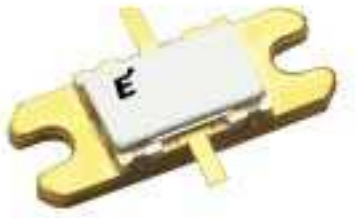
# GaN-HEMT 30W

# EGN26C030MK

***High Voltage - High Power GaN-HEMT***

## FEATURES

- High Voltage Operation : $V_{DS}$=50V
- High Power : 45.0dBm (typ.) @ Psat
- Power Gain : 18dB(typ.) @ f=2.60GHz
- Proven Reliability



## DESCRIPTION

SEDI's GaN-HEMT offers high efficiency, ease of matching, greater consistency and broad bandwidth for high power L-band amplifiers with 50V operation, and gives you higher gain.
This new product is ideally suited for use in 2.6GHz WiMAX design requirements as it offers high gain, long term reliability and ease of use.

## ABSOLUTE MAXIMUM RATINGS (Case Temperature Tc=25°C)

| Item | Symbol | Condition | Rating | Unit |
|---|---|---|---|---|
| Operating-Voltage | $V_{DS}$ | | 55 | V |
| Drain-Source Voltage | $V_{DS}$ | $V_{GS}$=-8V | 160 | V |
| Gate-Source Voltage | $V_{GS}$ | | -15 | V |
| Total Power Dissipation | $P_t$ | | 37.5 | W |
| Storage Temperature | $T_{stg}$ | | -65 to +175 | °C |
| Channel Temperature | $T_{ch}$ | | 250 | °C |

## RECOMMENDED OPERATING CONDITION

| Item | Symbol | Condition | Limit | Unit |
|---|---|---|---|---|
| DC Input Voltage | $V_{DS}$ | | ≤ 55 | V |
| Forward Gate Current | $I_{GF}$ | $R_G$=15Ω | ≤ 69 | mA |
| Reverse Gate Current | $I_{GR}$ | $R_G$=15Ω | ≥ -1.1 | mA |
| Channel Temperature | $T_{ch}$ | | ≤ 180 | °C |
| Average Output Power | Pave. | | ≤ 42.0 | dBm |

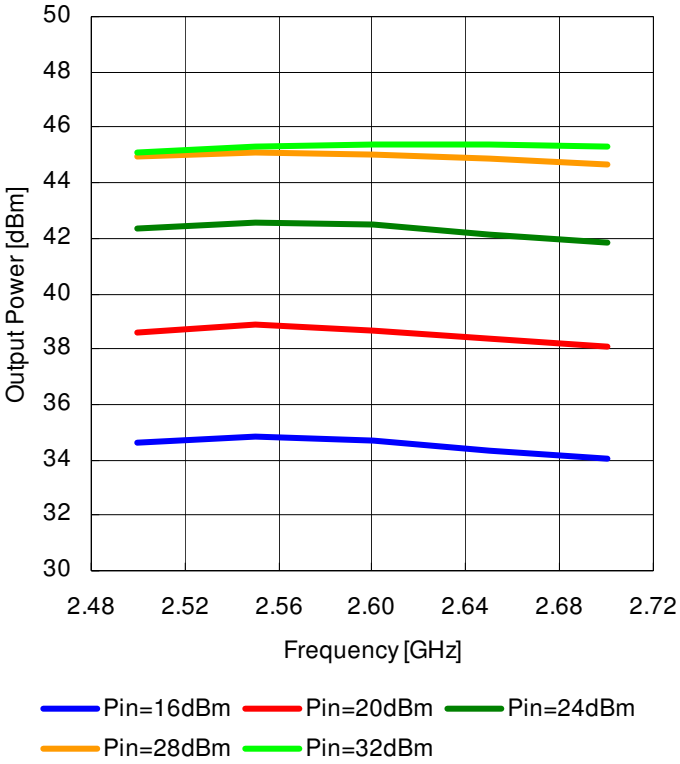
## ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25°C)

| Item | Symbol | Condition | Limit | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | Typ. | Max. | |
| Pinch-Off Voltage | $V_p$ | VDS=50V IDS=7.8mA | -1.0 | -1.5 | -2.0 | V |
| Saturated Power | Psat *1 | VDS=50V | 44.0 | 45.0 | - | dBm |
| Drain Efficiency | $\eta_d$ *2 | IDS(DC)=150mA | 10.5 | 12.5 | - | % |
| Power Gain | Gp *2 | f=2.60GHz | 17.0 | 18.0 | - | dB |
| Thermal Resistance | $R_{th}$ | Channel to Case at 24W $P_{DC}$ | - | 5.0 | 6.0 | °C/W |

