- Internally Matched FETs

NEC®

C-BAND POWER GaAs MESFET

NEZ C-BAND SERIES

FEATURES

- INTERNALLY MATCHED (IN/OUT)
- HIGH P_{OUT} (4 W, 8 W, & 15 W)
- CLASS A OPERATION
- HIGH η_{ADD} (40% TYP)
- LOW IM3 (-45 dBc TYP)
- HERMETICALLY SEALED METAL/CERAMIC PACKAGE
- SPACE QUALIFIED

APPLICATIONS

- ANALOG COMMUNICATIONS
- DIGITAL COMMUNICATIONS

DESCRIPTION

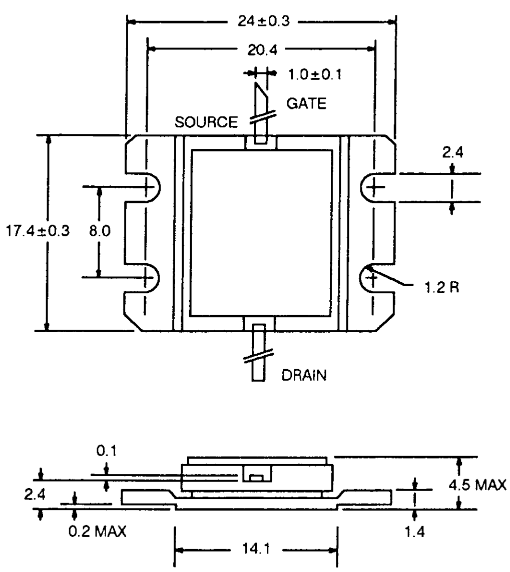
The NEZ C-Band series of high performance microwave power GaAs MESFETs provides high gain and low intermodulation distortion over standard and digital communication bands from 3 to 8 GHz.

Internal input and output thin film matching circuits are designed to optimize performance in 50 Ω external circuits. The NEZ series active devices use a 0.8 μm gate length for increased linear gain. NEC's Plated Heat Sink (PHS) technology reduces thermal resistance and enhances electrical performance. The gate structure is fabricated using WSi (tungsten silicide) for increased ruggedness and reliability. The devices feature TiAu plus plated Au bonding pads, and a combination of SiO_2/SiN_3 is used for scratch protection and surface stability.

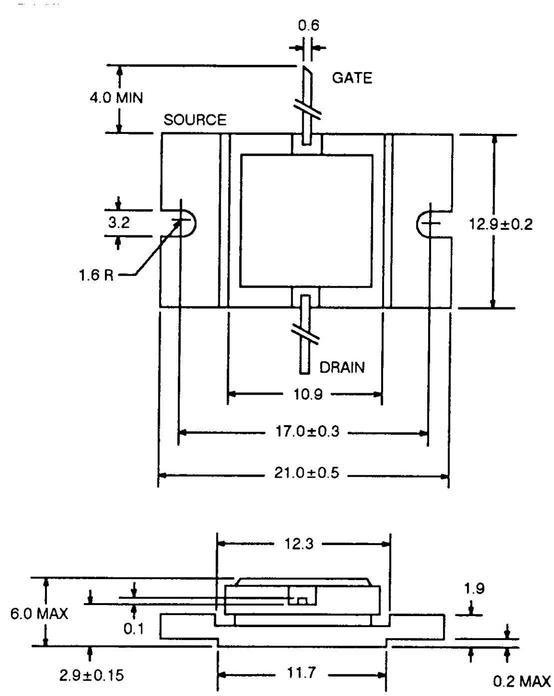
As always, NEC's stringent quality assurance and test procedures assure the highest reliability and consistent performances. This series of internally matched power FETs is space qualified.

OUTLINE DIMENSIONS (Units in mm)

NEZ-15B, BD
OUTLINE T-40



NEZ-4B, BD, -8B, BD
OUTLINE 98



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

PART NUMBER			NEZ-4B, 4BD	NEZ-8B, 8BD	NEZ-15B, 15BD
SYMBOLS	PARAMETERS	UNITS	RATINGS	RATINGS	RATINGS
V_{DS}	Drain to Source Voltage	V	15	15	15
V_{GD}	Gate to Drain Voltage	V	-18	-18	-18
V_{GS}	Gate to Source Voltage	V	-7	-7	-7
I_D	Drain Current	A	4.5	7.5	15
I_G	Gate Current	mA	25	50	100
T_{CH}	Channel Temperature	°C	+175	+175	+175
T_{STG}	Storage Temperature	°C	-65 to +175	-65 to +175	-65 to +175
P_T	Total Power Dissipation, T_{CASE} = +25°C	W	25	50	100

ELECTRICAL CHARACTERISTICS (T_A =25°C)

PART NUMBER PACKAGE OUTLINE			NEZ-4B, 4BD 98			NEZ-8B, 8BD 98			NEZ-15B, 15BD T-40		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
I_{DSS}	Saturated Drain Current, V_{DS} = 2.5 V, V_{GS} = 0	A	2.0	3.0	4.5	4.0	5.5	7.5	8	11	15
V_P	Pinch-off Voltage, V_{DS} = 2.5 V, I_D = 14 mA	V	-4.0	-2.5	-1.5						
	V_{DS} = 2.5 V, I_D = 25 mA	V				-5.0	-3.5	-1.5			
	V_{DS} = 2.5 V, I_D = 50 mA	V							-5.0	-3.5	-1.5
g_m	Transconductance, V_{DS} = 2.5 V, I_D = 1 A	mS		1000							
	V_{DS} = 2.5 V, I_D = 2 A	mS					2000				
	V_{DS} = 2.5 V, I_D = 4 A	mS								4000	
R_{TH}	Thermal Resistance, Channel to Case (T_{CH} = +125°C)	°C/W		5	6		2.4	3		1.2	1.5

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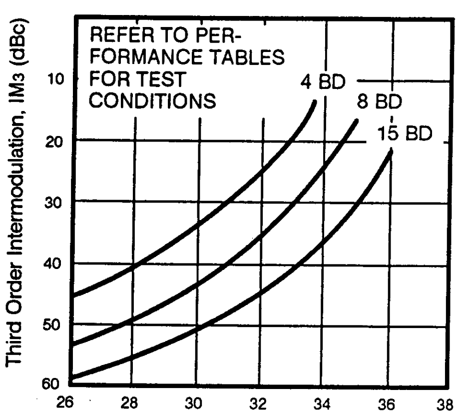
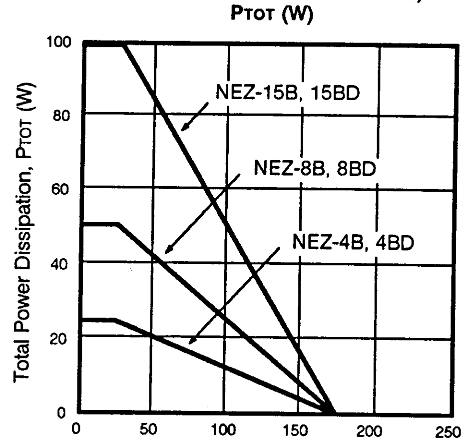
TYPICAL DEVICE CHARACTERISTICS (T_A =25°C)

THIRD ORDER INTERMODULATION vs. OUTPUT POWER



Output Power (S.C.L.), P_{OUT} (dBm)
S.C.L.: Single Carrier Level

TOTAL POWER DISSIPATION, P_{TOT} (W)



Case Temperature, T_C (C°)

4 W PERFORMANCE SPECIFICATIONS (T_A = 25°C)

PART NUMBERS	P_{1dB}[2, 3, 7] (dBm)		G_L[7, 8] (dB)		η_{ADD}[2] (%)	I_{DS}[3] (A)		FREQ. RANGE (GHz)	IM_3[4, 7] (dBm)		P_{IN}[5] (dBm)	P_{OUT}[7] (dBm)	TEST FREQ.[6] (GHz)
	MIN	TYP	MIN	TYP	TYP	TYP	MAX		MIN	TYP		TYP	
NEZ3742-4B, 4BD	35.5	36.5	10	11	40	1.1	1.5	3.7–4.2	-42	-45	27	37	4.2
NEZ4450-4B	35.5	36.5	9.5	10	39	1.1	1.5	4.4–5.0	–	–	28	37	5.0
NEZ5258-4B	35.5	36.5	9	9.5	38	1.1	1.5	5.2–5.8	–	–	28	37	5.8
NEZ5964-4B, 4BD	35.5	36.5	9	9.5	38	1.1	1.5	5.9–6.4	-42	-45	29	37	6.4
NEZ6472-4B, 4BD	35.5	36.5	8	8.5	36	1.1	1.5	6.4–7.2	-42	-45	29	37	7.2
NEZ7177-4B	35.5	36.5	7.5	8	34	1.1	1.5	7.1–7.7	–	–	29.5	37	7.7
NEZ7784-4B	35.5	36.5	7	7.5	33	1.1	1.5	7.7–8.4	–	–	30	37	8.4

Notes:
1. V_{DS} = +10 V for all test conditions.
2. I_{DS}, I_{GS}, η_{ADD}, values are specified at P_{1dB} point.
3. I_{GS} = 6 mA max with R_G = 100 Ω.
4. Specified for NEZ-4BD, Δf = 10 MHz, 2 Tone Test, Po = 26 dBm S.C.L. (Single Carrier Level).
5. Condition for P_{OUT}.
6. Condition for P_{OUT}, IM_3.
7. I_{DS} = 1 A (RF OFF). Z_S = Z_L = 50 Ω.
8. G_L is linear gain.

8 W PERFORMANCE SPECIFICATIONS (T_A = 25°C)

PART NUMBERS	P_{1dB}[2, 3, 7] (dBm)		G_L[7, 8] (dB)		η_{ADD}[2] (%)	I_{DS}[3] (A)		FREQ. RANGE (GHz)	IM_3[4, 7] (dBm)		P_{IN}[5] (dBm)	P_{OUT}[7] (dBm)	TEST FREQ.[6] (GHz)
	MIN	TYP	MIN	TYP	TYP	TYP	MAX		MIN	TYP		TYP	
NEZ3742-8B, 8BD	38.5	39.5	9	10	34	2.3	3	3.7–4.2	-42	-45	32	39.8	4.2
NEZ4450-8B, 8BD	38.5	39.5	8.5	9.5	33	2.3	3	4.4–5.0	-42	-45	32.5	39.8	5.0
NEZ5258-8B, 8BD	38.5	39.5	8	9	33	2.3	3	5.2–5.8	-42	-45	33	39.8	5.8
NEZ5964-8B, 8BD	38.5	39.5	8	9	33	2.3	3	5.9–6.4	-42	-45	33	39.8	6.4
NEZ6472-8B, 8BD	38.5	39.5	7	7.5	30	2.3	3	6.4–7.2	-42	-45	34	39.8	7.2
NEZ7177-8B, 8BD	38.5	39.5	6.5	7	29	2.3	3	7.1–7.7	-42	-45	34.5	39.8	7.7
NEZ7784-8B, 8BD	38.5	39.5	6	6.5	28	2.3	3	7.7–8.4	-42	-45	35	39.8	8.4

Notes:
1. V_{DS} = +10 V for all test conditions.
2. I_{DS}, I_{GS}, η_{ADD}, values are specified at P_{1dB} point.
3. I_{GS} = 10 mA max with R_G = 100 Ω.
4. Specified for NEZ-8BD, Δf = 10 MHz, 2 Tone Test, Po = 29 dBm S.C.L. (Single Carrier Level).
5. Condition for P_{OUT}.
6. Condition for P_{OUT}, IM_3.
7. I_{DS} = 2 A (RF OFF). Z_S = Z_L = 50 Ω.
8. G_L is linear gain.

