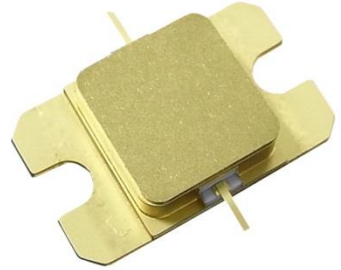


■ Features

- High Output Power: P5dB=45.0dBm (Typ.)
- High Linear Gain: GL=12.0dB (Typ.)
- High Power Added Efficiency: PAE=39% (Typ.)
- Broad Band: 7.7 to 8.5GHz
- Impedance Matched Zin/Zout = 50ohm
- Hermetically Sealed Package

■ Description

The SGK7785-30A is a high power GaN-HEMT that is internally matched for standard communication bands to provide optimum power and gain in a 50ohm system.



ABSOLUTE MAXIMUM RATING (Case Temperature T_c=25 deg.C)

| Item | Symbol | Rating | Unit |
|-------------------------|------------------|-------------|-------|
| Drain-Source Voltage | V _{DS} | 26 | V |
| Gate-Source Voltage | V _{GS} | -10 | V |
| Total Power Dissipation | P _T | 86.5 | W |
| Storage Temperature | T _{stg} | -55 to +125 | deg.C |
| Channel Temperature | T _{ch} | +250 | deg.C |

RECOMMENDED OPERATING CONDITION

| Item | Symbol | Condition | Limit | Unit |
|----------------------|-----------------|-----------|--------|-------|
| Drain-Source Voltage | V _{DS} | | <=24 | V |
| Forward Gate Current | I _{GF} | Rg=100ohm | <=6.1 | mA |
| Reverse Gate Current | I _{GR} | Rg=100ohm | >=-3.2 | mA |
| Channel Temperature | T _{ch} | | <+192 | deg.C |

ELECTRICAL CHARACTERISTICS (Case Temperature T_c=25 deg.C)

| Item | Symbol | Condition | Limit | | | Unit |
|---------------------------------------|------------------|--|-------|-------|------|---------|
| | | | Min. | Typ. | Max. | |
| Saturated Drain Current | I _{DSS} | V _{DS} =10V, V _{GS} =0V | - | 6.5 | - | A |
| Trans Conductance | G _m | V _{DS} =24V, I _{DS} =1.3A | - | 3.0 | - | S |
| Pinch-off Voltage | V _P | V _{DS} =24V, I _{DS} =1.3mA | - | -3.0 | - | V |
| Output Power at 5dB G.C.P. | P _{5dB} | V _{DS} =24V(typ.) I _{DS(DC)} =1.75A(typ.) f=7.7 to 8.5 GHz Vgs-constant | 44.0 | 45.0 | - | dBm |
| Linear Gain at Pin=23dBm | GL | | 11.0 | 12.0 | - | dB |
| Drain Current at 5dB G.C.P. | I _{DSR} | | - | 2.7 | 4.0 | A |
| Power Added Efficiency at 3dB G.C.P. | PAE | | - | 39.0 | - | % |
| Gain Flatness | ΔG | | - | - | 1.2 | dB |
| 3rd Order Inter Modulation Distortion | IM ₃ | f=7.7GHz, 8.5GHz Δf=10MHz, 2-tone Test Pout=29.5dBm (S.C.L.) | -40.0 | -45.0 | - | dBc |
| Thermal Resistance | R _{th} | Channel to Case | - | 2.2 | 2.6 | deg.C/W |
| Channel Temperature Rise | ΔT _{ch} | (V _{DS} × I _{DSR} - Pout + Pin) × R _{th} | - | 83 | 150 | deg.C |

G.C.P. : Gain Compression Point, S.C.L. : Single Carrier Level

| | |
|-----------------|----------|
| CASE STYLE | IBK |
| RoHS Compliance | YES |
| ESD | Class 1C |

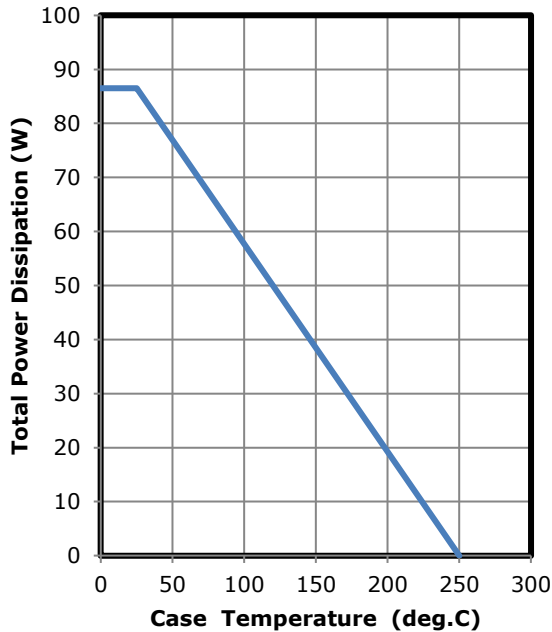
1000V to < 2000V

Note : Based on ANSI/ESDA/JEDEC JS-001-2012(C=100pF, R=1.5kohm)

