

## AX5043-1 DVK2b Module Performance TX



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### Introduction

This application note documents output power and transmit currents versus frequency, power settings and VDDIO for the following AX5043 modules:  
DVK2b-AX5043-2 V1.3 868 MHz / NB,  
DVK2b-AX5043-2 V1.3 433 MHz / NB and  
DVK2-AX5043-LF2 V1.2 169 MHz / NB.

### APPLICATION NOTE

#### DVK2b-AX5043-2 V1.3 868 MHz / NB Module

##### Setup

RF Module	DVK2b-AX5043-2 V1.3 868 MHz / NB with 16MHz TCXO unless stated otherwise. Using the internal VCO.
Main Board	DVK2b, powering the AX5043 via an external power supply
Setup Software	AX-RadioLAB_v2.1f
Software Setup	Basic & Regulatory Tests, Set Pattern, 10kbps GFSK, BT= 0.5. Output Power is varied by changing "Transmit Power" in the PHY panel, which determines the AX5043's TXPWRCOEFFB setting. Output power is plotted against TXPWRCOEFFB, rather than the "transmit power" setting.
RF Measurement equipment	Huber & Suhner 10 dB attenuator directly at the RF Module, 0.5 m Huber & Suhner RG-58 cable to Rhode & Schwarz FSEB spectrum analyzer. Measuring peak power with trace clear / write; RBW = 100 kHz; detector AUTO SELECT, AUTO PEAK; ATTEN AUTO NORMAL Power levels are spectrum analyzer readings plus 11 dB.

Output Power versus Power Setting and VDDIO

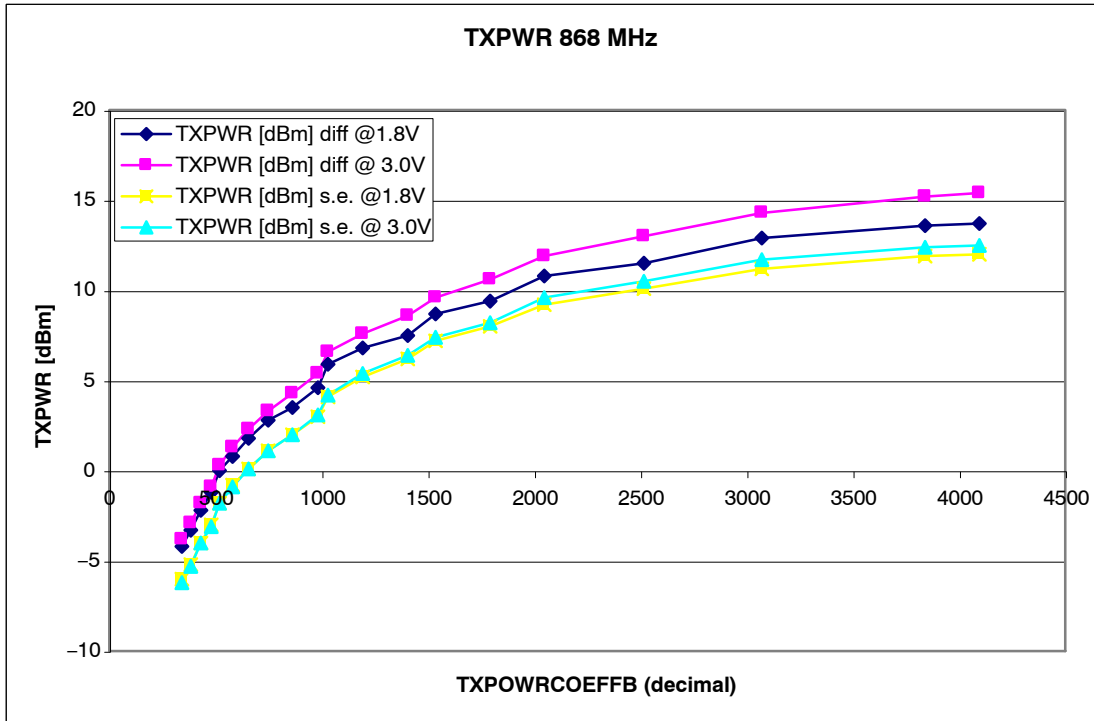


Figure 1. Output Power of the Differential and Single Ended PA versus TXPWRCOEFFB Register Setting at 868.3 MHz, VDDIO = 1.8 v and 3.0 V