MAXIMUM OPERATING LIMITS

PART NUMBER	R_G MAX	I_G RF MAX	V_{DS} MAX
	Ω	mA	V
NEZXXXX-4B, -4BD	100	10	10.0
NEZXXXX-8B, -8BD	100	20	10.0
NEZXXXX-15B, -15BD	50	40	10.0

R_G MAX is the maximum series resistance between the gate supply and the FET gate.

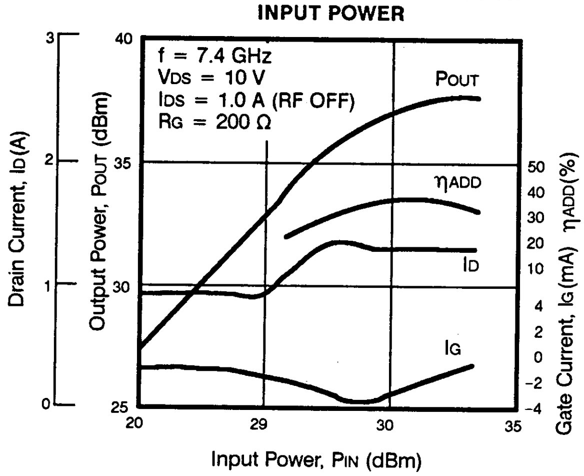
15 W PERFORMANCE SPECIFICATIONS (T_A = 25°C)

PART NUMBERS	P_{1dB}[2,3,7] (dBm)		G_L[7,8] (dB)		η_{ADD}[2] (%)	I_{DS}[3] (A)		FREQ. RANGE (GHz)	IM3[4,7] (dBm)		P_{IN}[5] (dBm)	P_{OUT}[7] (dBm)	TEST FREQ.[6] (GHz)
	MIN	TYP	MIN	TYP	TYP	TYP	MAX		MIN	TYP		TYP	
NEZ3742-15B, 15BD	41.5	42.5	9	10	34	4.5	6	3.7–4.2	-42	-45	35	42.8	4.2
NEZ4450-15B, 15BD	41.5	42.5	8	9	33	4.5	6	4.4–5.0	-42	-45	35.5	42.8	5.0
NEZ5258-15B, 15BD	41.5	42.5	7.5	8.5	33	4.5	6	5.2–5.8	-42	-45	36	42.8	5.8
NEZ5964-15B, 15BD	41.5	42.5	7	8	32	4.5	6	5.9–6.4	-42	-45	36	42.8	6.4
NEZ6472-15B, 15BD	41.5	42.5	6.5	7	30	4.5	6	6.4–7.2	-42	-45	37	42.8	7.2
NEZ7177-15B, 15BD	41.5	42.5	6	6.5	28	4.5	6	7.1–7.7	-42	-45	37.5	42.8	7.7
NEZ7784-15B, 15BD	41.5	42.5	5.5	6	27	4.5	6	7.7–8.4	-42	-45	38	42.8	8.4

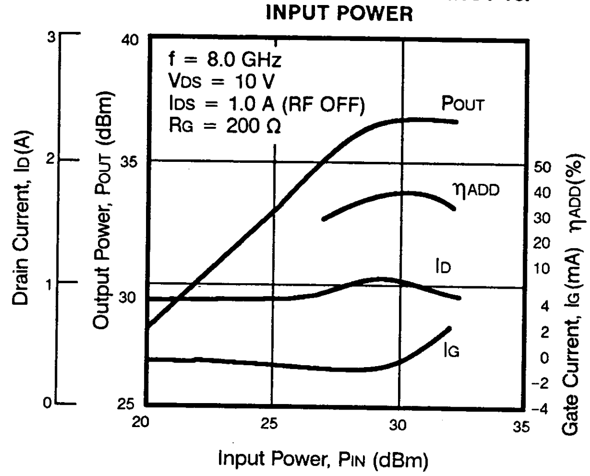
Notes:
1. V_{DS} = +10 V for all test conditions.
2. I_{DS}, I_{GS}, η_{ADD}, values are specified at P_{1dB} point.
3. I_{GS} = 20 mA max with R_G = 100 Ω.
4. Specified for NEZ-15BD, Δf = 10 MHz, 2 Tone Test, Po = 32 dBm S.C.L. (Single Carrier Level).
5. Condition for P_{OUT}.
6. Condition for P_{OUT}, IM3.
7. I_{DS} = 4 A (RF OFF). Z_S = Z_L = 50 Ω.
8. G_L is linear gain.

4 W TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

NEZ7177-4B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



NEZ7784-4B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



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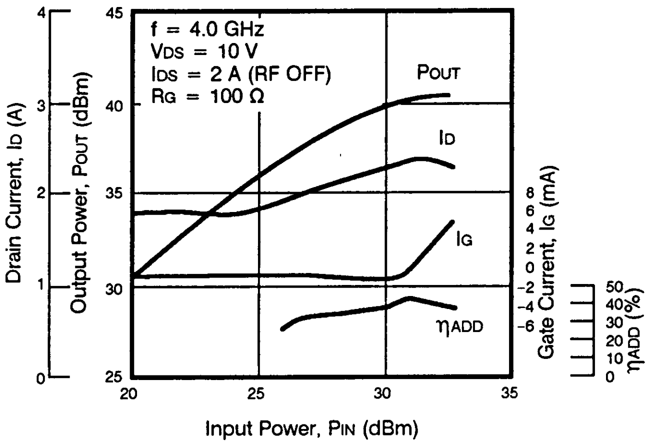
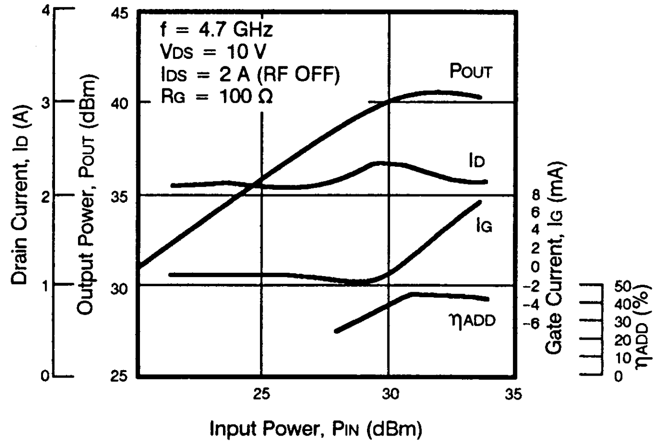
8 W TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

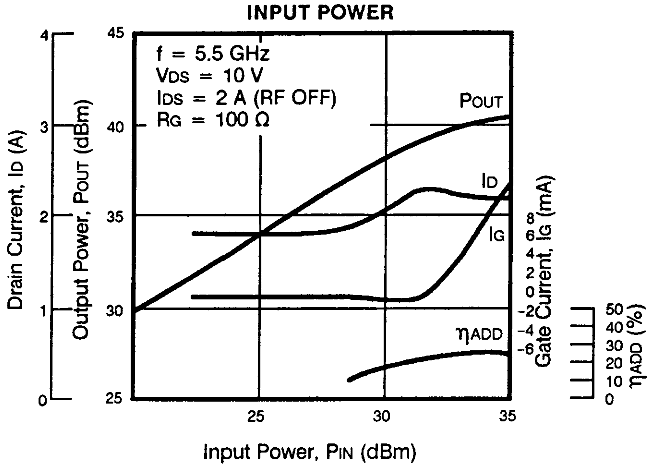
NEZ3742-8B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



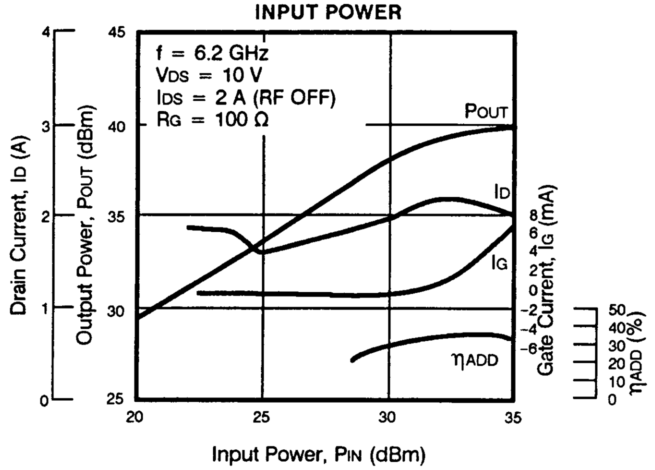
NEZ4450-8B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



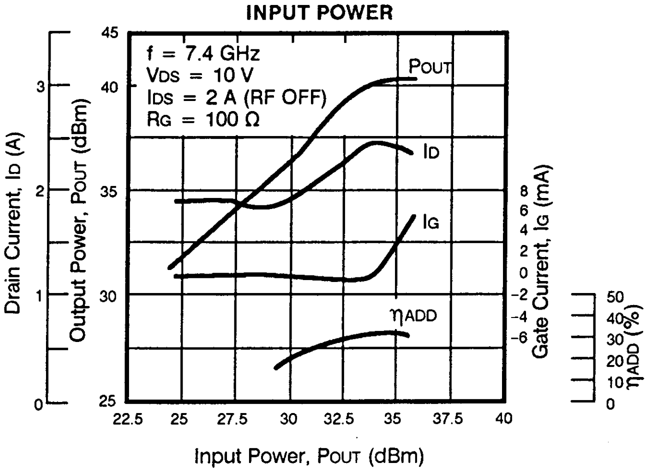
NEZ5258-8B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



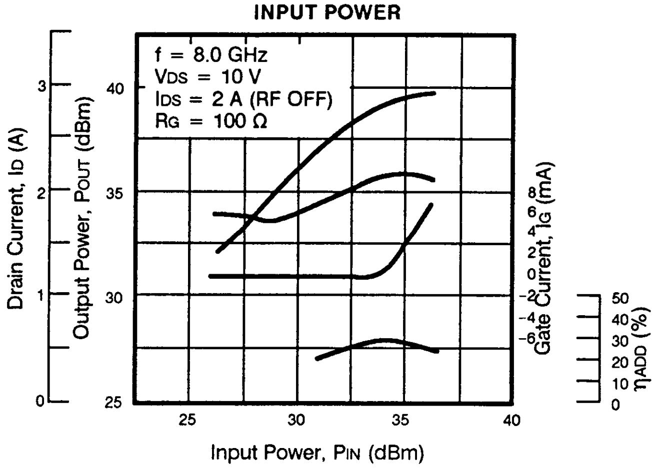
NEZ5964-8B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



