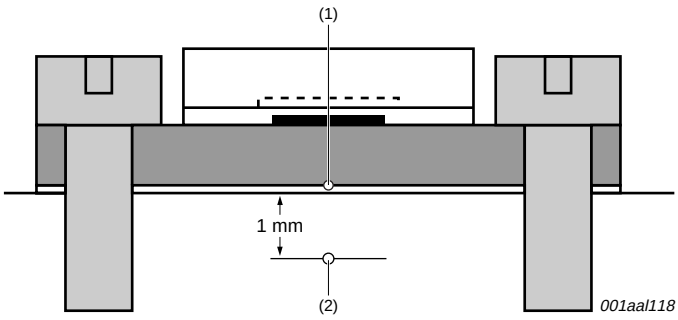


Fig 2. BLF578 junction temperature measured by infrared camera

The case temperature (T_{case}) was measured below the flange as shown in Figure 3.



(1) T_{case}.

(2) Heatsink temperature (T_h).

Fig 3. BLF578 temperature measurement points

3. Abbreviations

Table 1. Abbreviations

Acronym	Description
HV	High Voltage
LDMOS	Laterally Diffused Metal Oxide Semiconductor
VSWR	Voltage Standing Wave Ratio

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Date of release: 17 December 2009
Document identifier: AN10882_1