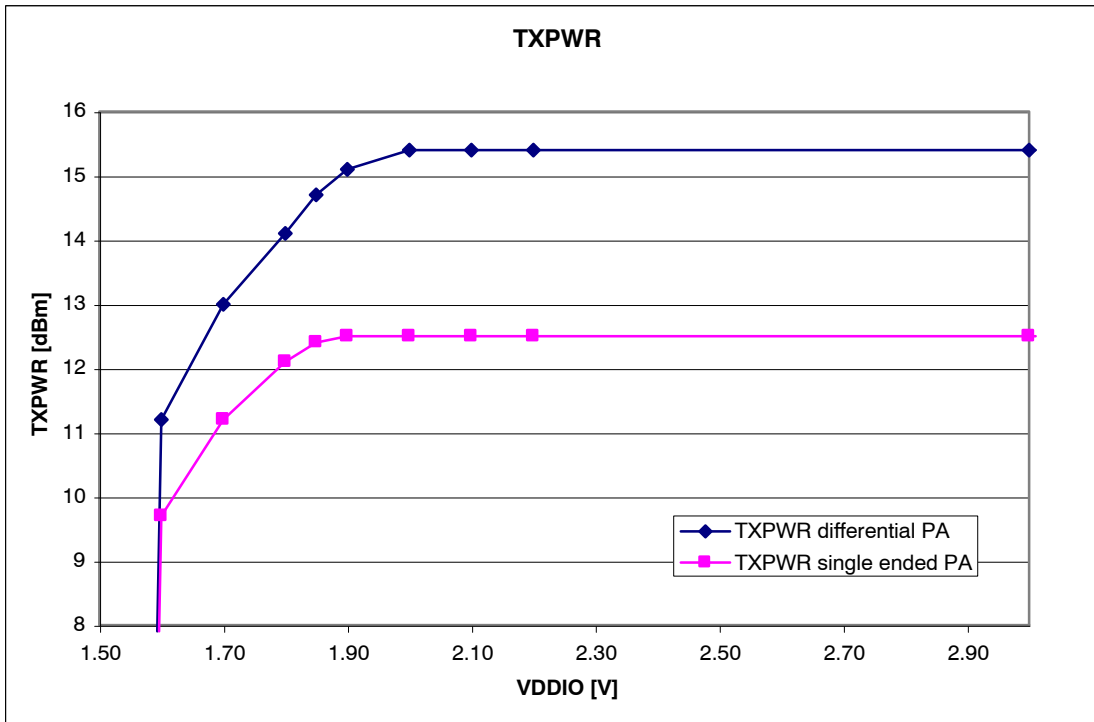
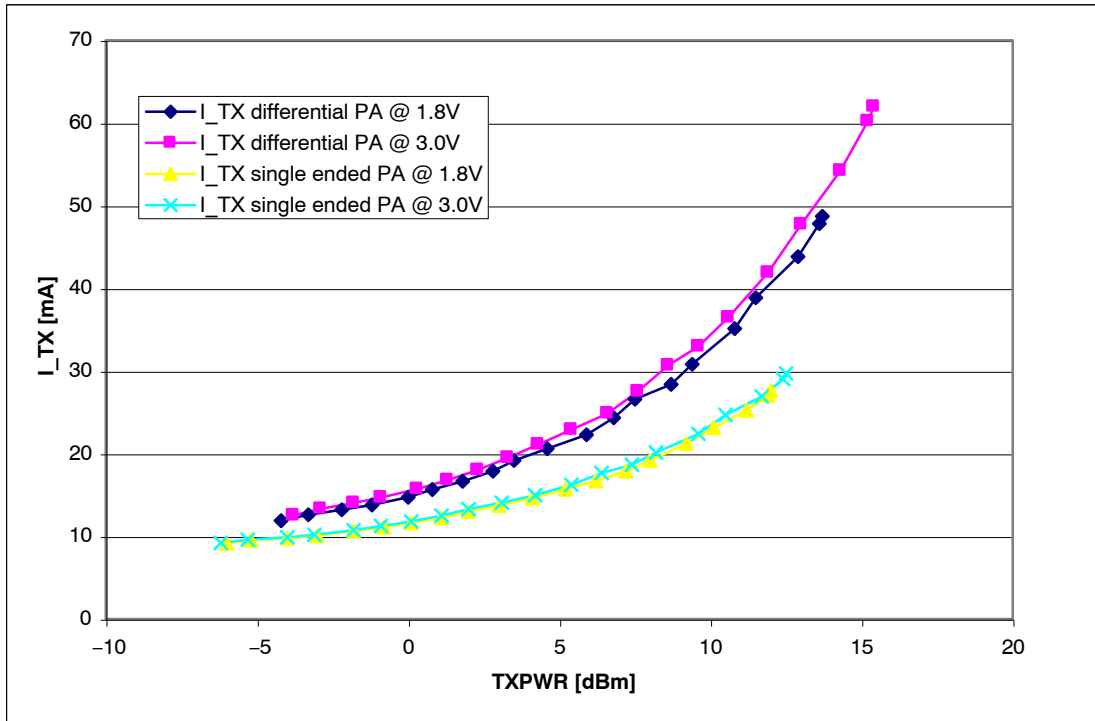


Figure 2. Output Power of the Differential and Single Ended PA versus VDDIO for TXPWRCOEFFB = 0xFF (Maximum Power) at 868.3 MHz

Transmit Current versus Output Power



**Figure 3. Transmit Current versus Output Power of the Differential and Single Ended PA at 868.3 MHz using a 16 MHz TCXO. (TCXO Current not included.) VDDIO = 1.8 V and 3.0 V.**

NOTE: This module is optimized for maximum output power. With a matching network optimized for 0 dBm the transmit current at 0 dBm is 8.5 mA, rather than 12 – 15 mA.