NEZ7177-8B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER

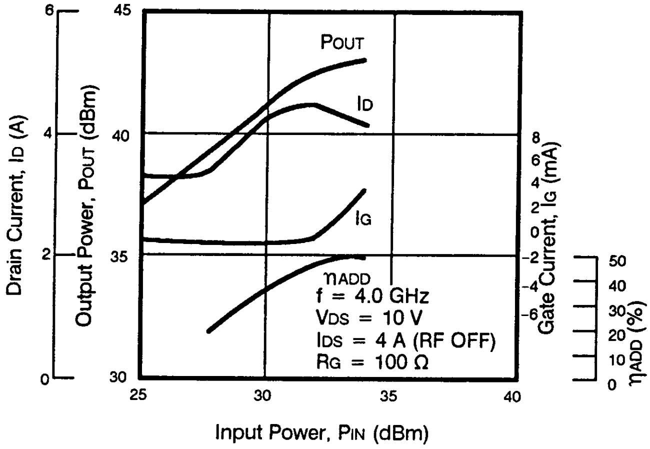


NEZ7784-8B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER

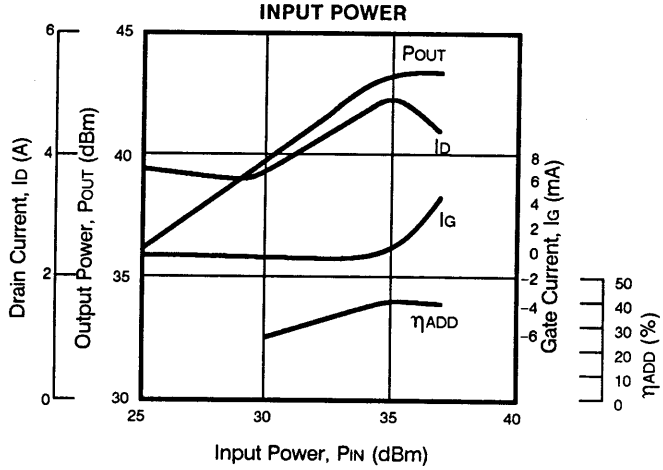


15 W TYPICAL PERFORMANCE CHARACTERISTICS ($T_A = 25°C$)

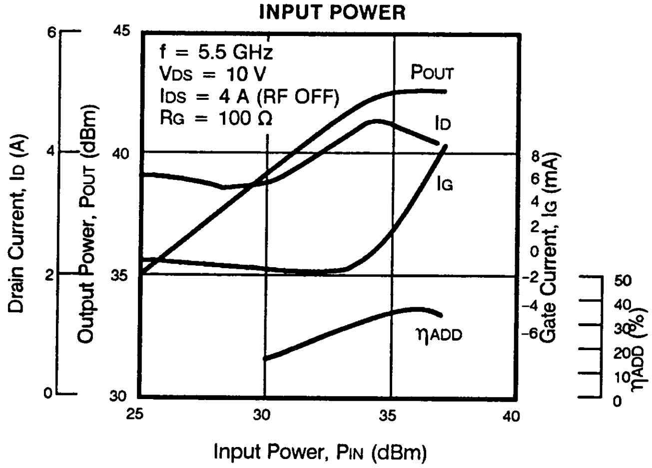
NEZ3742-15B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



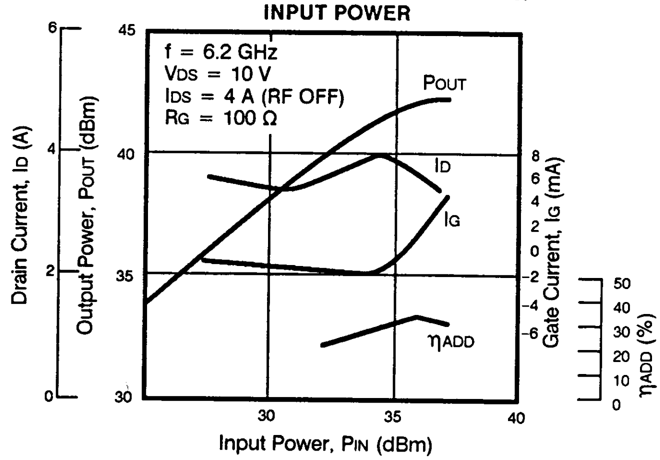
NEZ4450-15B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



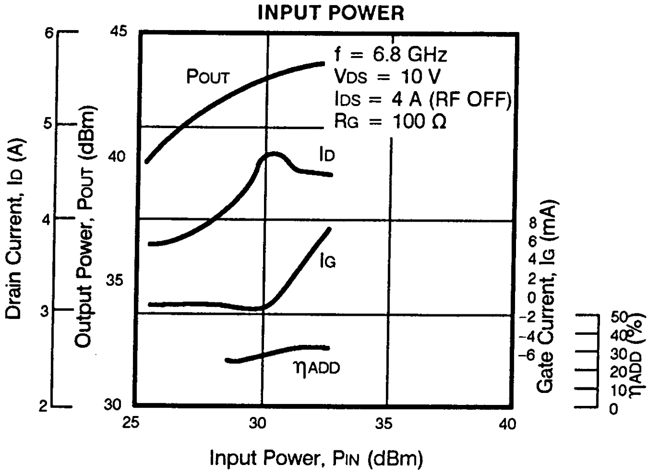
NEZ5258-15B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



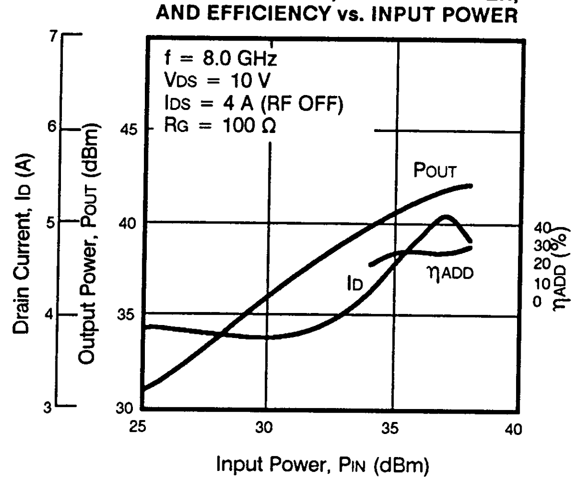
NEZ5964-15B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



NEZ6472-15B
DRAIN CURRENT, OUTPUT POWER, GATE CURRENT AND EFFICIENCY vs. INPUT POWER



NEZ7784-15B
DRAIN CURRENT, OUTPUT POWER, AND EFFICIENCY vs. INPUT POWER



- Power FETs

3

NEC®

L, S-BAND POWER GaAs MESFET

NE345 SERIES

FEATURES

- CHIP OR PACKAGE OPTIONS
- HIGH P_{OUT} (10W & 20W)
- CLASS A OPERATION
- HIGH η_{ADD} (40% TYP)
- HERMETICALLY SEALED METAL/CERAMIC PACKAGE
- ION IMPLANATION
- SPACE QUALIFIED

DESCRIPTION

The NE345 power GaAs FET series offers high output power (10W and 20W versions) and high gain in the L and S-bands. The NE3451600 is a 16 cell device with a total gate width of 30.72 mm and a gate length of 0.8 μm for increased linear gain. NEC's plated heat sink (PHS) technology reduces thermal resistance and enhances electrical performance. The devices feature TiAu plus plated Au bonding pads and a combination of SiO_2/SiN_3 glassivation for scratch protection as well as surface stability.

The NE345 series is offered in chip form (single or matched pairs) and in hermetically sealed metal/ceramic packages. Also available, with partial matching networks are the NES1417 (1.4 to 1.7 GHz) and NES1723 (1.7 to 2.3 GHz) packaged products. As always, NEC's stringent quality assurance and test procedures assure the highest reliability and performance. The NE345 series of power FETs is qualified for space applications.

APPLICATIONS

- L-BAND RADAR
- NARROW-BAND COMMUNICATIONS
- MSAT, INMARSAT

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{DS}	Drain to Source Voltage	V	15
V_{GS}	Gate to Source Voltage	V	-7
V_{GD}	Gate to Drain Voltage	V	-18
I_D	Drain Current NE345L-10B, NES1417-10B, NES1723-10B, NE3451600	A	9
	NE345L-20B, NES1417-20B NES1723-20B, NE3451600 (Pair)	A	18
I_G	Gate Current NE345L-10B, NES1417-10B, NES1723-10B, NE3451600	mA	60
	NE345L-20B, NES1417-20B NES1723-20B, NE3451600 (Pair)	mA	120
P_T	Total Power Dissipation NE345L-10B, NES1417-10B, NES1723-10B, NE3451600	W	50
	NE345L-20B, NES1417-20B NES1723-20B, NE3451600 (Pair)	W	100
T_{CH}	Channel Temperature	°C	+175
T_{STG}	Storage Temperature	°C	-65 to +175

APPLICATION SUMMARY TABLE

PART NUMBER	APPLICATION	FREQ. RANGE (GHz)	CHIP	PACKAGES			
				T-38	T-39	T-40	98
NE3451600	10 W chip device for hybrid applications	0.1 to 4.0 [1]	X				
NE3451600 Pair	20 W matched pair of chips for hybrid applications	0.1 to 4.0 [1]	X				
NE345L-10B	10 W unmatched packaged device	0.1 to 4.0 [1]		X			
NE345L-20B	20 W partial (input) matched packaged device	0.1 to 4.0 [1]			X		
NES1417-10B	10 W partially matched (input/output)[3]	1.4 to 1.7					X
NES1417-20B	20 W partially matched (input/output)[3]	1.4 to 1.7				X	
NES1723-10B	10 W partially matched (input/output)[3]	1.7 to 2.3					X
NES1723-20B	20 W partially matched (input/output)[3]	1.7 to 2.3				X	

Notes:

1. These devices are recommended for frequencies below 4 GHz. Please refer to our C-Band series of devices for applications above 4 GHz.
2. NE345L-20B is currently optimized for P_{OUT} at 2.3 GHz. Current development includes models optimized at 1.3 and 1.6 GHz. Contact your local sales engineer for availability.
3. Partial match - Gain is guaranteed over the frequency band while P_{OUT} is guaranteed at upper edge of frequency band.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

PART NUMBER			NE345L-10B NES1417-10B NES1723-10B NE3451600[2]			NE345L-20B NES1417-20B NES1723-20B NE3451600 (PAIR)[1, 2]		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
I_{DSS}	Saturated Drain Current at V_{DS} = 1.5 V, V_{GS} = 0	A	5	7	9	10	14	18
V_P	Pinch-off Voltage at V_{DS} = +2.5 V,							
	I_{DS} = 30 mA	V	-5	-3.5	-2			
	I_{DS} = 60 mA	V				-5	-3.5	-2
g_m	Transconductance at V_{DS} = +2.5 V,							
	I_{DS} = 2 A	mS		2000				
	I_{DS} = 4 A	mS					4000	
R_{TH}	Thermal Resistance (Channel to Case) T_{CH} = +125°C	°C/W		2.3	3		1.2	1.5

NE345 SERIES PERFORMANCE SPECIFICATIONS (T_A= +25 °C)

