NPT35050A

Gallium Nitride 28V, 65W RF Power Transistor

Built using the SIGANTIC® NRF1 process - A proprietary GaN-on-Silicon technology

FEATURES

- Optimized for CW, pulsed, WiMAX, and other applications from 3300 – 3800 MHz
- 90W P_{3dB} PEP power
- 65W P_{3dB} CW power
- 6W linear power @ 2.0% EVM for single carrier OFDM, 10.3dB peak/avg, 3.5MHz channel bandwidth, 12dB gain, 18% efficiency
- Qualified for operation up to 32V
- 100% RF tested
- Thermally enhanced industry standard package
- High reliability gold metallization process
- Lead-free and RoHS compliant
- Subject to 3A001b.3.a Export Control

3300 - 3800 MHz
65 Watt, 28 Volt
GaN HEMT

RoHS

RF Specifications (CW): V_{DS} = 28V, I_{DQ} = 750mA, Frequency = 3500MHz, T_C = 25°C, Measured in Nitronex Test Fixture

Symbol	Parameter	Min	Typ	Max	Units
P_{3dB}	Average Output Power at 3dB Compression	-	65	-	W
G_{SS}	Small Signal Gain	11	12.5	13.5	dB
η	Drain Efficiency at 3dB Compression	40	45	-	%
Ψ	Output Mismatch Stress, VSWR = 10:1, all phase angles at 3500MHz)	No Performance Degradation After Test			

Typical 2-Tone Performance: V_{DS} = 28V, I_{DQ} = 750mA, Frequency = 3500MHz, Tone Spacing = 0.1MHz, T_C = 25°C
Measured in Load-Pull System

Symbol	Parameter	Typ	Units
$P_{3dB,PEP}$	Peak Envelope Power at 3dB Compression	93	W
$P_{1dB,PEP}$	Peak Envelope Power at 1dB Compression	55	W
P_{IMD3}	Peak Envelope Power at -35dBm IMD3	71	W

Typical OFDM Performance: V_{DS} = 28V, I_{DQ} = 750mA, Single carrier OFDM waveform 64-QAM 3/4, 8 burst, 20ms frame, 15ms frame data, 3.5 MHz channel bandwidth. Peak/Avg. = 10.3dB @ 0.01% probability on CCDF. Frequency = 3400 - 3600MHz. $P_{OUT,AVG}$ = 6W, T_C = 25°C. Measured in Nitronex Test Fixture

Symbol	Parameter	Typ	Units
G_P	Power Gain	12	dB
η	Drain Efficiency	18	%
EVM	Error Vector Magnitude	2.0	%

DC Specifications: T_C=25°C

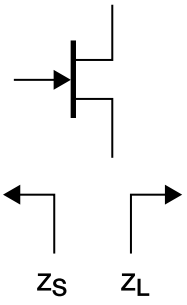
Symbol	Parameter	Min	Typ	Max	Units
Off Characteristics					
V_{BDS}	Drain-Source Breakdown Voltage (V_{GS}=-8V, I_{DQ}=36mA)	100	-	-	V
I_{DLK}	Drain-Source Leakage Current (V_{GS}=-8V, V_{DS}=60V)	-	-	18	mA
On Characteristics					
V_T	Gate Threshold Voltage (V_{DS} = 28V, I_{DQ} = 36mA)	-2.3	-1.8	-1.3	V
V_{GSQ}	Gate Quiescent Voltage (V_{DS} = 28V, I_{DQ} = 750mA)	-2.0	-1.5	-1.0	V
R_{ON}	On Resistance (V_{GS} = 2V, I_{DQ} = 270mA)	-	0.13	0.15	Ω
I_D	Drain Current (V_{DS} = 7V pulsed, 300ms pulse width, 0.2% duty cycle, V_{GS}=2V)	-	19.5	-	A