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## Output Power versus Frequency

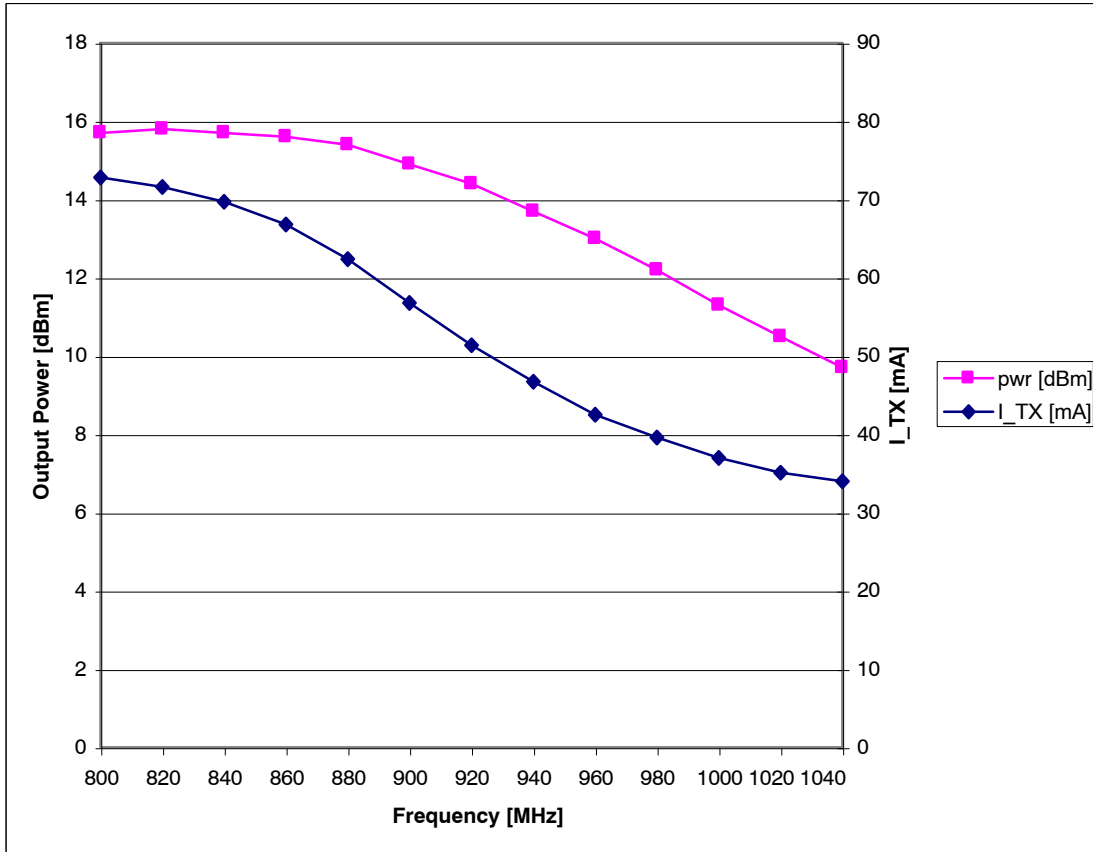


Figure 4. Output Power and Transmit Current versus Frequency for TXPWRCOEFFB = 0xFF (Maximum Power) using the Differential PA and a 48 MHz TCXO. (TCXO Current not included.) VDDIO = 3.0 V

### DVK2b-AX5043-2 V1.3 433 MHz / NB Module

#### Setup

RF Module	DVK2b-AX5043-2 V1.3 433 MHz / NB with 16 MHz TCXO unless stated otherwise. Using the internal VCO.
Main Board	DVK2b, powering the AX5043 via an external power supply
Setup Software	AX-RadioLAB_v2.1f
Software Setup	Basic & Regulatory Tests, Set Pattern, 10 kbps GFSK, BT = 0.5. Output Power is varied by changing "Transmit Power" in the PHY panel, which determines the AX5043's TXPWRCOEFFB setting. Output power is plotted against TXPWRCOEFFB, rather than the "transmit power" setting.
RF Measurement equipment	Huber & Suhner 10 dB attenuator directly at the RF Module, 0.5 m Huber & Suhner RG-58 cable to Rhode & Schwarz FSEB spectrum analyzer. Measuring peak power with trace clear / write; RBW = 100 kHz; detector AUTO SELECT, AUTO PEAK; ATTN AUTO NORMAL Power levels are spectrum analyzer readings plus 10.75 dB.