PART NUMBER				NE345L-10B NE3451600[2]			NE345L-20B NE341600 (PAIR)[1, 2]		
SYMBOLS	PARAMETERS AND CONDITIONS[3]	F_{TEST} (GHz)	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
P_{1dB}	Output Power at 1 dB Compression	1.6	dBm		40		42	43	
		2.3	dBm	39	40			43	
G_L	Linear Power Gain	1.6	dB		12		9	10	
		2.3	dB	8	9			11	
P_{OUT}	Output Power at P_{IN} = 35,	1.6	dBm					44	
	P_{IN} = 33	2.3	dBm		41				
η_{ADD}[4]	Power Added Efficiency at P_{1dB}		%		40			40	
I_D	Drain Current at P_{1dB}		A		2.3	3		4.6	6
I_G	Gate Current at P_{1dB}		mA			10			20

NES SERIES PERFORMANCE SPECIFICATIONS (T_A = +25°C)

PART NUMBER				NES1417-10B			NES1417-20B			NES1723-10B			NES1723-20B		
SYMBOLS	PARAMETERS AND CONDITIONS[3]	F_{TEST} (GHz)	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
P_{1dB}	Output Power at 1 dB Compression	1.6	dBm	39	40		42	43							
		2.3	dBm							39	40		42	43	
G_L	Linear Power Gain	1.6	dB	14	15.5		14	15.5							
		2.3	dB							12	13		11	12	
P_{OUT}	Output Power at P_{IN} = +27,	1.6	dBm		41										
	P_{IN} = +31	1.6	dBm					44							
	P_{IN} = +29	2.3	dBm								41				
	P_{IN} = +34	2.3	dBm											44	
η_{ADD}[4]	Power Added Efficiency at P_{1dB}		%		40			40			40			40	
I_D	Drain Current at P_{1dB}		A		2.3	3		4.6	6		2.3	3		4.6	6
I_G	Gate Current at P_{1dB}		mA			10			20			10			20

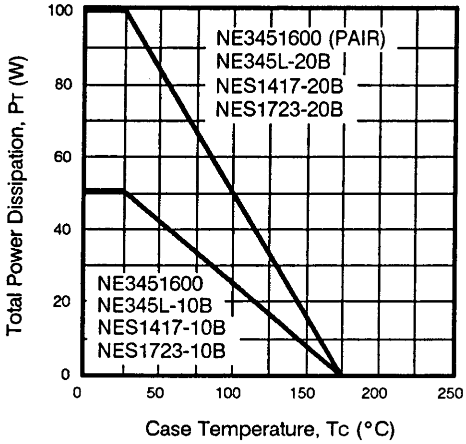
Notes:

1. Matching Condition, Delta VP (Absolute Value $V_{P1} - V_{P2}$); 0.2 V MAX
2. Sampling Basis: 10 Samples/Wafer; Accept 0/Reject 1; Sample housed in 98 pkg.
3. Test Conditions:
   a) V_{DS} = 10 V
   b) I_{DS} with RF OFF = 2A for -10B, 4A for -20B
   c) Rg = 100 Ω for -10B, 50 Ω for -20B
4. $\eta_{ADD} = \dfrac{P_{OUT} - P_{IN}}{V_{DS} \times I_{DS}} \times 100$

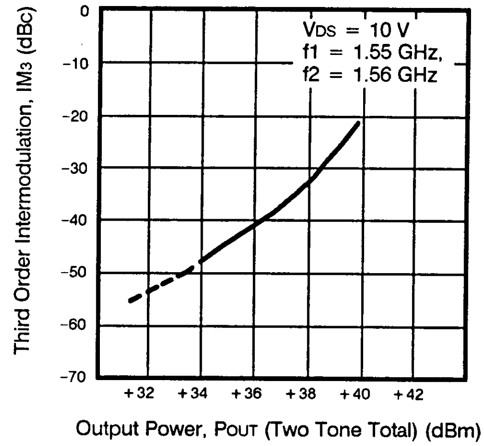
3

TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

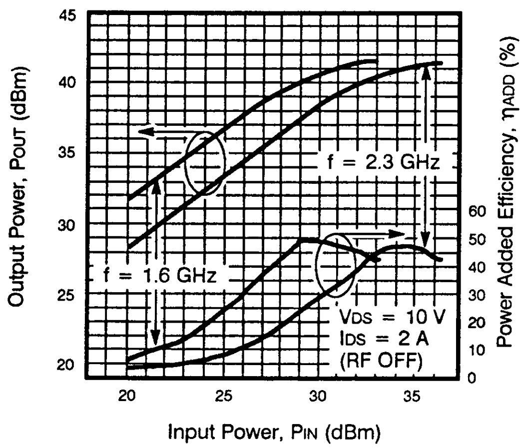
TYPICAL CHARACTERISTICS
POWER DERATING CURVE



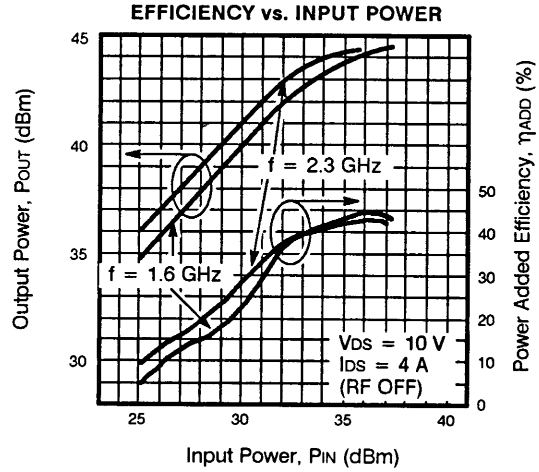
NE345L-20B
3rd ORDER INTERMODULATION
vs. OUTPUT POWER



NE345L-10B
OUTPUT POWER AND POWER ADDED
EFFICIENCY vs. INPUT POWER



NE345L-20B
OUTPUT POWER AND POWER ADDED
EFFICIENCY vs. INPUT POWER

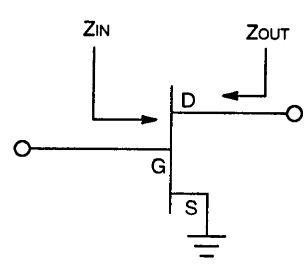


TYPICAL LARGE SIGNAL INPUT/OUTPUT IMPEDANCES (V_{DS} = 10 V)

PART NUMBER	f = 1.6 GHz		f = 2.3 GHz	
	ZIN (Ω)[1]	ZOUT (Ω)[2]	ZIN (Ω)[1]	ZOUT (Ω)[2]
NE345L-10B	4.0 + j10.3	4.3 + j5.0	22.7 + j25.2	29.8 + j27.3
NE345L-20B	3.1 + j7.3	4.1 + j4.3	11.5 + j8.9	2.1 + j9.3

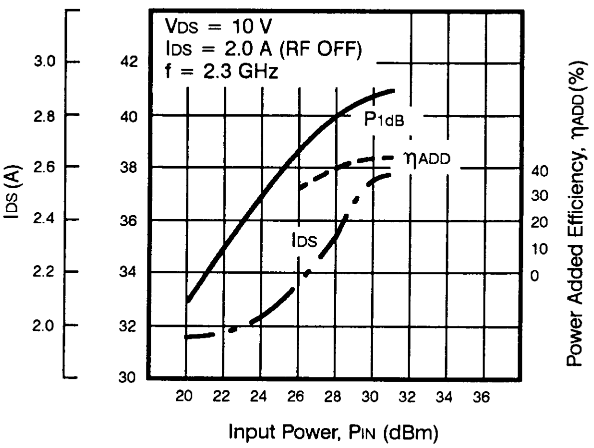
Notes:

1. ZIN = Input Impedance
2. ZOUT = Output Impedance

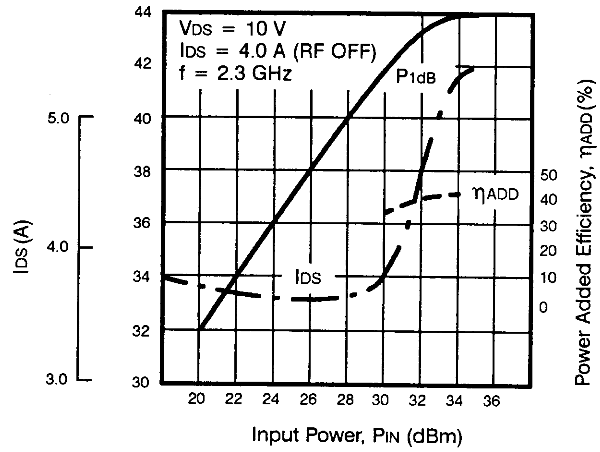


TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

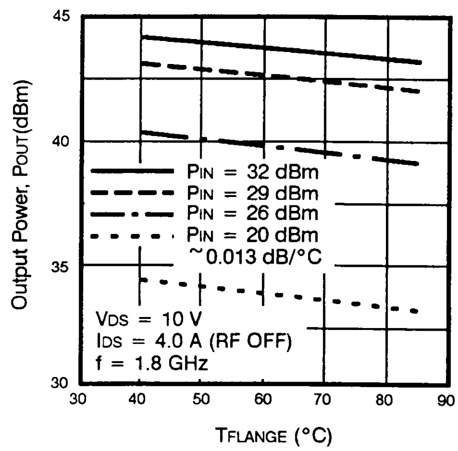
NES1723-10B
OUTPUT POWER, POWER ADDED EFFICIENCY AND DRAIN CURRENT vs. INPUT POWER



NES1723-20B
OUTPUT POWER, POWER ADDED EFFICIENCY AND DRAIN CURRENT vs. INPUT POWER



NES1723-20B
OUTPUT POWER vs. TEMPERATURE



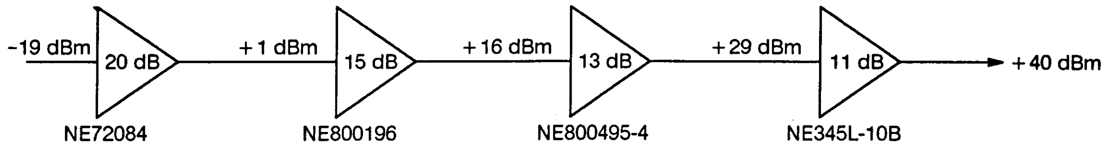
3

MAXIMUM OPERATING LIMITS

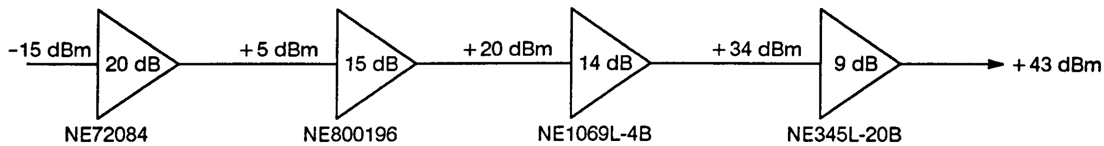
PART NUMBER	R_G MAX	I_G RF MAX	V_{DS} MAX
	Ω	mA	V
NE3451600, NE345L-10B, NE5XXXX-10B	100	20	10.0
NE3451600(Pair), NE345L-20B, NE5XXXX-20B	50	40	10.0

R_G MAX is the maximum series resistance between the gate supply and the FET gate.