Absolute Maximum Ratings: Not simultaneous, T_C=25°C unless otherwise noted

Symbol	Parameter	Max	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	-10 to 3	V
P_T	Total Device Power Dissipation (Derated above 25°C)	90	W
θ_{JC}	Thermal Resistance (Junction-to-Case)	1.95	°C/W
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_J	Operating Junction Temperature	200	°C
HBM	Human Body Model ESD Rating (per JESD22-A114)	1C (>1000V)	
MM	Machine Model ESD Rating (per JESD22-A115)	M3 (>200V)	

Table 1: Optimum Impedance Characteristics for OFDM Tuning (V_{DS}=28V, I_{DQ}=750 mA).

Frequency (MHz)	Z_S (Ω)	Z_L (Ω)
3300	5.0 + j1.5	5.5 - j11.0
3400	5.2 + j1.2	6.4 - j12.3
3500	6.0 + j0.5	8.9 - j14.9
3600	6.4 - j0.2	11.6 - j17.2
3700	8.2 - j2.1	14.0 - j20.1
3800	10.0 - j4.0	16.3 - j22.6



Z_S is the source impedance presented to the device.
Z_L is the load impedance presented to the device.

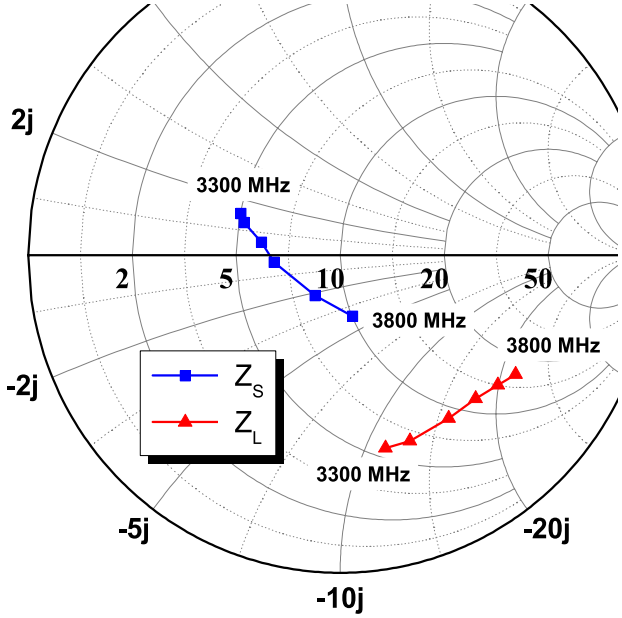


Figure 1 - Optimal Impedances for OFDM Performance - V_{DS} = 28V, I_{DQ} = 750mA