Output Power versus Power Setting and VDDIO

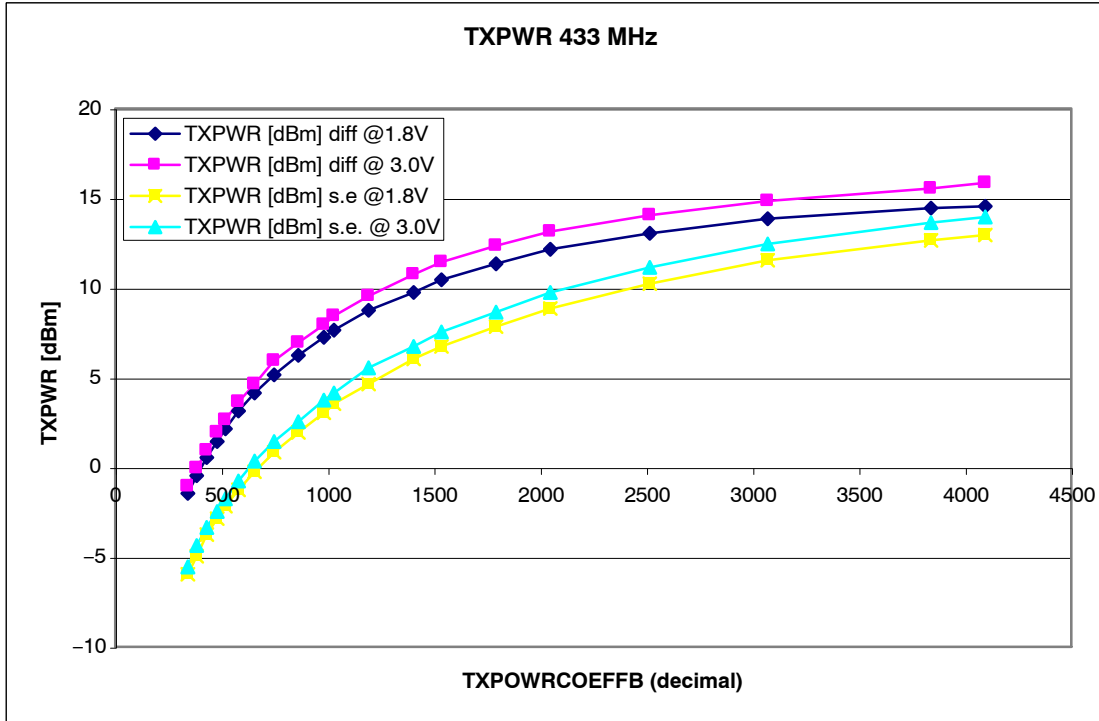


Figure 5. Output Power of the Differential and Single Ended PA versus TXPWRCOEFFB Register Setting at 433.15 MHz, VDDIO = 1.8 V and 3.0 V

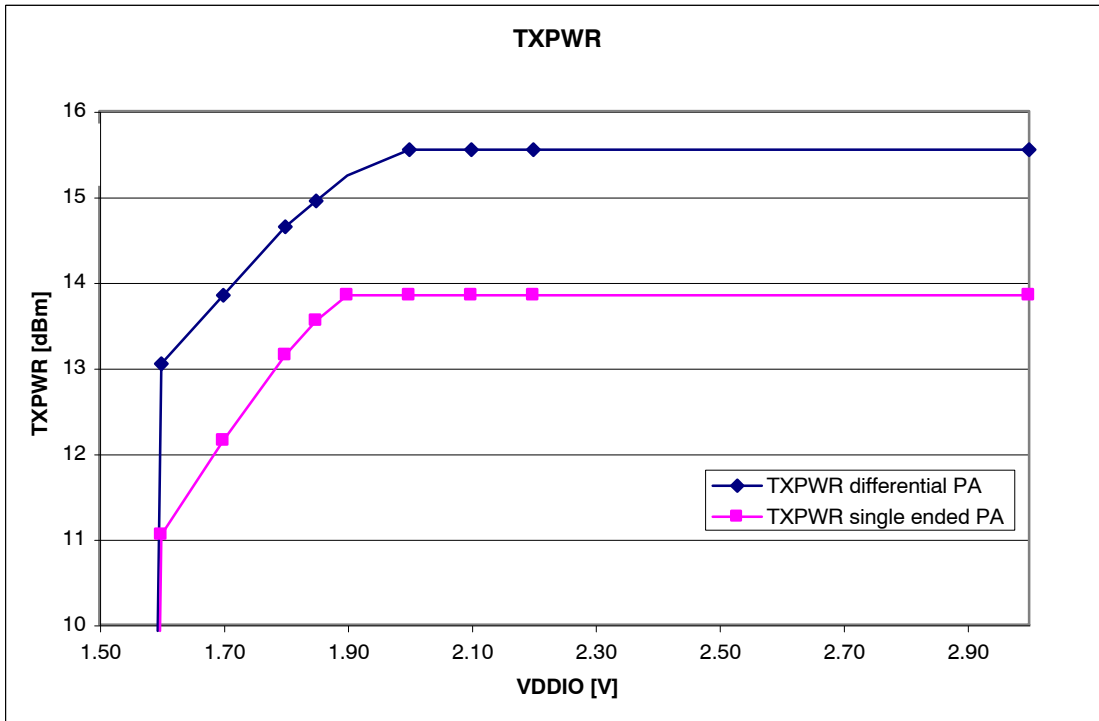


Figure 6. Output Power of the Differential and Single Ended PA versus VDDIO for TXPWRCOEFFB = 0xFF (Maximum Power) at 433.15 MHz