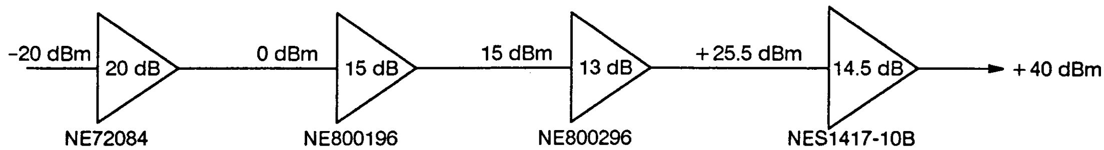
TYPICAL 10 W L-BAND LINE UP AT 1.6 GHz



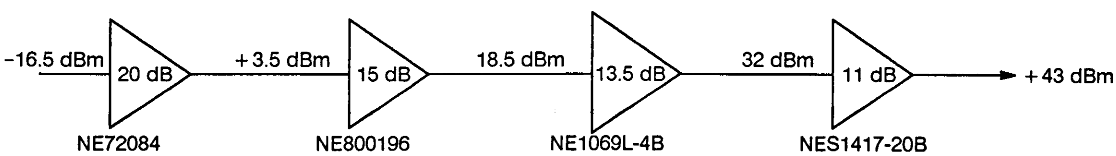
TYPICAL 20 W L-BAND LINE UP AT 1.6 GHz



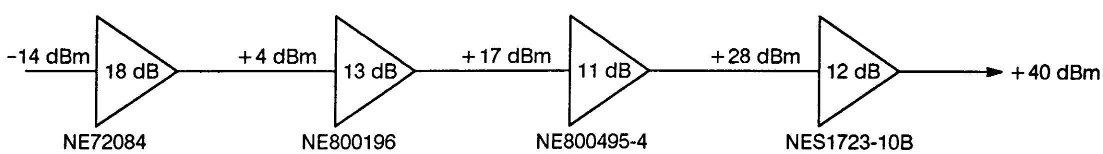
TYPICAL 10 W L-BAND LINE UP AT 1.6 GHz



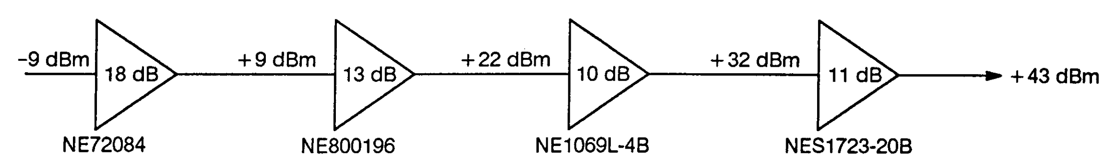
TYPICAL 20 W L-BAND LINE UP AT 1.6 GHz



TYPICAL 10 W S-BAND LINE UP AT 2.3 GHz

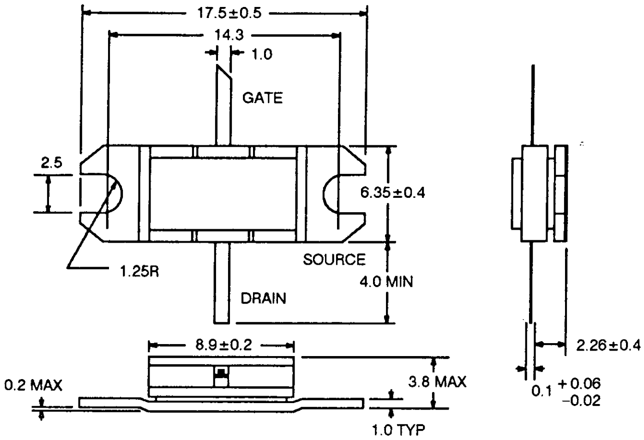


TYPICAL 20 W S-BAND LINE UP AT 2.3 GHz

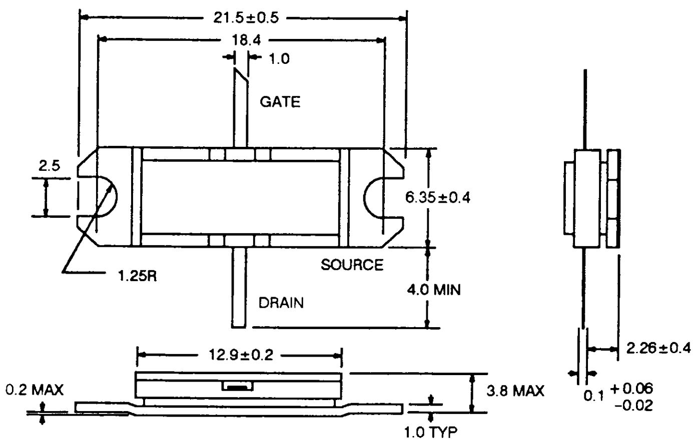


OUTLINE DIMENSIONS (Units in mm)

NE345L-10B
OUTLINE T-38



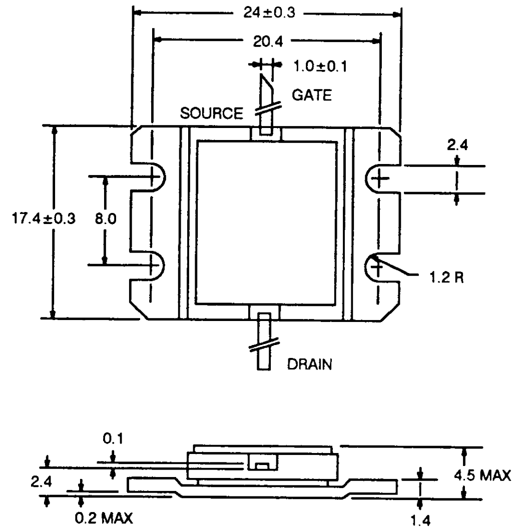
NE345L-20B
OUTLINE T-39



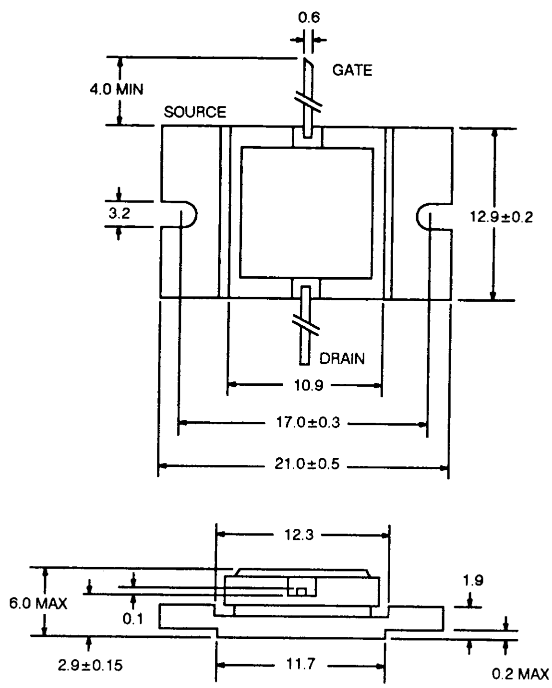
Flange Material: Copper
Flange Plating: Ni, Au

Lead Material: Kovar
Lead Plating: Ni, Au

NES1417-20B
NES1723-20B
OUTLINE T-40

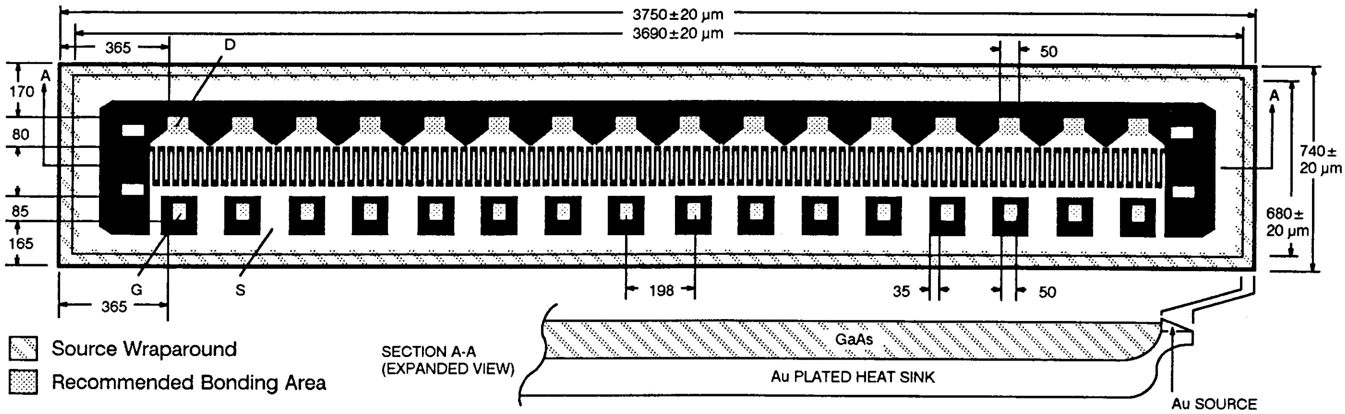


NES1417-10B
NES1723-10B
OUTLINE 98



CHIP DIMENSIONS (Units in µm)

TYPE OF CELLS	NUMBER OF CELLS	TOTAL GATE WIDTH	UNIT GATE FINGER WIDTH	GATE LENGTH	TOTAL NUMBER OF GATE FINGERS
NE3451600	16	30.72 mm	160 µm	0.8 µm	192
NE3451600 Pair	32	61.44 mm	160 µm	0.8 µm	384



Passivation: There is a SiO_2 layer covering the entire surface of the 50 µm GaAs except:
1) Under the drain bond pads and
2) In the active area shown in the cross section drawing below.

HANDLING PRECAUTIONS

HANDLING

1. The NE345 chips are very large and fragile. Handle with care.
2. Due to the chip processing, some of the gold source wraparound may break off during shipment in the waffle pack or during handling. These pieces can be large enough to cause drain-gate-source shorts. Therefore, the FETs should be inspected after die attach and the gold plated pieces should be blown off with dry nitrogen. RF performance will not be degraded by this phenomenon.

DIE ATTACHMENT

Chip cracking as a result of thermal shock may occur due to the different temperature coefficients of the GaAs and the gold of the plated heat sink. Therefore, it is recommended that the chip and the carrier on which it will be mounted be heated to an intermediate temperature for 2 minutes prior to being placed on the die attach hot plate. Example using AuSn preforms:

AMBIENT	WARM PLATE	DIE ATTACH	WARM PLATE	AMBIENT
→ 25°C	→ 150°C	→ 300°C	→ 150°C	→ 25°C

BONDING

Gate and drain bonding wires should be semi-hard gold wire (3 to 8% elongation) 20 microns in diameter.

Bonding should be performed with a wedge tip that has a taper of approximately 15°C. Die attach and bonding time should be kept to a minimum. As a general rule, the bonding operation should be kept within a 300°C to 10 minute curve. If longer periods are required, the temperature should be lowered.