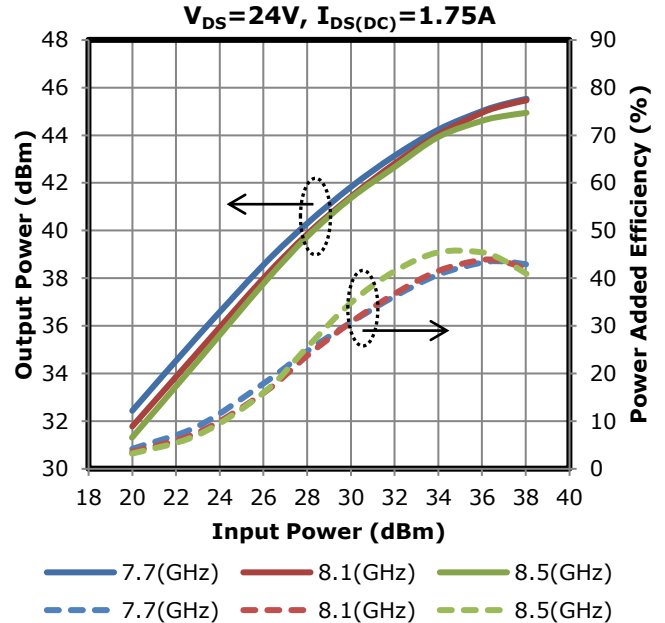


● RF Characteristics

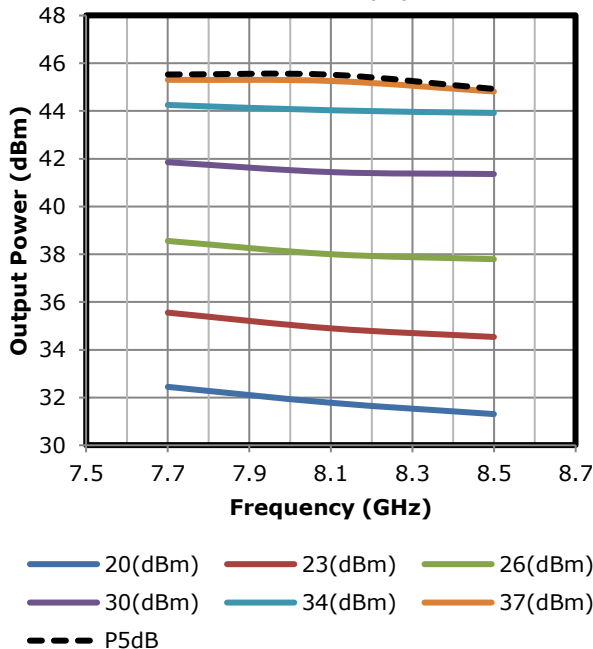
Power Derating Curve



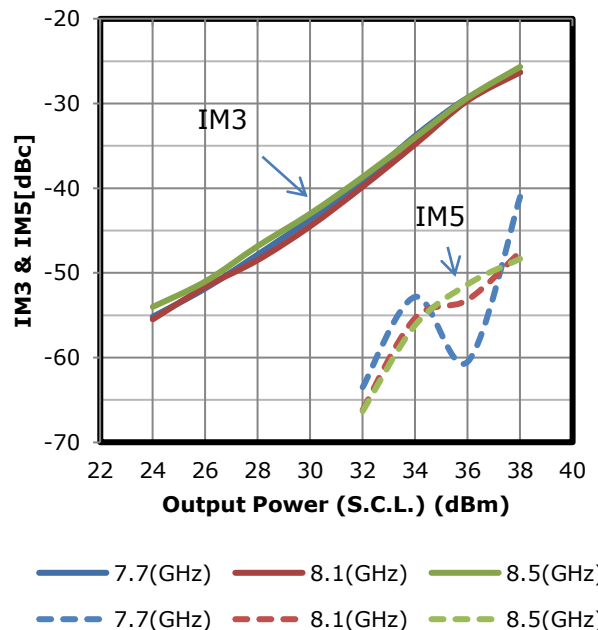
Output Power & Power Added Efficiency vs. Input Power
 $V_{DS}=24V, I_{DS(DC)}=1.75A$