Transmit Current versus Output Power

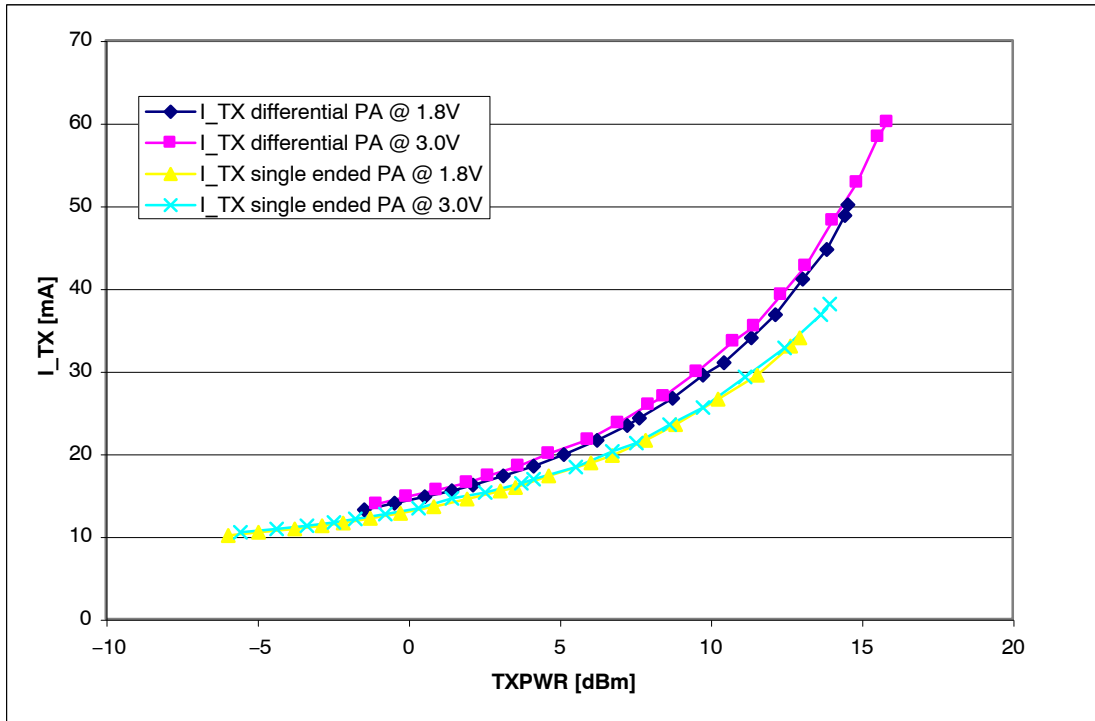


Figure 7. Transmit Current versus Output Power of the Differential and Single Ended PA at 433.15 MHz using a 16 MHz TCXO. (The TCXO Current is not included.)

NOTE: This module is optimized for maximum output power. With a matching network optimized for 0 dBm the transmit current at 0 dBm is 8.5 mA, rather than 12 – 15 mA.

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## Output Power versus Frequency