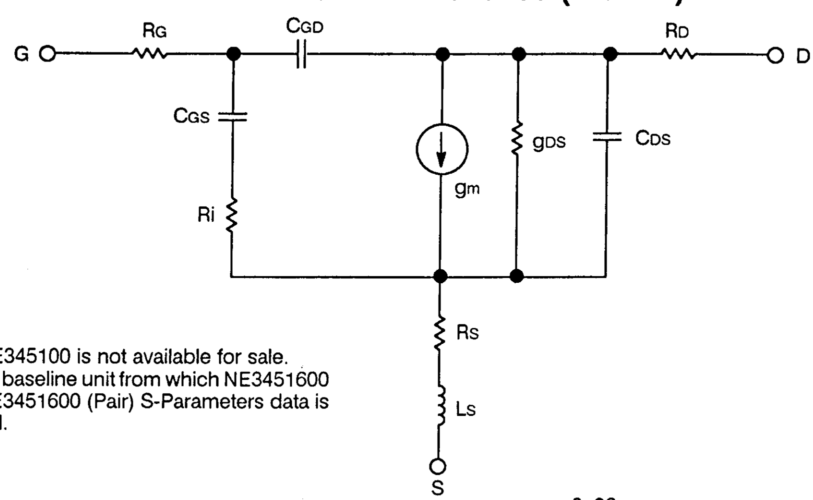
PRECAUTIONS

NE345 electrostatic discharge (ESD) sensitivity classification: Category A in accordance with MIL-STD-883C method 3015.2. Use ESD precautions per DOD-HDBK-263.

The user must operate in a clean, dry environment. The chip channel is glassivated for mechanical protection only and does not preclude the necessity of a clean environment,

The bonding equipment should be periodically checked for sources of surge voltage and should be properly grounded at all times. In fact, all test and handling equipment should be grounded to minimize the possibilities of static discharge.

EQUIVALENT CIRCUIT MODEL NE345100 (1 CELL)

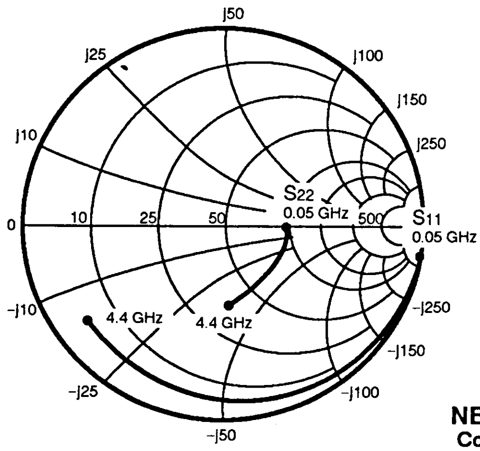


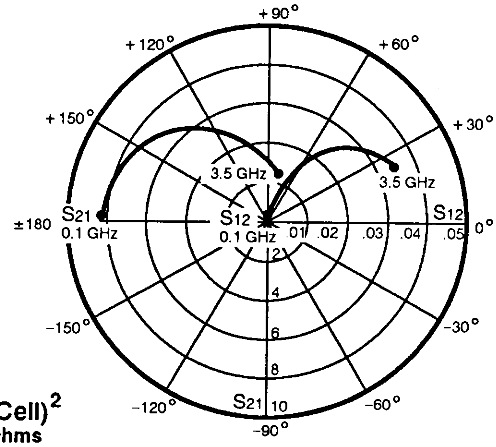
R_G = 1.42 Ω
C_{GS} = 2.36 pF
R_I = 2.73 Ω
R_S = 0.6 Ω
L_S = 0.016 nH
g_m = 137 mS
g_{DS} = 11.5 mS (86.956 Ω)
C_{GD} = 0.065 pF
C_{DS} = 0.50 pF
R_D = 0.86 Ω
τ = 4.0 ps
Z_T = 1.92 mm

Note:

The NE345100 is not available for sale.
It is the baseline unit from which NE3451600 and NE3451600 (Pair) S-Parameters data is derived.

TYPICAL COMMON SOURCE SCATTERING PARAMETERS





NE345100 (1 Cell)[2]
Coordinates in Ohms
Frequency in GHz
(V_{DS} = 10 V, I_{DS} = 125 mA)

S-MAGN AND ANGLES:
VDS = 10 V, IDS = 125 mA

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG[1]
.05	1.00	-4.64	8.18	177.06	.002	87.52	.31	-2.49	.02	37.00
0.1	1.00	-9.27	8.15	174.13	.003	85.04	.31	-4.98	.04	33.99
0.2	.99	-18.41	8.05	168.34	.006	80.17	.31	-9.89	.08	30.98
0.4	.98	-35.89	7.70	157.28	.012	70.94	.31	-19.26	.17	27.97
0.6	.96	-51.77	7.20	147.23	.017	62.73	.30	-27.77	.25	26.21
0.8	.94	-65.75	6.63	138.37	.021	55.70	.30	-35.30	.34	24.96
1.0	.92	-77.81	6.07	130.66	.024	49.83	.29	-41.91	.42	23.99
1.2	.90	-88.11	5.54	123.96	.026	44.98	.29	-47.70	.50	23.21
1.4	.89	-96.89	5.06	118.12	.028	40.99	.30	-52.81	.59	22.54
1.6	.88	-104.37	4.63	112.98	.029	37.73	.30	-57.37	.67	21.97
1.8	.87	-110.78	4.26	108.43	.030	35.04	.30	-61.48	.76	21.46
2.0	.86	-116.30	3.92	104.33	.031	32.84	.31	-65.21	.84	21.01
2.2	.85	-121.08	3.63	100.63	.032	31.03	.32	-68.63	.92	20.60
2.4	.85	-125.26	3.37	97.23	.032	29.54	.33	-71.79	1.01	19.64
2.6	.84	-128.92	3.14	94.10	.032	28.34	.34	-74.71	1.09	18.02
2.8	.84	-132.15	2.94	91.19	.032	27.36	.35	-77.45	1.18	17.01
3.0	.84	-135.03	2.76	88.46	.033	26.59	.36	-80.01	1.26	16.19
3.2	.83	-137.60	2.59	85.90	.033	26.00	.37	-82.43	1.35	15.48
3.4	.83	-139.91	2.44	83.47	.033	25.56	.38	-84.71	1.43	14.84
3.6	.83	-142.00	2.31	81.16	.033	25.26	.39	-86.87	1.52	14.26
3.8	.83	-143.89	2.18	78.95	.033	25.08	.40	-88.93	1.60	13.72
4.0	.83	-145.61	2.07	76.84	.032	25.02	.41	-90.90	1.68	13.22
4.2	.83	-147.19	1.97	74.82	.032	25.06	.42	-92.77	1.77	12.75
4.4	.82	-148.64	1.87	72.87	.032	25.19	.43	-94.57	1.85	12.32

V_{DS} = 10 V, I_{DS} = 125 mA with RF off. This data does not include bond wires on gate or drain. The source is connected to the backside of the chip by edge wrap around gold plating.

Note:

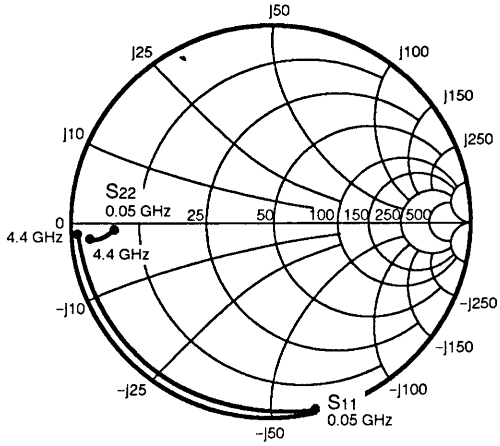
1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

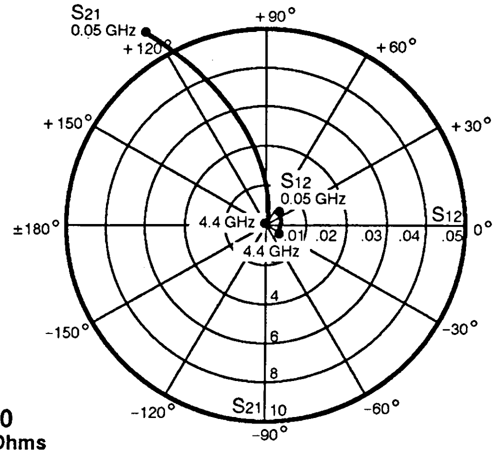
$$MSG = \frac{|S_{21}|}{|S_{12}|},\quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\,|S_{21}|},\quad \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

2. The NE345100 is not available for sale. It is the baseline unit from which NE3451600 and NE3451600 (Pair) S-Parameters data is derived.

TYPICAL COMMON SOURCE SCATTERING PARAMETERS





NE3451600
Coordinates in Ohms
Frequency in GHz
(V_{DS} = 10 V, I_{DS} = 2 A)

S-MAGN AND ANGLES:
V_{DS} = 10 V, I_{DS} = 2 A

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG[1]
.05	.99	-75.82	16.73	141.14	.003	51.60	.81	-177.85	.02	37.00
0.1	.99	-114.59	11.42	121.09	.005	32.00	.83	-177.93	.04	33.99
0.2	.98	-144.39	6.45	104.90	.005	16.73	.84	-178.41	.08	30.98
0.4	.98	-161.73	3.33	93.56	.005	7.22	.85	-178.54	.17	27.97
0.6	.98	-167.74	2.23	87.86	.005	3.35	.85	-178.33	.25	26.21
0.8	.98	-170.77	1.66	83.66	.005	0.99	.85	-178.05	.34	24.96
1.0	.98	-172.59	1.32	80.10	.005	-0.73	.85	-177.74	.42	23.99
1.2	.98	-173.80	1.09	76.87	.005	-2.11	.86	-177.43	.50	23.21
1.4	.98	-174.66	.93	73.86	.005	-3.26	.86	-177.13	.59	22.54
1.6	.98	-175.30	.80	71.01	.005	-4.25	.86	-176.86	.67	21.97
1.8	.98	-175.81	.71	68.29	.005	-5.10	.87	-176.60	.76	21.46
2.0	.98	-176.21	.63	65.68	.005	-5.82	.87	-176.37	.84	21.01
2.2	.98	-176.53	.56	63.16	.005	-6.44	.87	-176.17	.92	20.60
2.4	.98	-176.81	.51	60.74	.005	-6.95	.88	-175.99	1.01	19.64
2.6	.98	-177.04	.46	58.40	.005	-7.36	.88	-175.84	1.09	18.02
2.8	.98	-177.23	.42	56.15	.005	-7.68	.89	-175.71	1.18	17.01
3.0	.98	-177.41	.39	53.98	.005	-7.89	.89	-175.60	1.26	16.19
3.2	.98	-177.56	.35	51.88	.004	-8.02	.90	-175.51	1.35	15.48
3.4	.98	-177.69	.33	49.86	.004	-8.05	.90	-175.44	1.43	14.84
3.6	.98	-177.81	.30	47.91	.004	-7.99	.90	-175.39	1.52	14.26
3.8	.98	-177.92	.28	46.03	.004	-7.84	.91	-175.35	1.60	13.72
4.0	.98	-178.02	.26	44.22	.004	-7.60	.91	-175.33	1.68	13.22
4.2	.98	-178.11	.25	42.48	.004	-7.28	.91	-175.32	1.77	12.75
4.4	.99	-178.19	.23	40.80	.004	-6.88	.92	-175.32	1.85	12.32

V_{DS} = 10 V, I_{DS} = 2 A with RF off. This data does not include bond wires on gate or drain. The source is connected to the backside of the chip by edge wrap around gold plating.

