

Ultra Low Noise, High Current

E-PHEMT Transistor

TAV1-541+

50Ω 0.045 to 6 GHz

The Big Deal

- Low Noise Figure, 0.4 dB
- Gain, 24 dB typ. at 0.9 GHz
- High OIP3, +32 dBm



CASE STYLE: TE2769

Product Overview

TAV1-541+ is a low noise, high IP3 transistor device manufactured using E-PHEMT* technology enabling it to work with a single positive supply voltage. It has outstanding Noise figure, particularly below 2.5 GHz, and when combining this noise figure with IP3 performance in a single device it makes it an ideal amplifier for multiple applications.

Key Features

Feature	Advantages
Wideband, 0.045 to 6 GHz	Use in multiple applications: UHF, VHF, communication infrastructure
High Gain, Low noise figure	High Gain limits the effect of noise figure due to previous stages
Small size, 1.18 x 1.42 x 0.85 mm, MCLP package	Small foot print saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

* Enhancement mode Pseudomorphic High Electron Mobility Transistor.



Ultra Low Noise, High Current E-PHEMT Transistor

0.045-6 GHz

Product Features

- Low Noise Figure, 0.4 dB
- Gain, 24 dB typ. at 0.9 GHz
- High Output IP3, +32 dBm at 2 GHz, 60mA, 4V
- Output Power at 1dB compression, +21dBm, 60mA, 4V
- Wide bandwidth
- External biasing and matching required



TAV1-541+

CASE STYLE: TE2769

Typical Applications

- Cellular
- ISM
- GSM
- WCDMA
- WiMax
- WLAN
- UNII and HIPERLAN

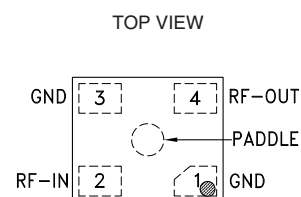
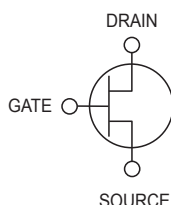
+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

General Description

TAV1-541+ is a low noise, high IP3 transistor device manufactured using E-PHEMPT* technology enabling it to work with a single positive supply voltage. It has outstanding Noise figure, particularly below 2.5 GHz, and when combining this noise figure with IP3 performance in a single device it makes it an ideal amplifier for multiple applications.

simplified schematic and pin description



Function	Pad Number	Description
RF-IN	2	Gate used for RF input
RF-OUT	4	Drain used for RF output
GND	1,3 and Paddle	Source terminal and Paddle, normally connected to ground.

* Enhancement mode Pseudomorphic High Electron Mobility Transistor.

Electrical Specifications at $T_{AMB}=25^{\circ}\text{C}$, Frequency 0.045 to 6 GHz

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
DC Specifications						
V_{GS}	Operational Gate Voltage	$V_{DS}=3\text{V}$, $I_{DS}=60\text{ mA}$	0.37	0.48	0.69	V
V_{TH}	Threshold Voltage	$V_{DS}=3\text{V}$, $I_{DS}=4\text{ mA}$	0.18	0.26	0.38	V
I_{DSS}	Saturated Drain Current	$V_{DS}=3\text{V}$, $V_{GS}=0\text{ V}$	—	1.0	5.0	μA
G_M	Transconductance	$\Delta I_D = \Delta V_{GS} / \Delta V_{GS}$ $\Delta I_D = 2 I_{DSS} = 60$ $\Delta V_{GS} = 1 + 0.05$	230	392	560	mS
I_{GSS}	Gate leakage Current	$V_{GD}=V_{GS}=-3\text{V}$	—	—	200	μA
RF Specifications¹, $Z_0=50\text{ Ohms}$ (Figure 1)						
NF	Noise Figure	$V_{DS}=3\text{V}$, $I_{DS}=60\text{ mA}$ $V_{DS}=4\text{V}$, $I_{DS}=60\text{ mA}$ f=0.9 GHz f=2.0 GHz f=3.9 GHz f=5.8 GHz f=2.0 GHz	—	0.4 0.6 0.9 1.4 0.7	0.9	dB
Gain	Gain	$V_{DS}=3\text{V}$, $I_{DS}=60\text{ mA}$ $V_{DS}=4\text{V}$, $I_{DS}=60\text{ mA}$ f=0.9 GHz f=2.0 GHz f=3.9 GHz f=5.8 GHz f=2.0 GHz	16.4	24.1 18.6 13.3 9.3 18.6	20.4	dB
OIP3	Output IP3	$V_{DS}=3\text{V}$, $I_{DS}=60\text{ mA}$ $V_{DS}=4\text{V}$, $I_{DS}=60\text{ mA}$ f=0.9 GHz f=2.0 GHz f=3.9 GHz f=5.8 GHz f=2.0 GHz		32 31.4 31.7 31.9 33.9		dBm
P1dB ²	Power output at 1 dB Compression	$V_{DS}=3\text{V}$, $I_{DS}=60\text{ mA}$ $V_{DS}=4\text{V}$, $I_{DS}=60\text{ mA}$ f=0.9 GHz f=2.0 GHz f=3.9 GHz f=5.8 GHz f=2.0 GHz		18.2 18.4 18.6 18.3 20.7		dBm

Absolute Maximum Ratings³

Symbol	Parameter	Max.	Units
$V_{DS}^{(4)}$	Drain-Source Voltage	5	V
$V_{GS}^{(4)}$	Gate-Source Voltage	-5 to 0.7	V
$V_{GD}^{(4)}$	Gate-Drain Voltage	-5 to 0.7	V
$I_{DS}^{(4)}$	Drain Current	120	mA
I_{CS}	Gate Current	2	mA
P_{DISS}	Total Dissipated Power	360	mW
$P_{IN}^{(5)}$	RF Input Power	17	dBm
T_{CH}	Channel Temperature	150	$^{\circ}\text{C}$
T_{OP}	Operating Temperature	-40 to 85	$^{\circ}\text{C}$
T_{STD}	Storage Temperature	-65 to 150	$^{\circ}\text{C}$
Θ_{JC}	Thermal Resistance	160	$^{\circ}\text{C/W}$

Notes:

- Drain current bias is allowed to increase during compression measurement.
- Operation of this device above any one of these parameters may cause permanent damage
- Assumes DC quiescent conditions
- I_{GS} is limited to 2 mA during test.