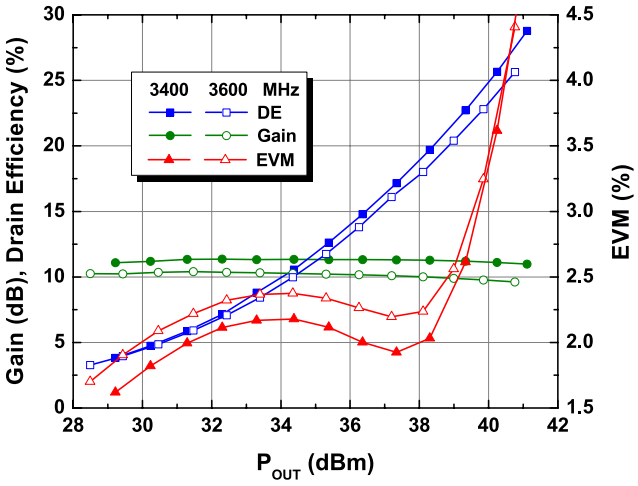


Figure 2 - Typical OFDM Performance in Nitronex Demonstration Board

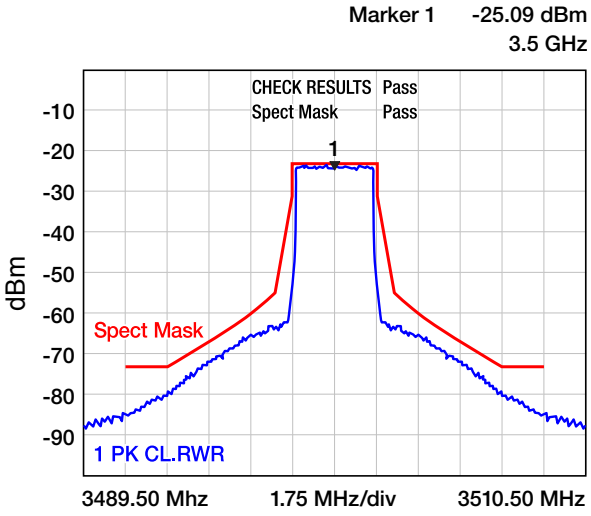


Figure 3 - ETSI Mask Compliance in Nitronex Demonstration Board, 3500MHz and P_{OUT} = 6W

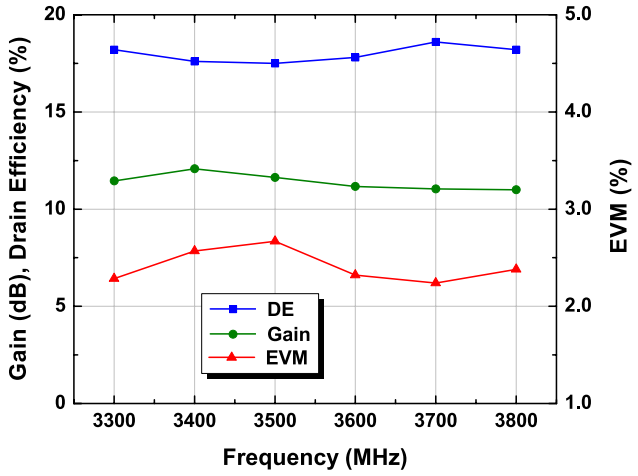


Figure 4 - Typical OFDM Performance in Load-Pull System, P_{OUT} = 6W

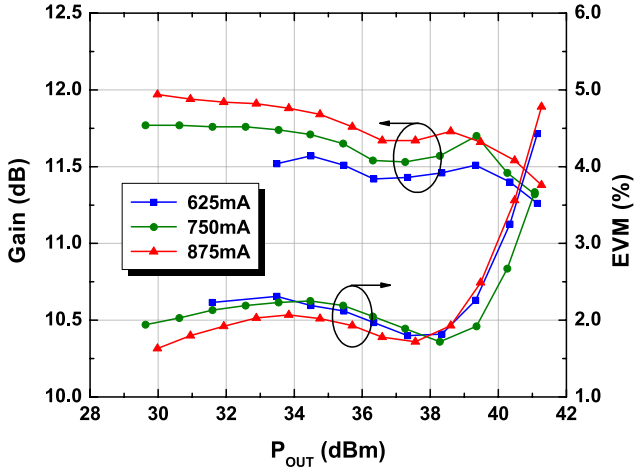


Figure 5 - Typical OFDM Performance at 3500MHz versus I_{DQ}

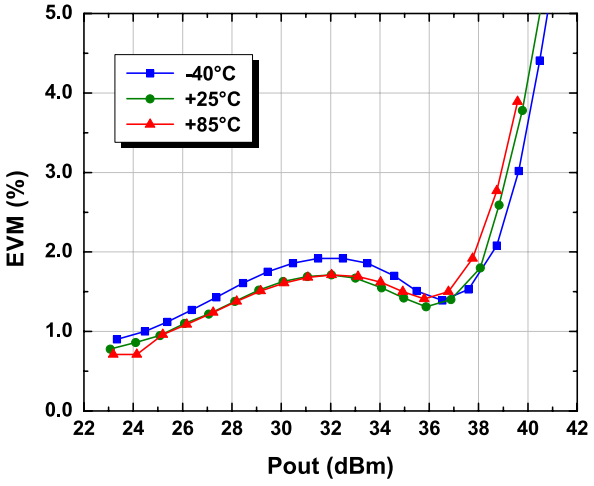


Figure 6 - Typical Device Linearity over Temperature in Nitronex Demonstration Board, V_{DS} = 28V, I_{DQ} = 750mA, 3400MHz