Output Power vs. Frequency
 $V_{DS}=24V, I_{DS(DC)}=1.75A$



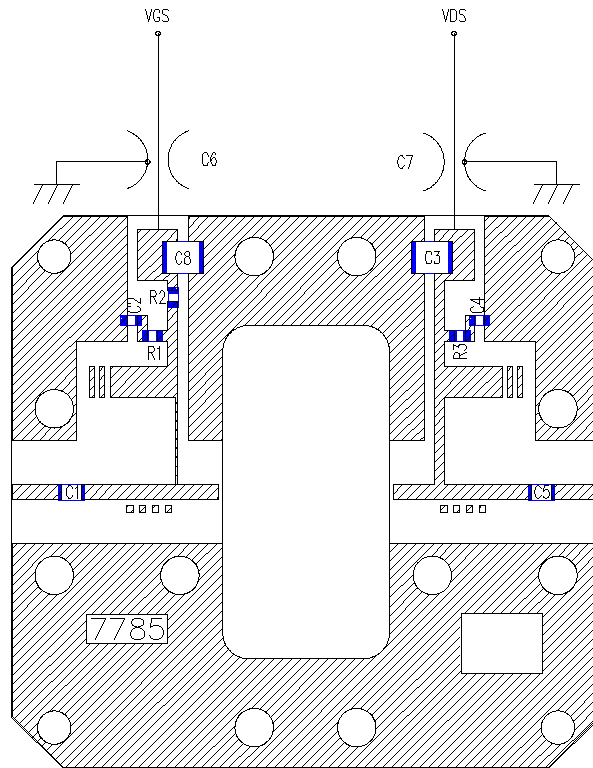
IMD vs. Output Power (S.C.L.)
 $V_{DS}=24V, I_{DS(DC)}=1.75A$



| Freq. | S11 | | S21 | | S12 | | S22 | |
|-----------------|-------|--------|-------|--------|-------|-------|-------|--------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 7500 MHz | 0.366 | -174.1 | 4.276 | -154.3 | 0.094 | 135.7 | 0.272 | -107.2 |
| 7600 MHz | 0.365 | 162.0 | 4.269 | -168.0 | 0.094 | 122.3 | 0.215 | -115.5 |
| 7700 MHz | 0.376 | 140.3 | 4.226 | 178.2 | 0.095 | 108.7 | 0.162 | -124.4 |
| 7800 MHz | 0.387 | 120.7 | 4.189 | 164.8 | 0.095 | 95.2 | 0.114 | -133.1 |
| 7900 MHz | 0.393 | 103.1 | 4.156 | 151.2 | 0.095 | 81.8 | 0.070 | -150.1 |
| 8000 MHz | 0.390 | 87.2 | 4.097 | 137.9 | 0.095 | 67.8 | 0.035 | 168.4 |
| 8100 MHz | 0.375 | 72.6 | 4.067 | 123.7 | 0.096 | 54.0 | 0.052 | 98.6 |
| 8200 MHz | 0.335 | 59.8 | 4.044 | 109.7 | 0.097 | 39.3 | 0.102 | 74.1 |
| 8300 MHz | 0.274 | 48.7 | 4.026 | 94.8 | 0.098 | 24.2 | 0.168 | 61.1 |
| 8400 MHz | 0.186 | 41.8 | 3.987 | 78.7 | 0.099 | 8.3 | 0.249 | 50.9 |
| 8500 MHz | 0.090 | 59.8 | 3.870 | 62.2 | 0.098 | -8.7 | 0.341 | 40.5 |
| 8600 MHz | 0.124 | 128.9 | 3.687 | 44.4 | 0.096 | -26.2 | 0.439 | 28.7 |
| 8700 MHz | 0.269 | 133.8 | 3.372 | 26.6 | 0.089 | -44.1 | 0.529 | 16.2 |

● Amplifier Circuit Outline

SGK7785-30A



| | |
|----|--------|
| C1 | 2.0pF |
| C2 | 1000pF |
| C3 | 0.1uF |
| C4 | 1000pF |
| C5 | 2.0pF |
| C6 | 1000pF |
| C7 | 1000pF |
| C8 | 0.1uF |
| R1 | 51ohm |
| R2 | 100ohm |
| R3 | 51ohm |

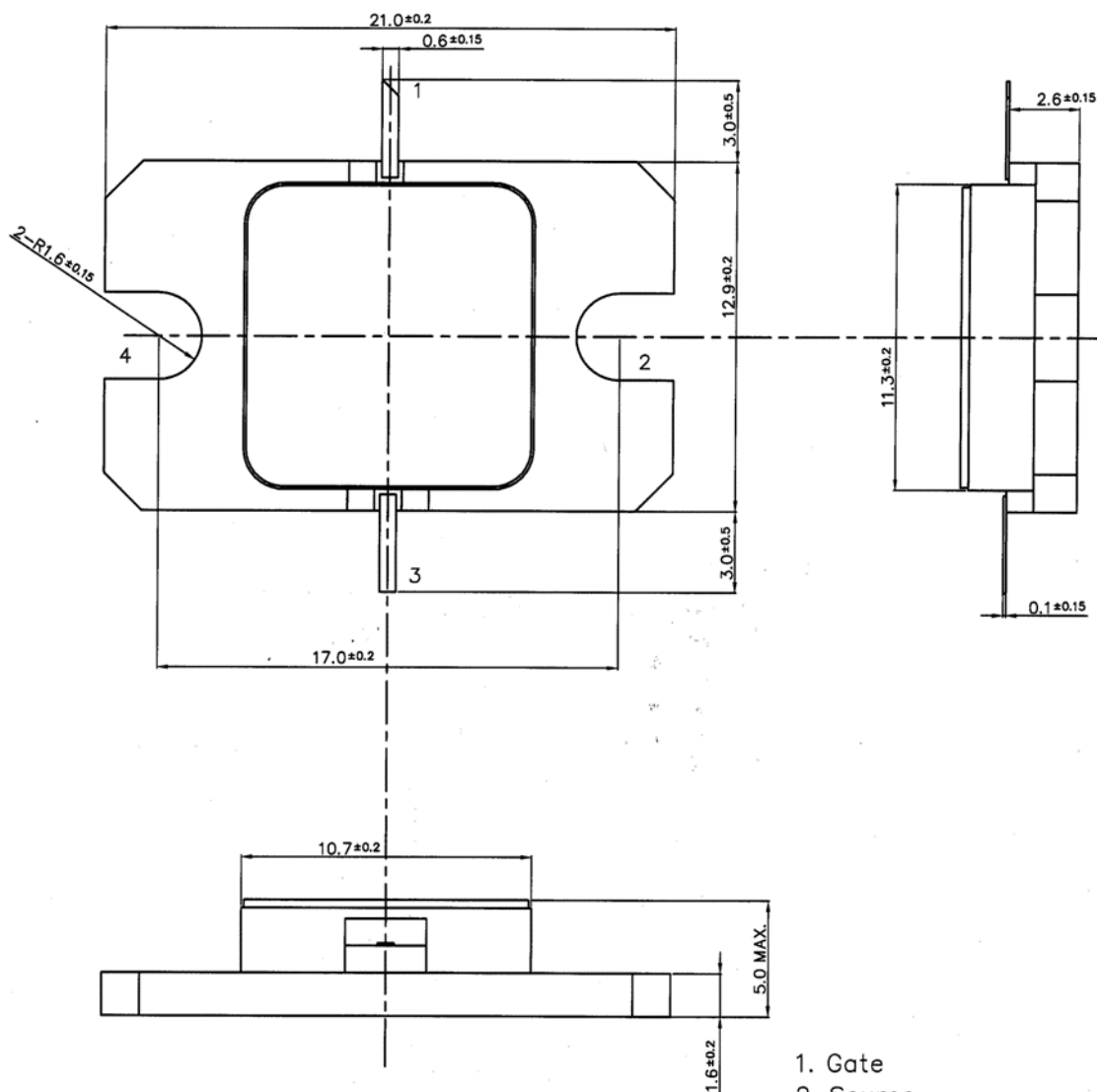
Substrate : Rogers RO4003C
 h=0.542mm, $\epsilon_r=3.38$
 Cu=18um

C1, C5 : ATC600F(size:0805), +/- 0.1pF
 C6, C7 : EMI FILTER MARUWA(FTA352AR102S-S)



● **Package Out line**

Case Style : IBK



- 1. Gate
 - 2. Source
 - 3. Drain
 - 4. Source
- Unit: mm
Tolerance : ± 0.15

For Safety, Observe the Following Procedures Environmental Management

- Do not put this product into the mouth.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Respect all applicable laws of the country when discarding this product.
This product must be disposed in accordance with methods specified by applicable hazardous waste procedures.

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