Characterization Test Circuit

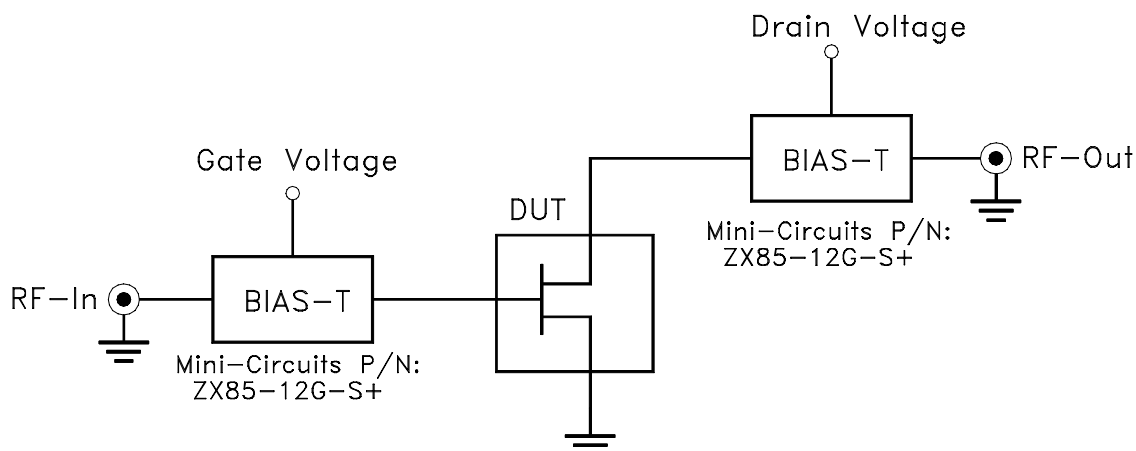


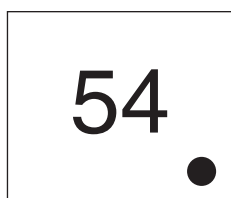
Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Test Board TB-TAV1-541+)

Gain, Output power at 1dB compression (P1 dB), Noise Figure and output IP3 (OIP3) are measured using Keysight/Agilent Network Analyzer PNA-X.

Conditions:

1. Drain voltage (with reference to source, V_{DS}) = 3 or 4V as shown.
2. Gate Voltage (with reference to source, V_{GS}) is set to obtain desired Drain-Source current (I_{DS}) as shown in specification table.
3. Gain: $P_{in} = -25\text{dBm}$
4. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.
5. No external matching components used.

Product Marking



Additional Detailed Technical Information

additional information is available on our dash board. To access this information [click here](#)

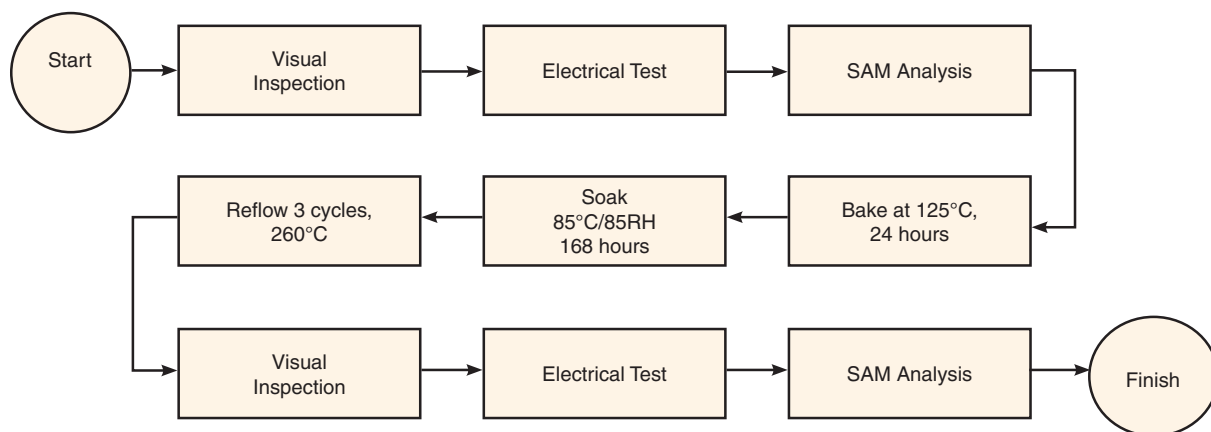
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	TE2769 Plastic package, exposed paddle, lead finish: Matte-Tin plated
Tape & Reel Standard quantities available on reel	F90 7" reels with 20, 50, 100, 200, 500, 1K, 2K or 3K devices
Suggested Layout for PCB Design	98-PL-665
Evaluation Board	TB-TAV1-541+
Environmental Ratings	ENV08T2

ESD Rating

Human Body Model (HBM): Class 1A (250V to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL Test Flow Chart**Additional Notes**

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp