

AD-007: Nitronex NPT35050 GaN HEMT Tuned for 3.4 to 3.6GHz

The Nitronex NPT35050 GaN HEMT devices output approximately 6 Watts of average RF power under single carrier OFDM (WiMax) modulation¹ and approximately 12 dB gain with 20% drain efficiency at 2.5% EVM. All measurements were collected at 3.4 - 3.6 GHz with a drain bias of $V_{DS}=28V$ and $I_{DQ}=750mA$.

Caution: Do not operate the device with greater than 36 volts of drain-source potential and $I_{DQ} > 500mA$. Drain current can exceed 500ma under RF drive.

Note, the gate bias is negative and is fully pinched off at approximately $-1.8V$. It is highly recommended to provide some active cooling in order to maintain the test board at room temperature during testing. The device needs to have thermal grease applied to the source lead (package bottom) prior to placement in the test fixture.

Caution: Do not exceed 5 dB of gain compression with a single tone signal or expose the device to a strong reversal of the gate leakage current – from negative to positive. Note: Device saturation is reached when the polarity of the gate current turns positive, a small positive gate current of +10 ma will not harm the device but once the current turns positive it will grow exponentially with additional RF driver level. Maximum Pin should not exceed 35 dBm.

Biasing sequence: GaN HEMTs are depletion mode devices, therefore set the gate voltage to $-3.0V$, bring drain voltage up to 28VDC, adjust gate to obtain desired I_{dq} , and then enable RF. Turn off device in the reverse sequence.

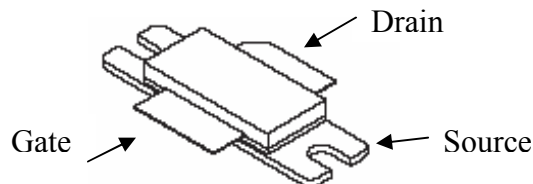
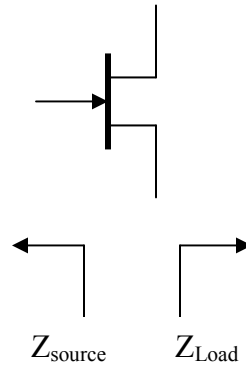


Figure 1. Packaged device lead identification

¹64 QAM 3/4, 8 burst, 3.5 MHz, 10.3 dB PAR @ 0.01% CCDF, 75% full data frame, 20ms frame length.

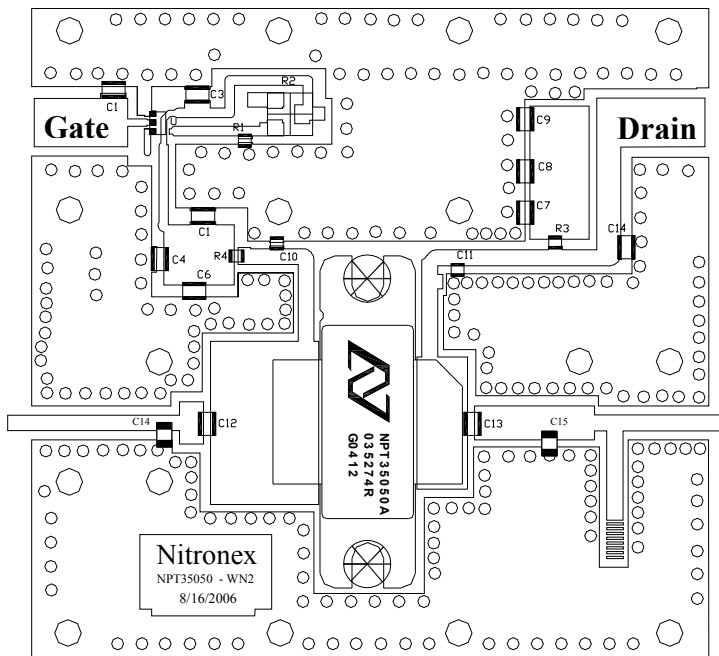


Vdd= 28 Vdc, Idq=750ma, OFDM tuning

Freq (MHz)	Z_{source} (Ω)	Z_{load} (Ω)
3400	$5.2 + j 1.2$	$6.4 - j 12.3$
3500	$6.0 + j 0.5$	$8.9 - j 14.9$
3600	$6.4 - j 0.2$	$11.6 - j 17.2$

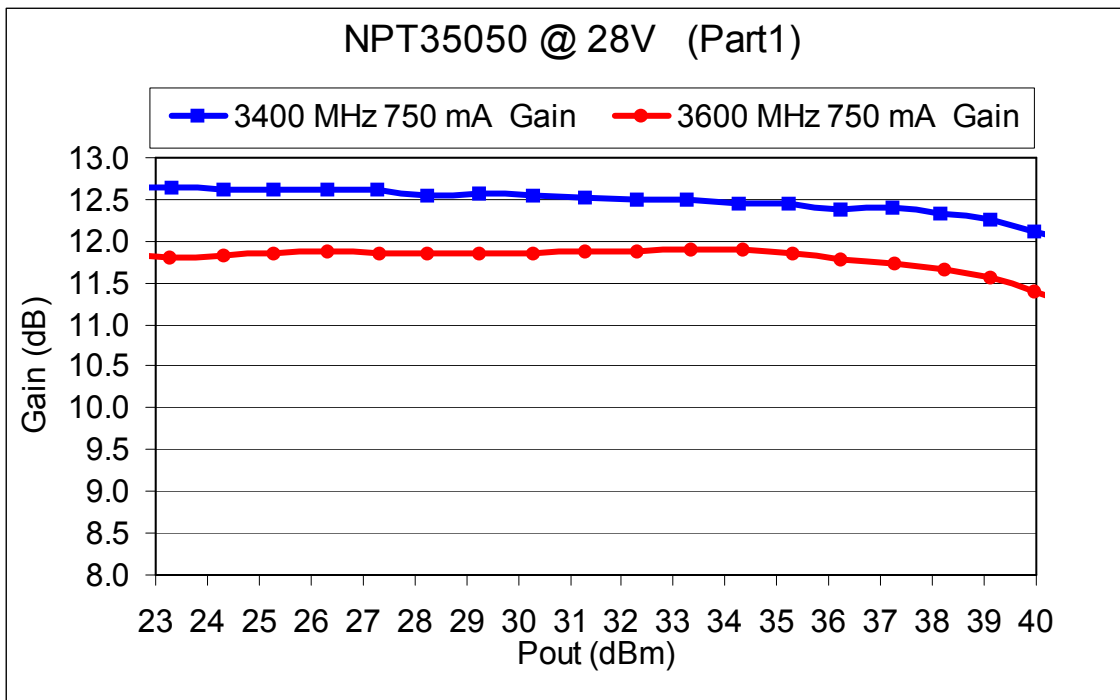
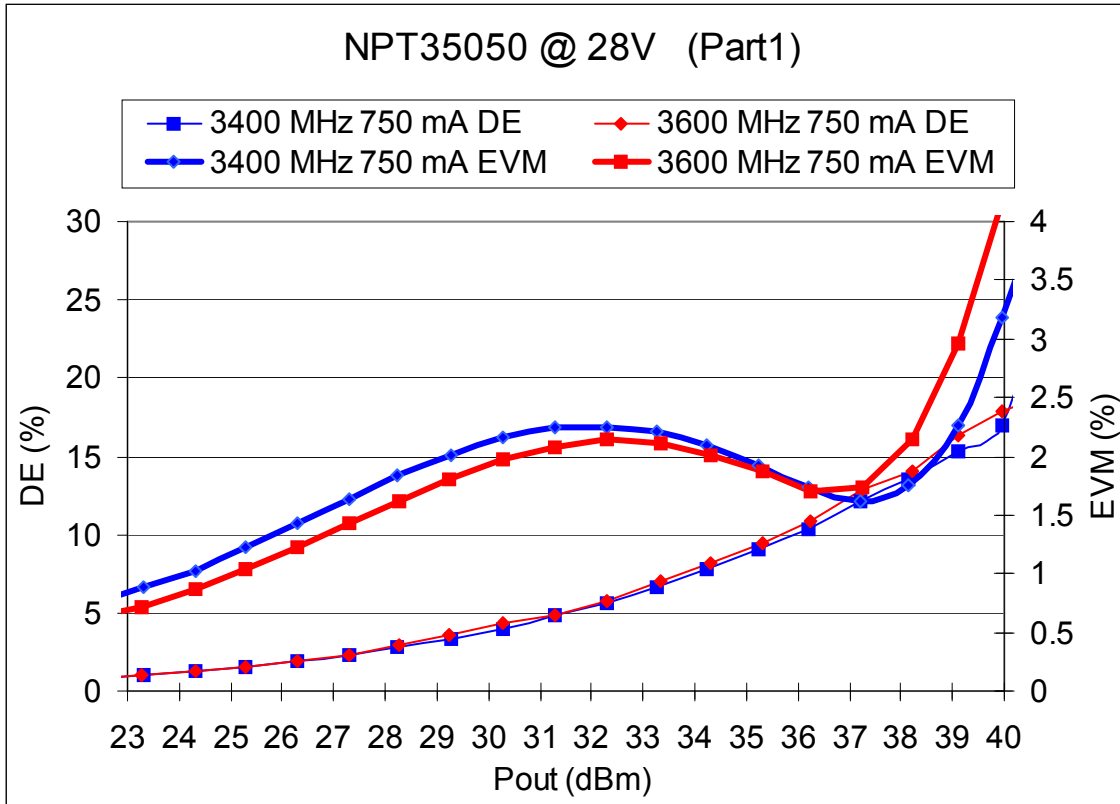
Z_{source} = Test circuit impedance of input matching network from gate to ground.

Z_{load} = Test circuit impedance of output matching network from drain to ground.



Component ID	Value
C1,C2,C3	10uF 16V Ceramic
C4, C7	0.01uF 100V Ceramic
C5, C8	0.1uF 100V Ceramic
C6, C9	1.0uF 100V Ceramic
C10, C11, C12, C13	5.6 pF ATC600F
C14	1.0 pF ATC600F
C15	1.5 pF ATC600F
C16	16V, 150uF Al Electro
C17	63V, 270uF Al Electro
R1	12k ohm
R2	10 ohm
R3	0.33 ohm
P1	20k ohm Potentiometer
IC1	IC LT1964-BYP
RF substrate	Taconic-RF35 30mils, $\epsilon_r=3.5$, 1 oz. Cu

EVM Data Collected in Nitronex Test Fixture



EVM Data Collected in Nitronex Test Fixture