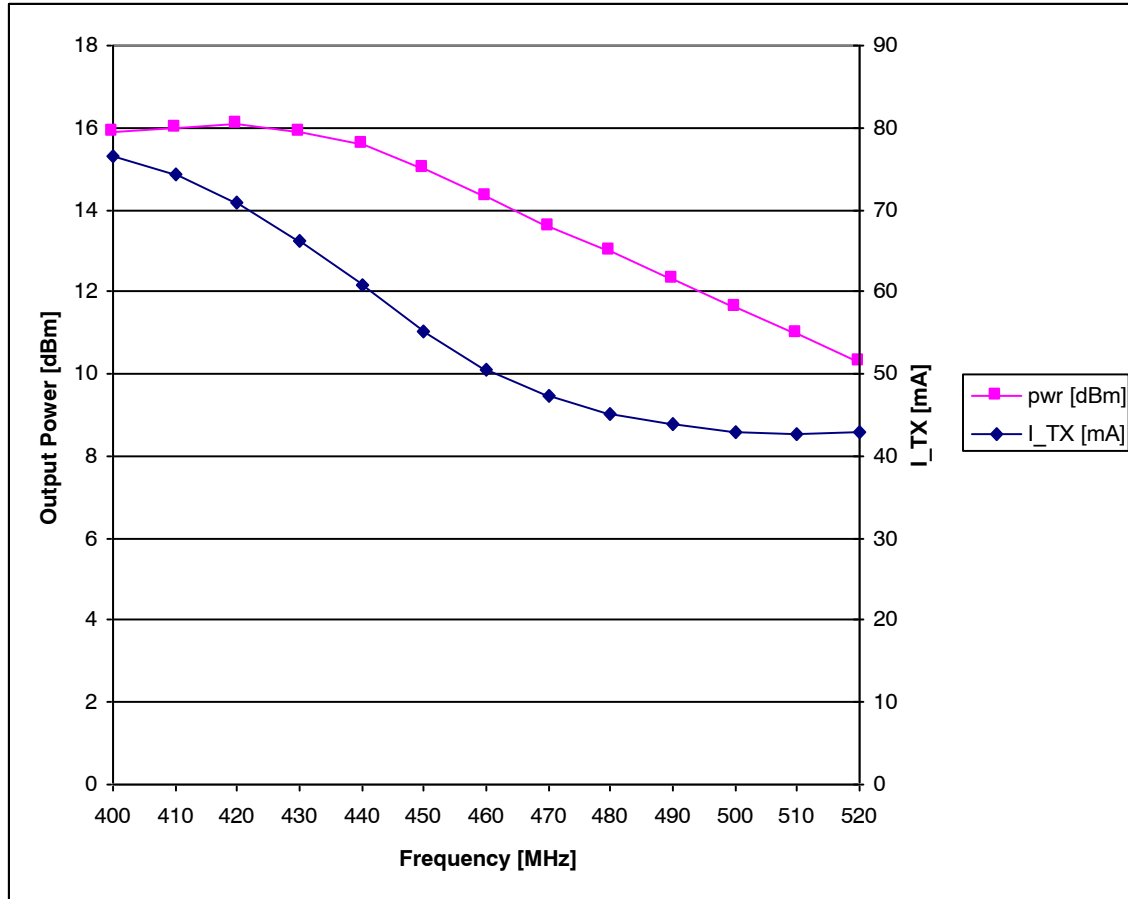


Figure 8. Output Power and Transmit Current versus Frequency for TXPWRCOEFFB = 0xFF (Maximum Power) using the Differential PA and a 48 MHz TCXO. (TCXO Current not included.) VDDIO = 3.0 V

### DVK2-AX5043-LF2 V1.2 169 MHz / NB Module

#### Setup

RF Module	DVK2-AX5043-LF2 V1.2 169 MHz / NB with 16 MHz TCXO unless stated otherwise. Using VCO2 with external L.
Main Board	DVK2b with connectors for DVK2 modules added, powering the AX5043 via an external power supply
Setup Software	AX-RadioLAB_v2.1f
Software Setup	Basic & Regulatory Tests, Set Pattern, 10 kbps GFSK, BT = 0.5. Output Power is varied by changing "Transmit Power" in the PHY panel, which determines the AX5043's TXPWRCOEFFB setting. Output power is plotted against TXPWRCOEFFB, rather than the "transmit power" setting.
RF Measurement equipment	Huber & Suhner 10 dB attenuator directly at the RF Module, 0.5 m Huber & Suhner RG-58 cable to Rhode & Schwarz FSEB spectrum analyzer. Measuring peak power with trace clear / write; RBW = 100 kHz; detector AUTO SELECT, AUTO PEAK; ATTEN AUTO NORMAL Power levels are spectrum analyzer readings plus 10.5 dB.

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Output Power versus Power Setting and VDDIO

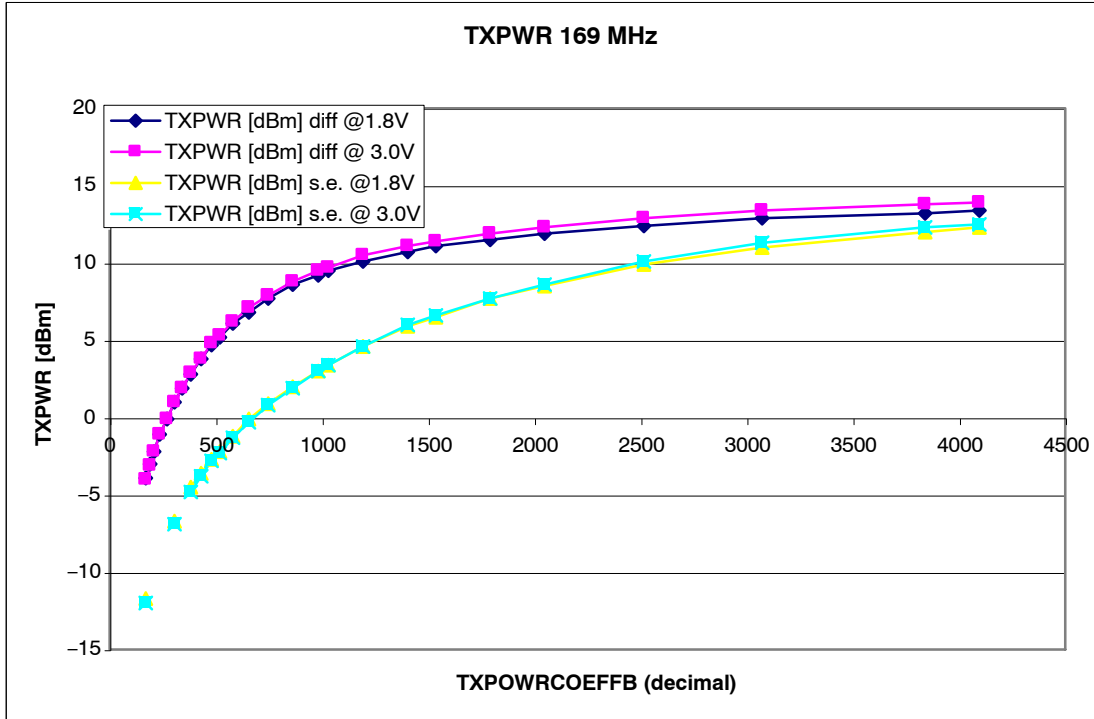


Figure 9. Output Power of the Differential and Single Ended PA versus TXPWRCOEFFB Register Setting at 169.3 MHz, VDDIO = 1.8 V and 3.0 V

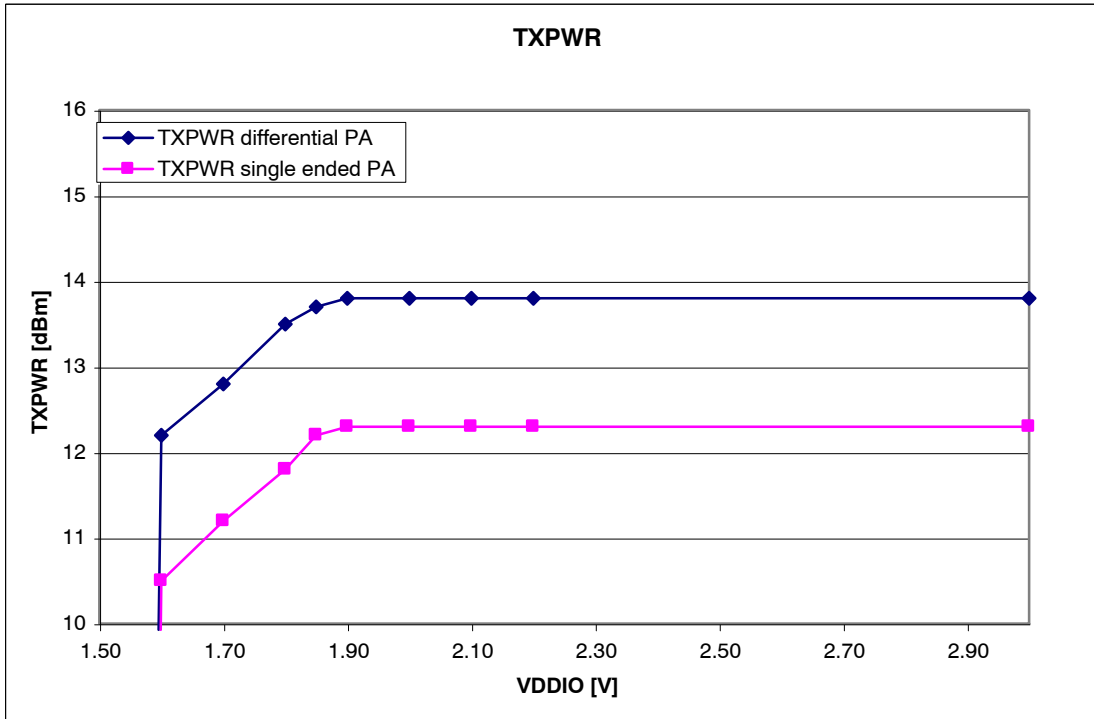


Figure 10. Output Power of the Differential and Single Ended PA versus VDDIO for TXPWRCOEFFB = 0xFFF (Maximum Power) at 169.3 MHz