Note:

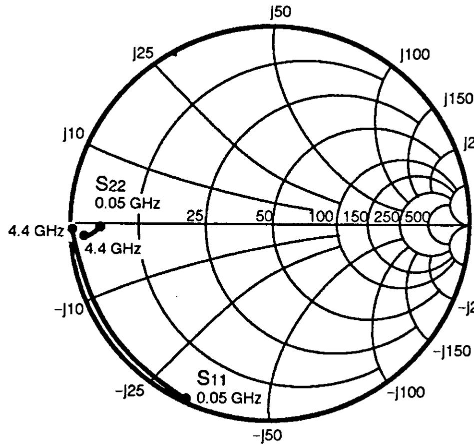
1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

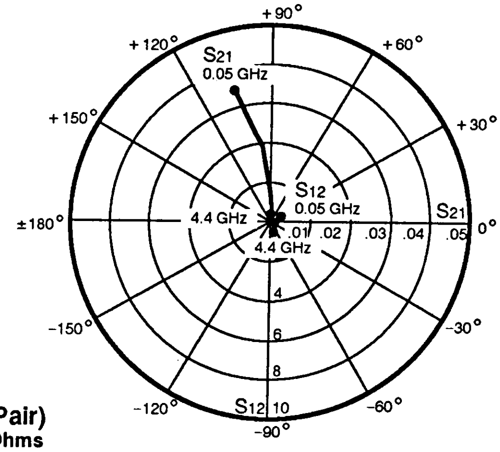
   $MSG = \frac{|S_{21}|}{|S_{12}|}$, $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\ |S_{21}|}$, $\Delta = S_{11} S_{22} - S_{21} S_{12}$

   MAG = Maximum Available Gain
   MSG = Maximum Stable Gain

2. The NE345100 is not available for sale. It is the baseline unit from which NE3451600 and NE3451600 (Pair) S-Parameters data is derived.

TYPICAL COMMON SOURCE SCATTERING PARAMETERS





NE3451600 (Pair)
Coordinates in Ohms
Frequency in GHz
(V_{DS} = 10 V, I_{DS} = 4 A)

S-MAGN AND ANGLES:
VDS = 10 V, IDS = 4 A

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG[1]
.05	.99	−115.38	11.97	121.47	.002	31.93	.91	−179.03	.02	37.00
0.1	.99	−144.91	6.75	106.05	.003	16.96	.92	−179.32	.04	33.99
0.2	.99	−162.03	3.49	96.10	.003	7.93	.92	−179.48	.08	30.98
0.4	.99	−170.95	1.76	88.83	.003	2.49	.92	−179.42	.17	27.97
0.6	.99	−173.94	1.17	84.52	.003	.02	.92	−179.27	.25	26.21
0.8	.99	−175.44	.87	80.99	.003	−1.68	.92	−179.10	.34	24.96
1.0	.99	−176.34	.69	77.80	.003	−3.03	.92	−178.93	.42	23.99
1.2	.99	−176.94	.57	74.79	.003	−4.19	.93	−178.77	.50	23.21
1.4	.99	−177.36	.48	71.92	.003	−5.20	.93	−178.61	.59	22.54
1.6	.99	−177.68	.42	69.17	.003	−6.09	.93	−178.47	.67	21.97
1.8	.99	−177.93	.37	66.51	.003	−6.88	.93	−178.33	.76	21.46
2.0	.99	−178.12	.33	63.94	.003	−7.56	.93	−178.21	.84	21.01
2.2	.99	−178.28	.29	61.45	.003	−8.15	.94	−178.11	.92	20.60
2.4	.99	−178.42	.26	59.05	.002	−8.64	.94	−178.02	1.01	19.64
2.6	.99	−178.53	.24	56.73	.002	−9.03	.94	−177.94	1.09	18.02
2.8	.99	−178.63	.22	54.49	.002	−9.33	.94	−177.87	1.18	17.01
3.0	.99	−178.71	.20	52.33	.002	−9.54	.94	−177.81	1.26	16.19
3.2	.99	−178.79	.18	50.25	.002	−9.65	.95	−177.77	1.35	15.48
3.4	.99	−178.85	.17	48.24	.002	−9.66	.95	−177.73	1.43	14.84
3.6	.99	−178.91	.16	46.31	.002	−9.59	.95	−177.70	1.52	14.26
3.8	.99	−178.96	.15	44.44	.002	−9.43	.95	−177.69	1.60	13.72
4.0	.99	−179.01	.14	42.65	.002	−9.18	.95	−177.67	1.68	13.22
4.2	.99	−179.06	.13	40.92	.002	−8.84	.96	−177.67	1.77	12.76
4.4	.99	−179.10	.12	39.26	.002	−8.42	.96	−177.67	1.85	12.32

V_{DS} = 10 V, I_{DS} = 4 A with RF off. This data does not include bond wires on gate or drain. The source is connected to the backside of the chip by edge wrap around gold plating.

Note:

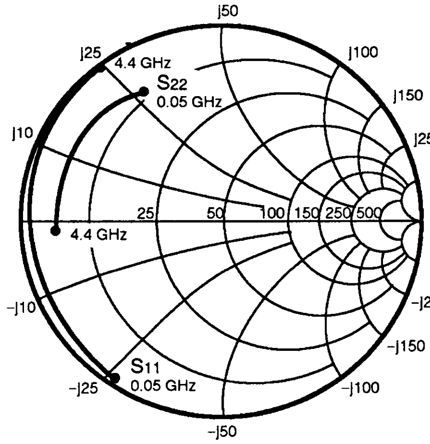
1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

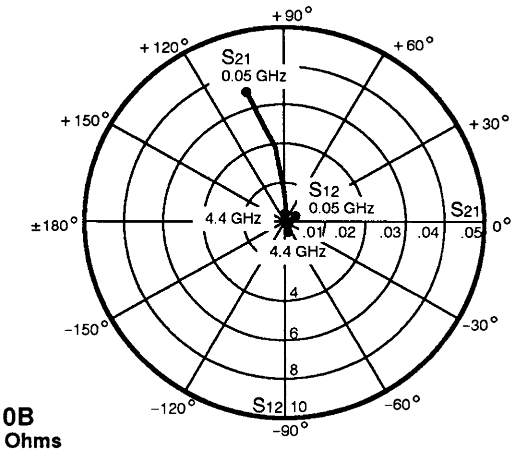
$$MSG = \frac{|S_{21}|}{|S_{12}|},\quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\,|S_{21}|},\quad \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

2. The NE345100 is not available for sale. It is the baseline unit from which NE3451600 and NE3451600 (Pair) S-Parameters data is derived.

TYPICAL COMMON SOURCE SCATTERING PARAMETERS





NE345L-10B
Coordinates in Ohms
Frequency in GHz
(V_{DS} = 10 V, I_{DS} = 2 A)

S-MAGN AND ANGLES:
VDS = 10 V, IDS = 2 A, Rg = 100 Ω

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG[1]
0.1	.98	−124.70	10.43	128.60	.006	23.10	.84	−176.30	.19	32.40
0.2	.97	−152.20	6.73	110.50	.008	24.40	.84	−177.60	.38	29.25
0.4	.97	−169.40	3.33	92.50	.008	26.20	.84	178.60	.59	26.19
0.6	.97	−176.00	2.21	84.80	.009	28.00	.84	177.70	.70	23.90
0.8	.97	179.50	1.44	82.40	.011	30.00	.84	176.70	.88	21.18
1.0	.97	176.10	1.28	79.80	.013	33.10	.84	171.20	.97	19.92
1.2	.97	173.00	1.10	71.60	.014	37.50	.84	168.70	.99	18.94
1.4	.98	170.20	.94	66.10	.014	40.10	.84	167.00	1.03	17.19
1.6	.98	167.70	.81	62.30	.015	47.50	.84	164.90	1.16	14.93
1.8	.98	165.00	.74	59.30	.017	50.90	.84	163.20	1.24	13.42
2.0	.98	162.50	.68	55.10	.020	52.40	.84	157.40	1.13	13.13
2.2	.98	160.40	.64	53.20	.021	54.00	.84	158.60	1.10	12.88
2.4	.98	157.70	.61	49.20	.023	46.90	.84	156.10	1.01	13.47
2.6	.99	155.20	.58	45.70	.026	54.00	.84	153.30	1.00	13.16
2.8	.99	152.70	.56	41.40	.030	51.10	.84	150.80	.93	12.74
3.0	.99	149.90	.55	37.50	.033	52.20	.84	148.00	.89	12.22
3.2	.99	147.30	.54	33.10	.037	52.70	.84	145.60	.86	11.61
3.4	.99	144.50	.52	29.60	.038	49.50	.83	142.40	.85	11.36
3.6	.99	141.50	.53	26.80	.046	49.00	.83	139.20	.85	10.65
3.8	.99	138.30	.55	21.60	.048	44.90	.82	136.10	.81	10.60
4.0	.99	134.90	.55	16.70	.054	43.00	.81	132.60	.79	10.10
4.2	.99	131.30	.57	14.40	.064	41.60	.79	128.50	.80	9.51
4.4	.99	127.30	.63	7.50	.073	36.60	.76	123.50	.76	9.37

V_{DS} = 10 V, I_{DS} = 4 A with RF off. This data does not include bond wires on gate or drain. The source is connected to the backside of the chip by edge wrap around gold plating.

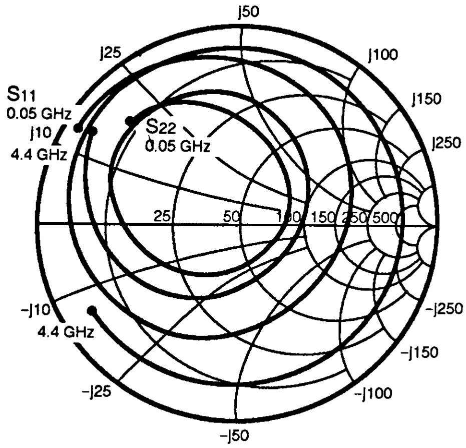
Note:

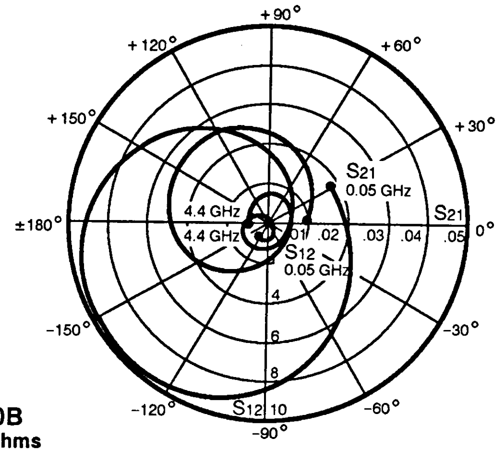
1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K \pm \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

$$MSG = \frac{|S_{21}|}{|S_{12}|},\quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\,|S_{21}|},\quad \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

TYPICAL SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS





NES1417-10B
Coordinates in Ohms
Frequency in GHz
(V_{DS} = 10 V, I_{DS} = 4 A)

S-MAGN AND ANGLES:
VDS = 10 V, IDS = 4 A, Rg = 100 Ω

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	Gma dB
.8	.94	146	1.77	28	.009	-25	.73	131	1.69	18.0
.9	.93	139	1.79	17	.011	-36	.71	124	1.48	17.9
1.0	.92	131	1.86	5	.014	-46	.69	116	1.31	17.9
1.1	.92	122	2.00	-7	.013	-66	.65	109	1.42	17.9
1.2	.89	112	2.23	-22	.019	-74	.60	101	1.21	18.0
1.25	.88	106	2.41	-29	.021	-78	.57	97	1.23	17.7
1.3	.87	100	2.60	-38	.021	-93	.54	93	1.24	17.9
1.35	.84	92	2.83	-48	.023	-103	.51	89	1.39	17.3
1.4	.81	83	3.12	-59	.027	-114	.47	85	1.24	17.7
1.45	.77	71	3.44	-71	.030	-127	.44	81	1.34	17.1
1.5	.71	57	3.85	-84	.034	-144	.42	76	1.32	17.1
1.55	.64	37	4.31	-100	.041	-158	.40	70	1.23	17.3
1.6	.57	9	4.72	-118	.046	179	.36	58	1.26	17.0
1.65	.51	-31	5.07	-140	.051	158	.34	42	1.23	17.1
1.7	.52	-74	4.83	-163	.052	133	.27	12	1.37	16.1
1.75	.61	-113	4.54	176	.049	114	.20	-25	1.42	15.8
1.8	.70	-142	4.00	155	.046	90	.20	-70	1.44	15.4
1.85	.78	-163	3.38	137	.040	71	.25	-107	1.55	14.9
1.9	.83	-179	2.84	121	.035	54	.32	-131	1.61	14.5

V_{DS} = 10 V, I_{DS} = 4 A with RF off. This data does not include bond wires on gate or drain. The source is connected to the backside of the chip by edge wrap around gold plating.