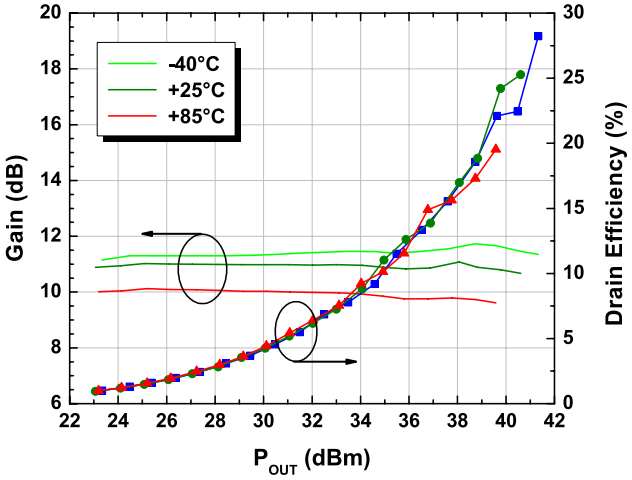


Figure 7 - Typical Device Gain and Efficiency over Temperature in Nitronex Demonstration Board, V_{DS} = 28V, I_{DQ} = 750mA, 3400MHz

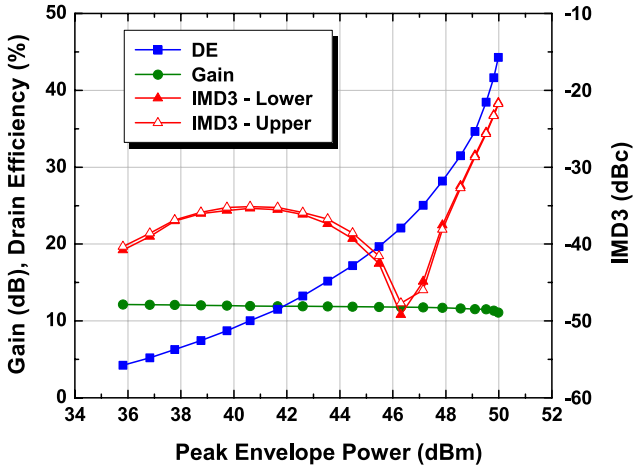


Figure 8 - Typical IMD3 Performance at V_{DS} = 28V, I_{DQ} = 750mA, 3500MHa

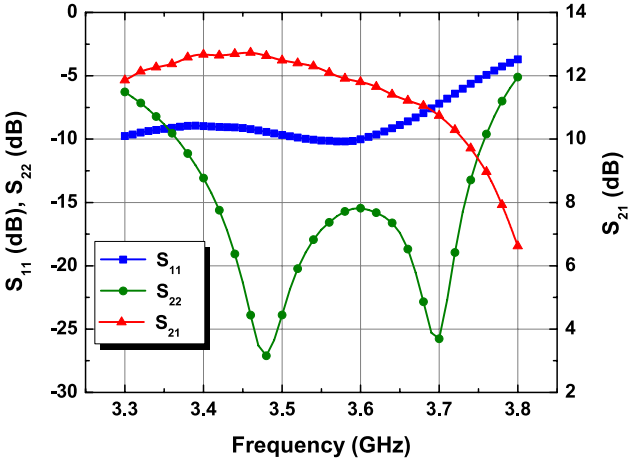


Figure 9 - Typical S_{11} and S_{21} in Nitronex Demonstration Board, P_{IN} = 0 dBm, V_{DS} = 28V, I_{DQ} = 750mA

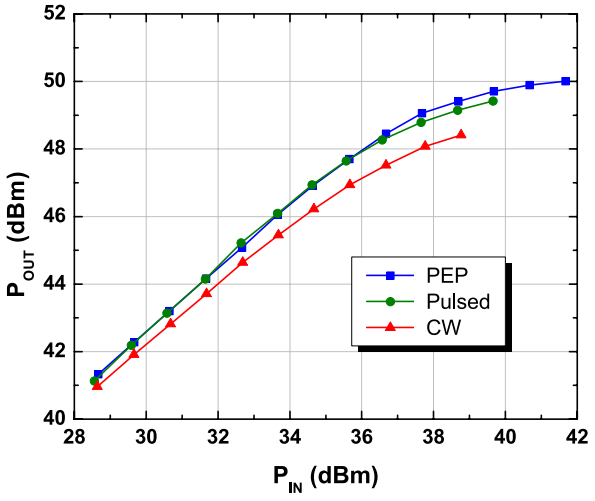


Figure 10 - Power Sweeps for CW, pulsed CW, and PEP, V_{DS} = 28V, I_{DQ} = 750mA, 3500MHz, Constant Impedance States for All Sweeps

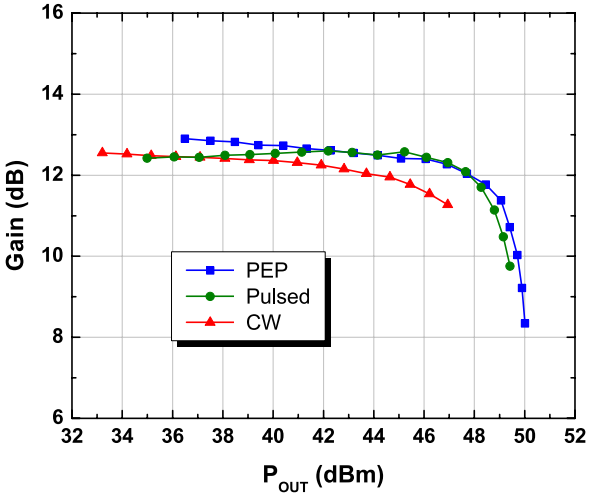


Figure 11 - Power Sweeps for CW, pulsed CW, and PEP at V_{DS} = 28V, I_{DQ} = 750mA, 3500MHz, Constant Impedance States for All Sweeps

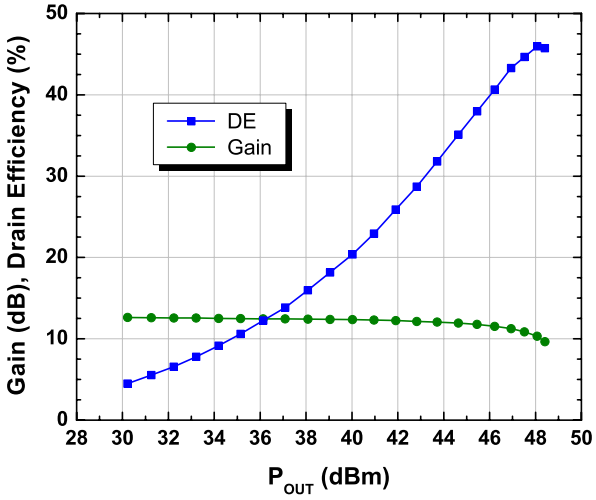


Figure 12 - CW Power Sweep, V_{DS} = 28V, I_{DQ} = 750mA, 3500MHz

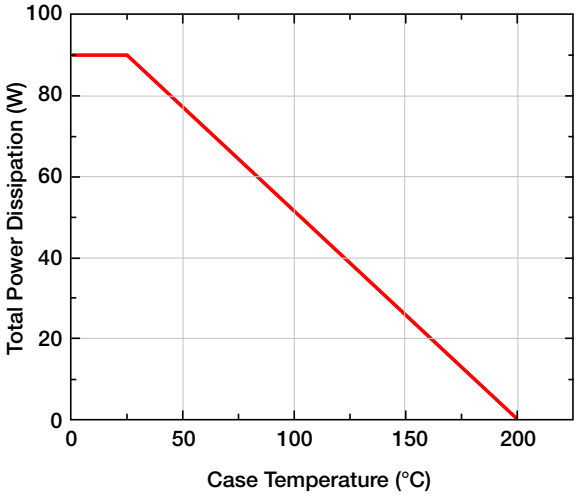


Figure 13 - Power Derating Curve

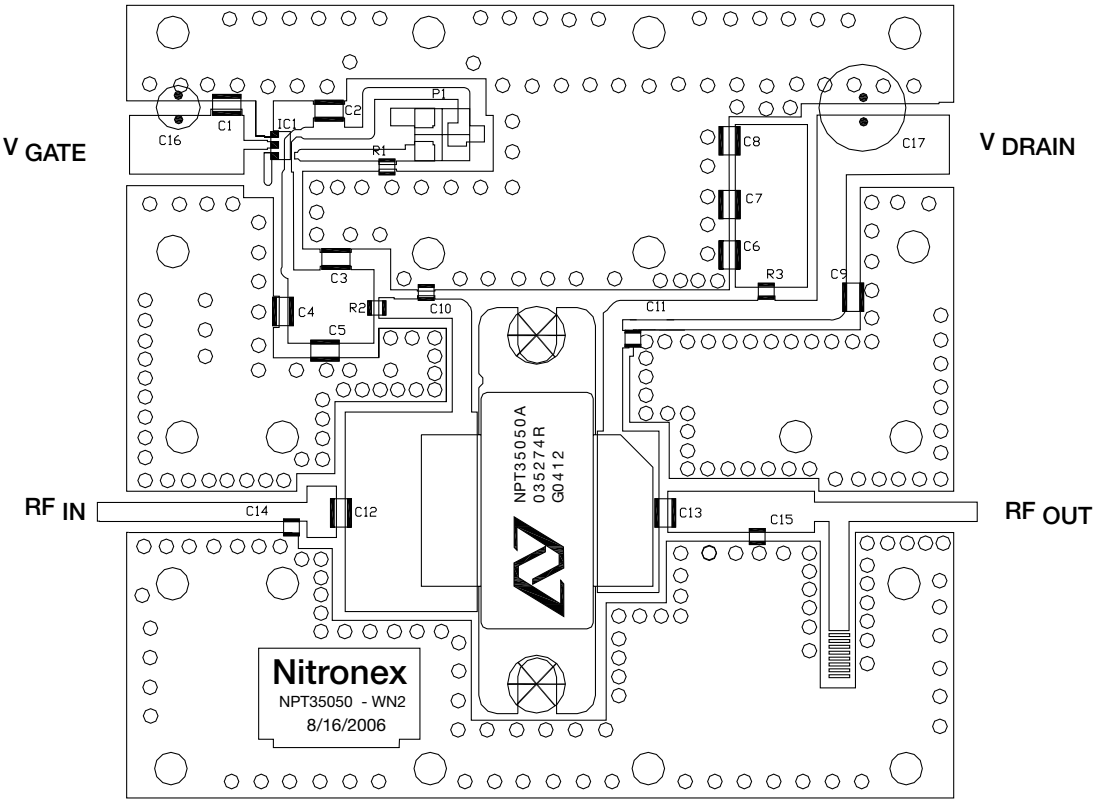


Figure 14 - APP-NPT35050A-35 Demonstration Board

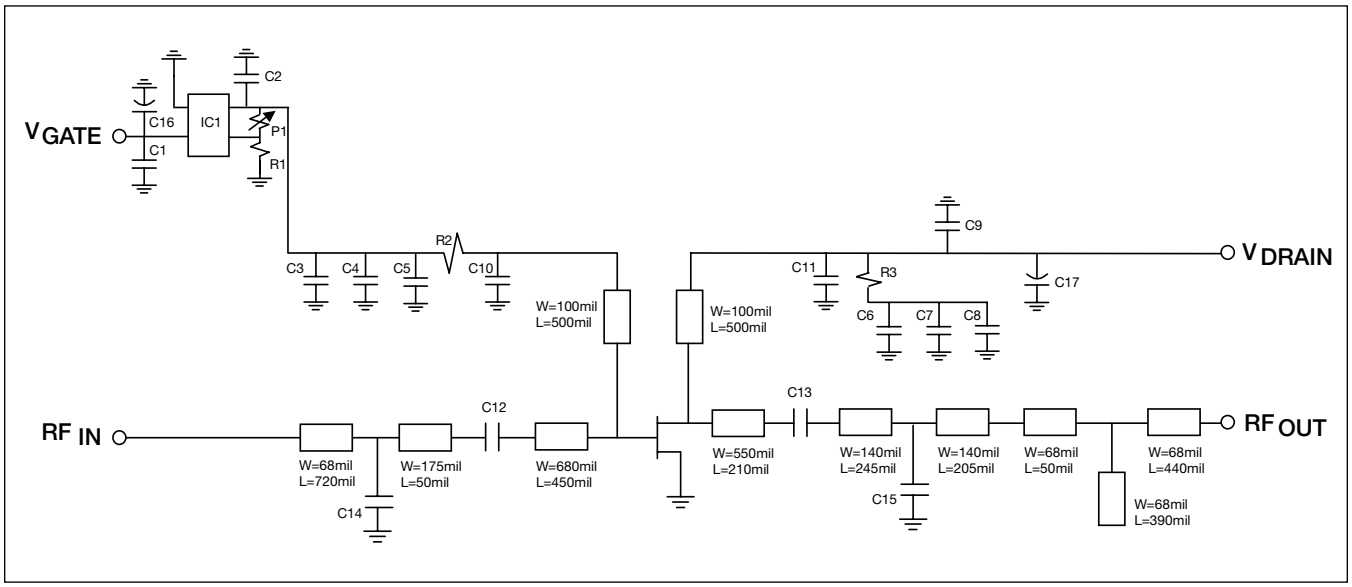


Figure 15 - APP-NPT35050A-35 Demonstration Board Equivalent Circuit

Table 1: APP-NPT35050A-35 Demonstration Board Bill of Materials

Component	Value	ID
C1, C2, C3	10 uF	16V Ceramic X7R (1210)
C4, C7	0.01 uF	100V Ceramic X7R (1206)
C5, C8	0.10 uF	100V Ceramic X7R (1206)
C6, C9	1.0 uF	100V CeramicX7R (1812)
C10, C11, C12, C13	5.6 pF	ATC600F5R6CT
C14	1.0 pF	ATC600F1R0AT
C15	1.5 pF	ATC600F1R5AT
C16	150uF	16V, Aluminum Electrolytic - Nichicon (PW)
C17	270uF	63V, Aluminum Electrolytic - UCC (LXY)
R1	12k ohm	0603
R2	10 ohm	0805
R3	0.33 ohm	0805
P1	20k ohm	Potentiometer - Bourns (3224 series)
IC1		IC LT1964-BYP
Substrate	Taconic RF35	t=30mil, ε_r=3.5, 1 oz. Cu

Ordering Information[1]

Part Number	Description
NPT35050AB	NPT35050A in AC780B-2 Metal-Ceramic Bolt-Down Package

1: To find a Nitronex contact in your area, visit our website at http://www.nitronex.com

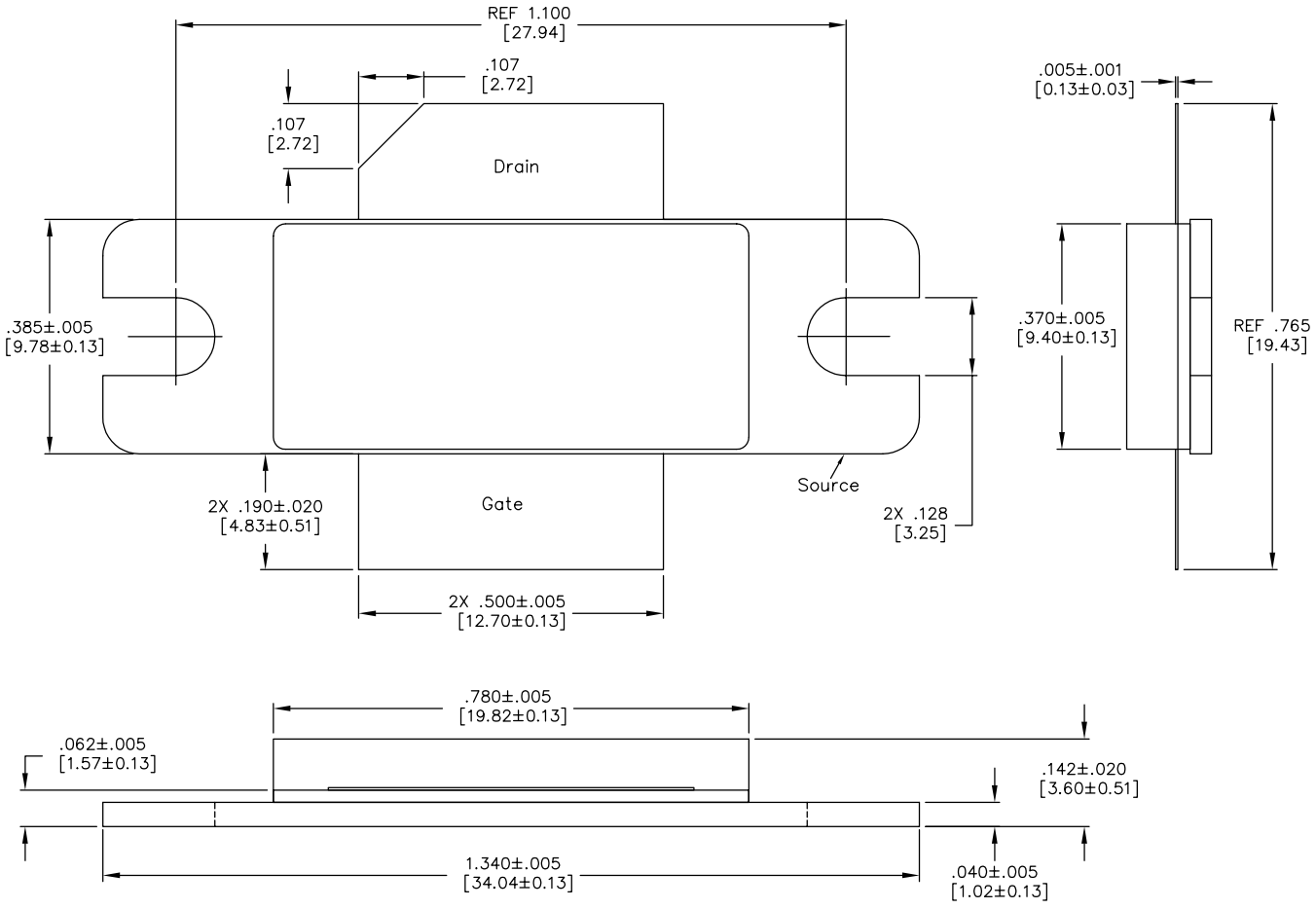


Figure 16 - AC780B-2 Metal-Ceramic Package Dimensions and Pinout (all dimensions are in inches [mm])

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Additional Information

This part is lead-free and is compliant with the RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

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