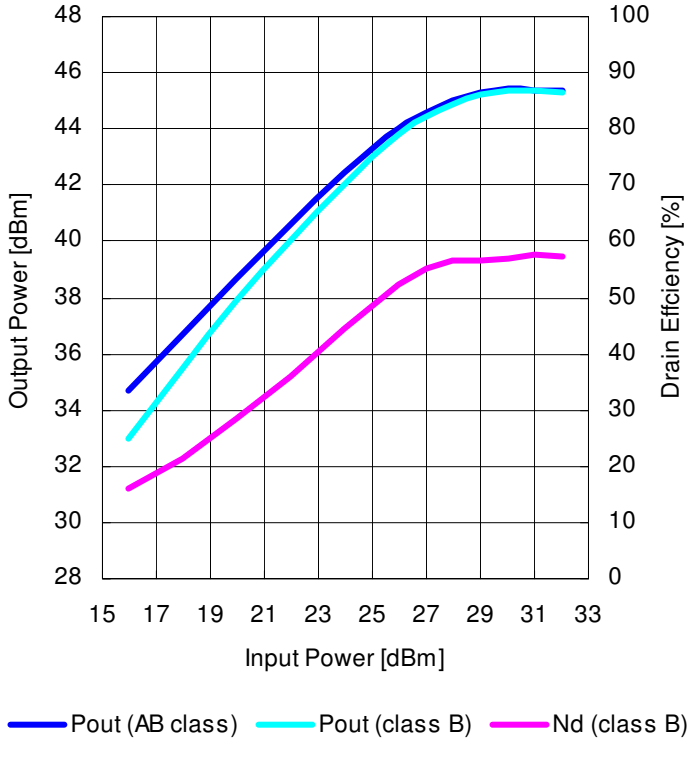
*1 : 10%-duty RF pulse (DC supply constant)
*2 : Pout = 31.5dBm, CW

**RF characteristics @f=2.6GHz fine tuned**

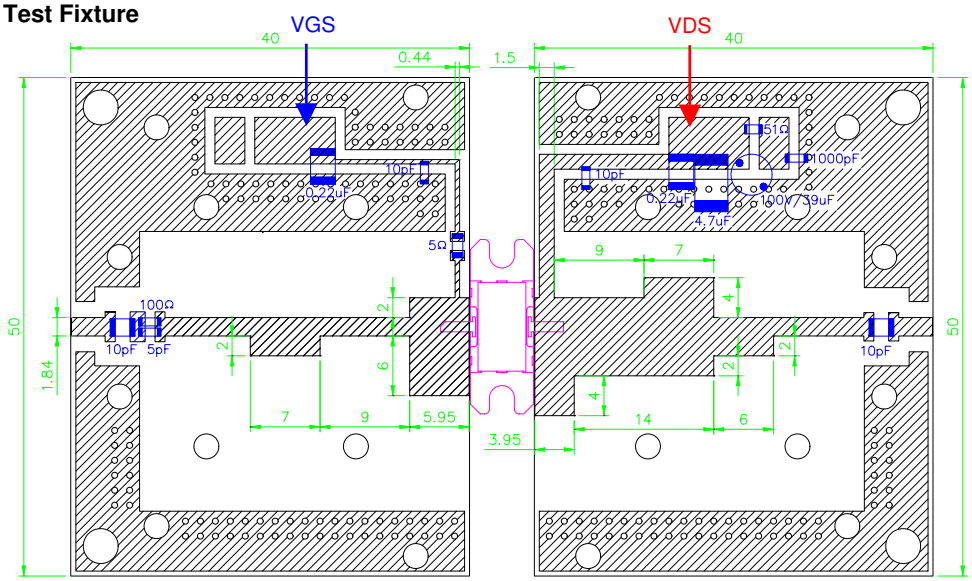
**Output Power vs. Frequency**
**VDS=50V, IDS(DC)=150mA**