Transmit Current versus Output Power

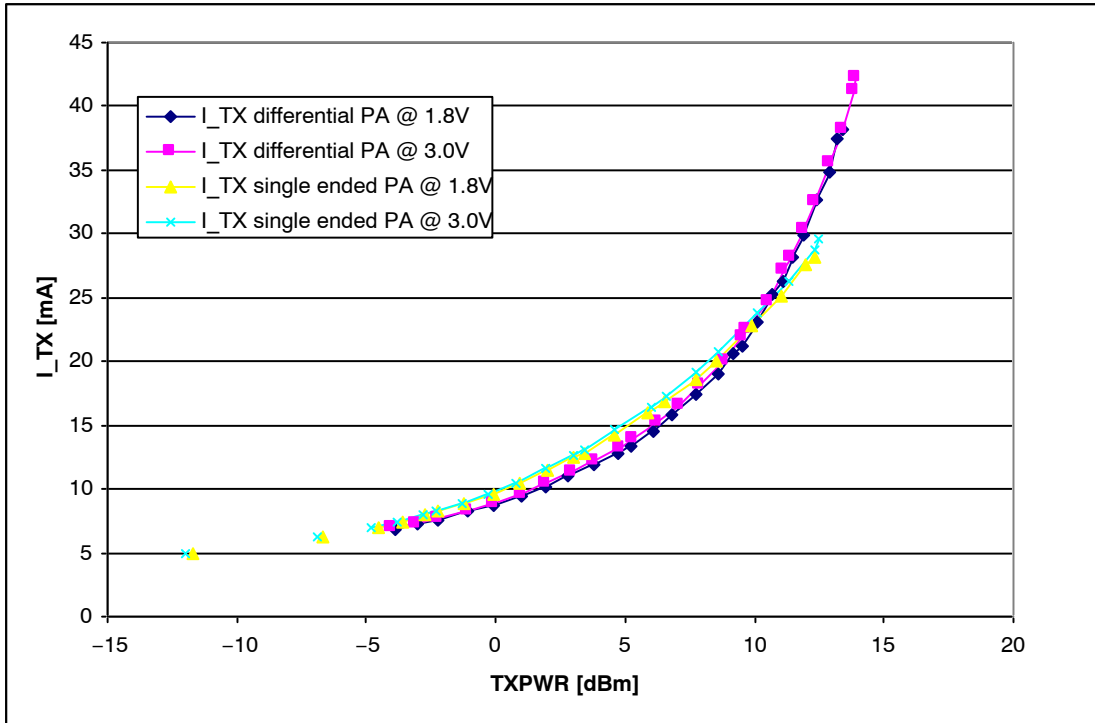


Figure 11. Transmit Current versus Output Power of the Differential and Single Ended PA at 169.3 MHz using a 16 MHz TCXO. (The TCXO Current is not included.)

NOTE: This module is optimized for maximum output power. With a matching network optimized for 0 dBm the transmit current at 0 dBm is 5 mA, rather than 9 – 10 mA.

Output Power versus Frequency

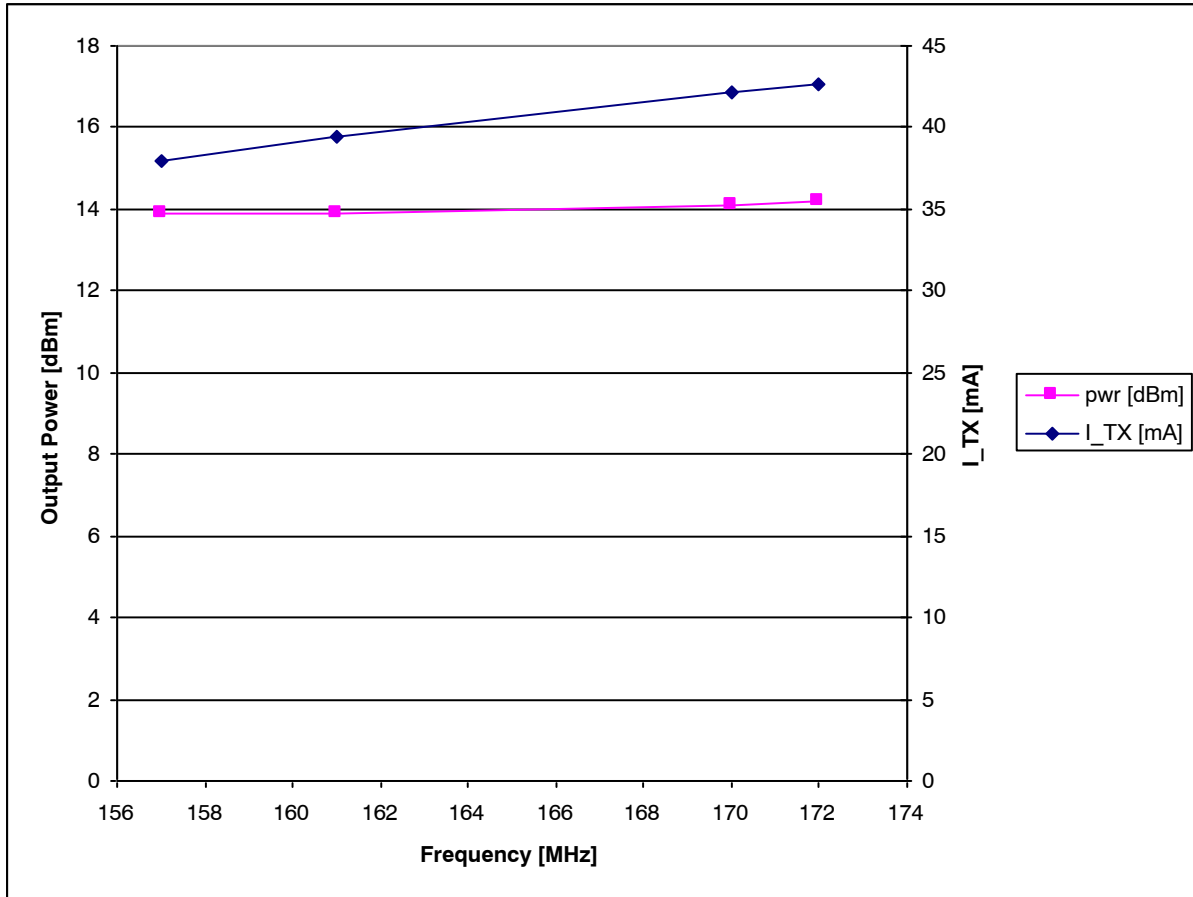


Figure 12. Output Power and Transmit Current versus Frequency for TXPWRCOEFFB = 0xFF (Maximum Power) using the Differential PA and a 48 MHz TCXO. (TCXO Current not included.) VDDIO = 3.0 V

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