Note:

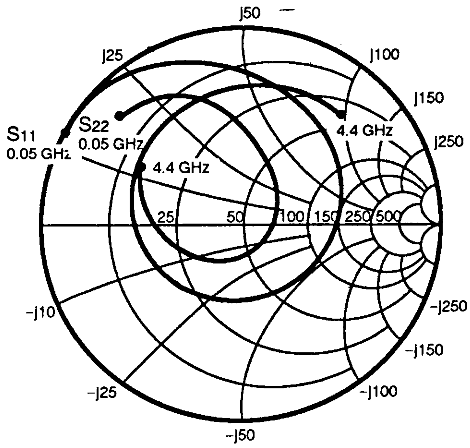
1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

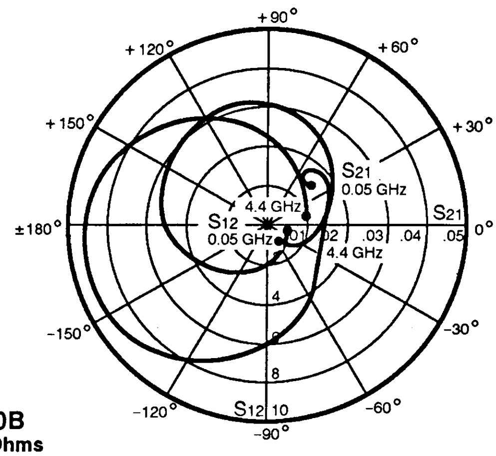
$$MSG = \frac{|S_{21}|}{|S_{12}|},\ K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\ |S_{21}|},\ \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

2. The NE345100 is not available for sale. It is the baseline unit from which NE3451600 and NE3451600 (Pair) S-Parameters data is derived.

TYPICAL COMMON SOURCE SCATTERING PARAMETERS





NES1723-10B
Coordinates in Ohms
Frequency in GHz
(V_{DS} = 10 V, I_{DS} = 2 A)

S-MAGN AND ANGLES:

V_{DS} = 10 V, I_{DS} = 2 A, Rg = 100 Ω

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	Gma dB
.8	.94	147	1.68	52	.010	-19	.81	136	0.42	22.2
.9	.99	140	1.78	31	.011	-24	.80	131	0.23	22.2
1.0	.98	133	1.64	19	.013	-30	.78	125	0.42	21.1
1.1	.96	127	1.53	9	.012	-41	.75	119	0.77	21.0
1.2	.94	120	1.46	-1	.014	-44	.72	113	1.34	16.8
1.3	.91	114	1.44	-9	.014	-53	.68	107	2.28	13.8
1.4	.87	107	1.46	-18	.015	-64	.63	102	3.03	12.1
1.5	.84	101	1.56	-27	.018	-71	.59	98	3.34	11.3
1.55	.82	97	1.62	-32	.017	-79	.57	95	3.74	11.0
1.6	.80	93	1.69	-37	.018	-88	.54	93	3.89	10.8
1.65	.78	90	1.80	-43	.021	-93	.52	91	3.61	10.9
1.7	.76	86	1.92	-50	.022	-100	.50	88	3.46	11.1
1.75	.74	81	2.05	-56	.025	-109	.47	86	3.23	11.2
1.8	.72	76	2.21	-64	.028	-116	.45	84	2.92	11.5
1.85	.69	70	2.41	-73	.031	-126	.42	82	2.65	11.9
1.9	.67	62	2.61	-82	.033	-137	.41	79	2.47	12.2
1.95	.63	52	2.95	-91	.037	-148	.38	75	2.18	12.9
2.0	.59	40	3.35	-103	.043	-161	.35	71	1.85	13.6
2.05	.54	23	3.81	-118	.049	-176	.32	63	1.64	14.2
2.1	.47	-3	4.27	-136	.054	166	.29	53	1.54	14.6
2.15	.39	-40	4.57	-156	.060	147	.23	35	1.51	14.6
2.2	.37	-91	4.64	-180	.063	126	.16	2	1.52	14.4
2.25	.42	-138	4.26	157	.062	100	.13	-59	1.66	13.6
2.3	.50	-172	3.65	137	.057	77	.19	-117	1.92	12.6
2.35	.56	165	3.09	119	.050	57	.28	-147	2.26	11.6
2.4	.60	148	2.57	103	.042	39	.36	-166	2.84	10.5
2.45	.63	134	2.16	91	.036	25	.42	-179	3.49	9.5
2.5	.65	122	1.87	79	.028	8	.47	171	4.54	8.7
2.6	.70	99	1.44	57	.021	-15	.54	157	6.43	7.4

V_{DS} = 10 V, I_{DS} = 4 A with RF off. This data does not include bond wires on gate or drain. The source is connected to the backside of the chip by edge wrap around gold plating.

Note:

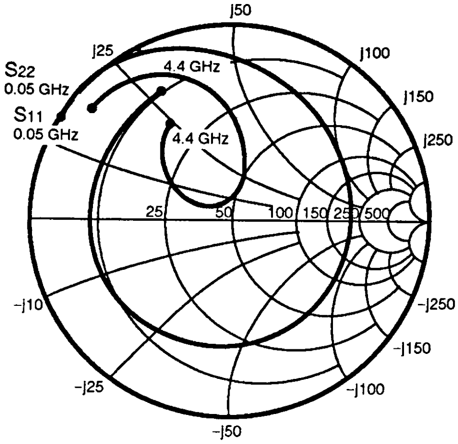
1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When K ≤ 1, MAG = MSG.

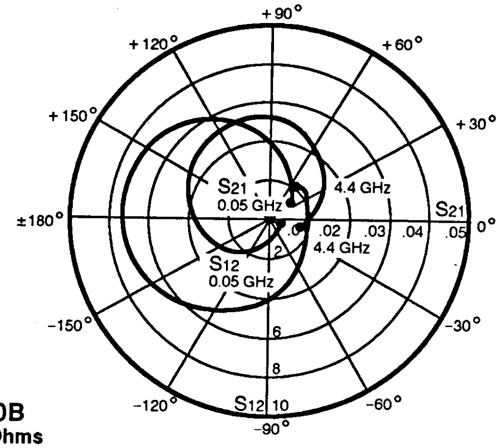
$$MSG = \frac{|S_{21}|}{|S_{12}|},\quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\,|S_{21}|},\quad \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

2. The NE345100 is not available for sale. It is the baseline unit from which NE3451600 and NE3451600 (Pair) S-Parameters data is derived.

TYPICAL COMMON SOURCE SCATTERING PARAMETERS





NES1723-20B
Coordinates in Ohms
Frequency in GHz
(V_{DS} = 10 V, I_{DS} = 4 A)

S-MAGN AND ANGLES:

VDS = 10 V, IDS = 4 A, Rg = 50 Ω

FREQUENCY (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	Gma dB
.8	1.01	145	.94	48	.007	-19	.88	141	0.02	21.0
.9	1.00	139	1.12	29	.007	-31	.91	135	-0.14	22.1
1.0	1.00	132	1.08	15	.006	-34	.89	129	-0.19	22.3
1.1	.99	126	1.03	3	.009	-37	.86	123	0.10	20.7
1.2	.96	118	1.03	-7	.010	-57	.83	117	0.81	20.3
1.3	.94	111	1.04	-17	.011	-59	.78	112	1.81	14.7
1.4	.90	104	1.08	-27	.011	-72	.75	107	3.03	12.2
1.5	.86	96	1.18	-37	.013	-86	.69	101	3.87	10.6
1.55	.84	92	1.23	-43	.014	-96	.66	99	4.55	10.0
1.6	.82	88	1.31	-48	.015	-100	.63	96	4.34	10.0
1.65	.80	83	1.41	-55	.017	-109	.60	94	4.37	9.8
1.7	.78	78	1.52	-63	.019	-117	.57	92	4.18	9.9
1.75	.76	73	1.63	-70	.020	-125	.55	91	4.15	10.0
1.8	.74	66	1.79	-78	.023	-135	.51	86	3.77	10.2
1.85	.71	59	1.96	-87	.026	-147	.47	86	3.41	10.5
1.9	.69	50	2.17	-97	.030	-156	.44	83	3.09	10.9
1.95	.67	39	2.39	-108	.033	-168	.41	82	2.77	11.3
2.0	.64	25	2.70	-120	.037	-179	.36	76	2.47	11.9
2.1	.60	-19	3.37	-151	.047	148	.24	73	1.90	13.1
2.15	.60	-50	3.65	-171	.050	129	.17	77	1.77	13.6
2.2	.62	-86	3.72	167	.052	110	.11	103	1.67	13.7
2.25	.65	-121	3.45	144	.051	91	.13	145	1.76	13.2
2.3	.68	-149	3.00	124	.047	73	.21	157	2.03	12.3
2.35	.70	-172	2.54	107	.042	56	.29	156	2.42	11.2
2.4	.71	171	2.10	92	.037	41	.36	151	3.05	9.7
2.45	.72	159	1.76	81	.032	30	.41	146	3.89	8.5
2.5	.72	149	1.49	71	.028	20	.44	141	4.96	7.3
2.6	.72	134	1.08	55	.023	4	.49	134	7.78	4.9

V_{DS} = 10 V, I_{DS} = 4 A with RF off. This data does not include bond wires on gate or drain. The source is connected to the backside of the chip by edge wrap around gold plating.

Note:

1. Gain Calculations: $MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$. When $K \leq 1$, MAG = MSG.

$$MSG = \frac{|S_{21}|}{|S_{12}|},\quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}|\,|S_{21}|},\quad \Delta = S_{11}S_{22} - S_{21}S_{12}$$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

2. The NE345100 is not available for sale. It is the baseline unit from which NE3451600 and NE3451600 (Pair) S-Parameters data is derived.