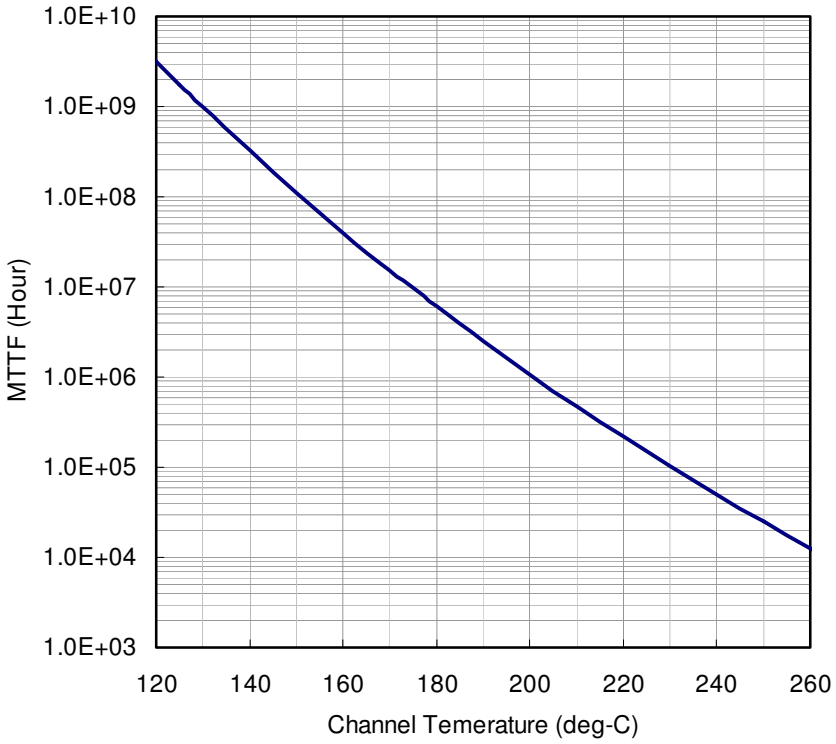

**Output Power and Drain Efficiency vs. Input Power**
**VDS=50V, IDS(DC)=150mA, f=2.60GHz**




**Test Fixture**



**MTTF Calculation**
**– Estimated MTTF –**




Ea= 1.6eV
Confidence Level= 90%

| Channel Temp (deg-C) | MTTF (Hours) |
|---|---|
| 160 | $4.05 \times 10^7$ |
| 180 | $6.07 \times 10^6$ |
| 200 | $1.07 \times 10^6$ |

$AF=\exp[(-Ea/k)(1/T_{stress}-1/T_{use})$

$MTTF_{use}=MTTF_{stress}*AF$

Where;

AF: acceleration factor

Ea: activation energy (1.6 eV)

k: Boltzman's constant ($8.62 \times 10^{-5}$ eV/K)

$T_{stress}$: stress temperature (K)

$T_{use}$: use temperature (K)

**ESD characteristic**

| Test Methodology | Class |
|---|---|
| Human Body Model (per JESD22-A114) | 0 |
| Machine Model (per JEIA/ESD22-A115) | A |

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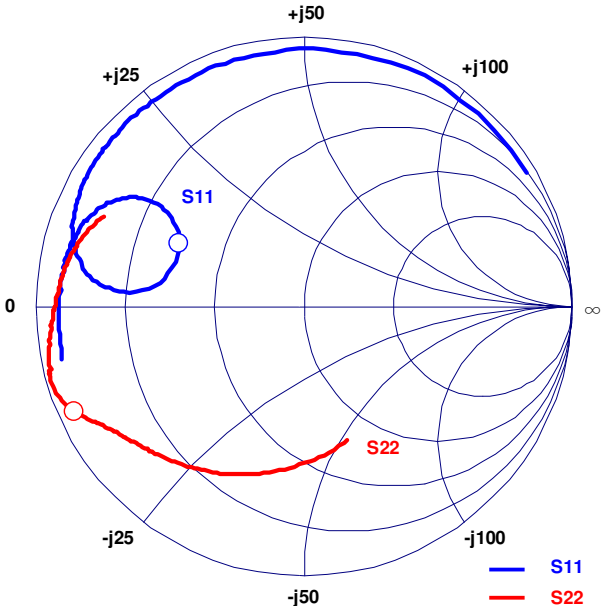
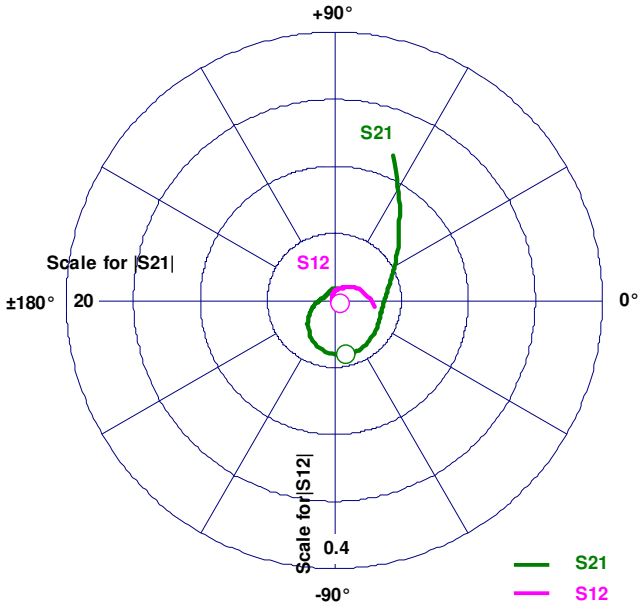
**- Reference DATA -**

**S-Parameters @$V_{DS}$=50V, $I_{DS(DC)}$=150mA, f=0.5 to 5.5GHz**
**$Z_l = Z_s$ = 50 ohm  Marker : 2.60GHz**




| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| GHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 0.50 | 0.92 | -167.59 | 11.70 | 67.79 | 0.008 | -3.61 | 0.52 | -72.04 |
| 0.60 | 0.92 | -172.48 | 9.72 | 60.78 | 0.007 | -7.90 | 0.55 | -80.15 |
| 0.70 | 0.92 | -176.60 | 8.30 | 54.02 | 0.008 | -7.03 | 0.58 | -87.84 |
| 0.80 | 0.92 | -179.44 | 7.19 | 47.93 | 0.007 | -12.96 | 0.60 | -95.06 |
| 0.90 | 0.91 | 177.63 | 6.39 | 41.13 | 0.007 | -12.66 | 0.63 | -101.89 |
| 1.00 | 0.91 | 174.88 | 5.69 | 35.94 | 0.006 | -9.94 | 0.65 | -107.94 |
| 1.10 | 0.91 | 172.55 | 5.19 | 29.99 | 0.006 | -16.19 | 0.68 | -113.18 |
| 1.20 | 0.91 | 170.24 | 4.79 | 24.93 | 0.005 | -14.65 | 0.70 | -117.85 |
| 1.30 | 0.90 | 167.97 | 4.45 | 19.72 | 0.005 | -5.79 | 0.72 | -122.32 |
| 1.40 | 0.90 | 165.69 | 4.17 | 14.42 | 0.005 | -0.55 | 0.74 | -126.16 |
| 1.50 | 0.89 | 163.35 | 3.98 | 9.17 | 0.005 | 6.30 | 0.75 | -129.89 |
| 1.60 | 0.89 | 161.40 | 3.82 | 4.20 | 0.005 | 9.66 | 0.77 | -133.34 |
| 1.70 | 0.88 | 158.96 | 3.71 | -1.39 | 0.005 | 10.74 | 0.78 | -136.35 |
| 1.80 | 0.86 | 156.89 | 3.63 | -6.27 | 0.006 | 16.54 | 0.80 | -139.23 |
| 1.90 | 0.85 | 154.47 | 3.61 | -12.70 | 0.006 | 11.11 | 0.81 | -141.64 |
| 2.00 | 0.82 | 152.07 | 3.62 | -18.57 | 0.006 | 10.52 | 0.83 | -144.05 |
| 2.10 | 0.80 | 149.99 | 3.68 | -25.34 | 0.008 | 11.04 | 0.84 | -145.93 |
| 2.20 | 0.76 | 147.55 | 3.77 | -32.53 | 0.009 | 5.39 | 0.86 | -147.84 |
| 2.30 | 0.71 | 146.24 | 3.86 | -41.62 | 0.009 | 1.33 | 0.87 | -149.71 |
| 2.40 | 0.65 | 145.27 | 4.03 | -51.19 | 0.010 | -3.21 | 0.89 | -151.12 |
| 2.50 | 0.58 | 147.18 | 4.13 | -63.84 | 0.012 | -13.71 | 0.92 | -153.08 |
| 2.60 | 0.52 | 153.63 | 4.14 | -77.53 | 0.011 | -24.72 | 0.94 | -155.54 |
| 2.70 | 0.51 | 163.84 | 4.01 | -92.37 | 0.011 | -44.31 | 0.96 | -158.18 |
| 2.80 | 0.56 | 172.23 | 3.69 | -106.85 | 0.010 | -53.14 | 0.98 | -160.88 |
| 2.90 | 0.65 | 175.72 | 3.31 | -121.41 | 0.009 | -69.37 | 0.99 | -163.63 |
| 3.00 | 0.73 | 174.59 | 2.85 | -132.69 | 0.007 | -85.79 | 0.98 | -166.06 |
| 3.10 | 0.80 | 172.88 | 2.46 | -143.63 | 0.006 | -91.42 | 0.97 | -168.12 |
| 3.20 | 0.84 | 170.30 | 2.11 | -151.48 | 0.005 | -110.01 | 0.97 | -169.98 |
| 3.30 | 0.87 | 166.92 | 1.82 | -159.19 | 0.005 | -122.98 | 0.96 | -171.46 |
| 3.40 | 0.90 | 163.95 | 1.59 | -165.58 | 0.003 | -153.13 | 0.96 | -172.89 |
| 3.50 | 0.91 | 161.43 | 1.40 | -171.42 | 0.003 | -171.61 | 0.95 | -174.25 |
| 3.60 | 0.92 | 159.07 | 1.24 | -175.62 | 0.004 | 174.53 | 0.95 | -175.43 |
| 3.70 | 0.93 | 156.66 | 1.12 | 178.88 | 0.004 | 149.65 | 0.94 | -176.73 |
| 3.80 | 0.93 | 154.41 | 1.01 | 175.55 | 0.005 | 140.15 | 0.94 | -177.75 |
| 3.90 | 0.94 | 151.86 | 0.94 | 171.20 | 0.006 | 127.27 | 0.94 | -179.05 |
| 4.00 | 0.94 | 149.46 | 0.86 | 167.38 | 0.007 | 120.23 | 0.93 | 179.79 |
| 4.10 | 0.95 | 146.93 | 0.82 | 163.80 | 0.008 | 111.19 | 0.92 | 178.90 |
| 4.20 | 0.95 | 144.31 | 0.77 | 159.87 | 0.010 | 102.85 | 0.92 | 177.49 |
| 4.30 | 0.95 | 141.61 | 0.75 | 156.19 | 0.011 | 97.08 | 0.92 | 176.59 |
| 4.40 | 0.95 | 138.10 | 0.72 | 152.29 | 0.014 | 90.28 | 0.91 | 175.25 |
| 4.50 | 0.95 | 134.43 | 0.70 | 147.74 | 0.015 | 81.75 | 0.91 | 174.02 |
| 4.60 | 0.95 | 130.16 | 0.70 | 143.86 | 0.017 | 75.18 | 0.91 | 172.64 |
| 4.70 | 0.95 | 125.66 | 0.69 | 139.07 | 0.018 | 69.23 | 0.91 | 171.22 |
| 4.80 | 0.95 | 120.21 | 0.70 | 133.73 | 0.022 | 61.37 | 0.90 | 169.71 |
| 4.90 | 0.95 | 113.90 | 0.72 | 128.40 | 0.024 | 54.72 | 0.89 | 168.18 |
| 5.00 | 0.95 | 106.02 | 0.74 | 122.06 | 0.027 | 47.23 | 0.88 | 166.48 |
| 5.10 | 0.95 | 96.55 | 0.78 | 115.40 | 0.033 | 38.00 | 0.88 | 164.63 |
| 5.20 | 0.95 | 85.01 | 0.82 | 106.59 | 0.038 | 28.89 | 0.87 | 162.71 |
| 5.30 | 0.96 | 70.36 | 0.87 | 97.12 | 0.044 | 17.89 | 0.85 | 160.56 |
| 5.40 | 0.96 | 52.81 | 0.93 | 84.44 | 0.051 | 6.14 | 0.84 | 158.35 |
| 5.50 | 0.97 | 30.93 | 0.97 | 71.24 | 0.060 | -8.37 | 0.82 | 155.95 |

**MK Package Outline**
**Metal-Ceramic Hermetic Package**