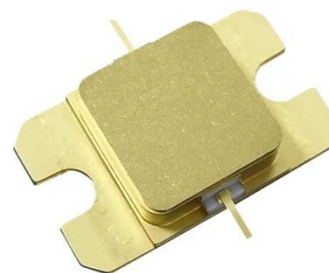


FEATURES

- High Output Power: $P_{5dB}=48.0dBm$ (Typ.)
- High Gain: $GL=11.0dB$ (Typ.)
- High Power Added Efficiency: $PAE=37\%$ (Typ.)
- Broad Band: 7.7 to 8.5GHz
- Hermetically Sealed Package

DESCRIPTION

The SGK7785-60A 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 $T_c=25\text{ deg.C}$)

Item	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	26	V
Gate-Source Voltage	V_{GS}	-10	V
Total Power Dissipation	P_T	112	W
Storage Temperature	T_{stg}	-55 to +125	deg.C
Channel Temperature	T_{ch}	+250	deg.C
Case Temperature	T_c	-40 to +125	deg.C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
Drain-Source Voltage	V_{DS}		≤ 24	V
Forward Gate Current	I_{GF}	$R_g=51\text{ohm}$	≤ 12.2	mA
Reverse Gate Current	I_{GR}	$R_g=51\text{ohm}$	≥ -6.4	mA
Channel Temperature	T_{ch}		$< +192$	deg.C

ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25\text{ deg.C}$)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Saturated Drain Current	I_{DSS}	$V_{DS}=10V, V_{GS}=0V$		13		A
Trans Conductance	G_m	$V_{DS}=24V, I_{DS}=2.6A$	-	6.0	-	S
Pinch-off Voltage	V_P	$V_{DS}=10V, I_{DS}=2.6mA$	-	-3	-	V
Frequency Range	f	$V_{DS}=24V\text{-typ.}$ $I_{DS(DC)}=2.6A\text{-typ.}$ $V_{GS}\text{-constant}$	7.7	-	8.5	GHz
Output Power at 5dB G.C.P.	P_{5dB}		47.0	48.0	-	dBm
Linear Gain at $P_{in}=27dBm$	GL		9.5	11.0	-	dB
Drain Current at 5dB G.C.P.	I_{DSR}		-	5.4	7.0	A
Power Added Efficiency at 3dB G.C.P.	PAE		-	37	-	%
Gain Flatness	ΔG				1.6	dB
3 rd Order Inter modulation Distortion	IM_3	$f=7.7GHz, 8.5GHz$ $\Delta f=10MHz, 2\text{-tone Test}$ $P_{out}=32.0dBm$ (S.C.L.)	-38.0	-42.0	-	dBc
Thermal Resistance	R_{th}	Channel to Case ($T_c=25\text{deg.C}, P_{diss}=62.4W$)	-	1.3	1.5	deg.C/W
Channel Temperature Rise	ΔT_{ch}	$(V_{DS} \times I_{DSR} - P_{out} + P_{in}) \times R_{th}$	-	110	150	deg.C

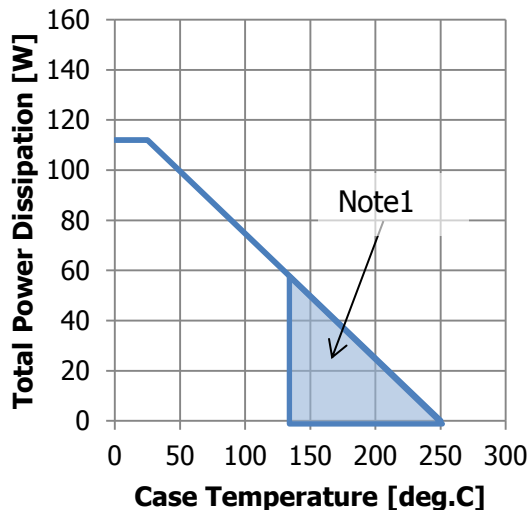
G.C.P. : Gain Compression Point, S.C.L. : Single Carrier Level

CASE STYLE	IBK	
RoHS Compliance	YES	
ESD	Class 1C	1000V to <2000V

Note : Based on ANSI/ESDA/JEDEC JS-001-2012($C=100pF, R=1.5k\text{ohm}$)

● RF Characteristics

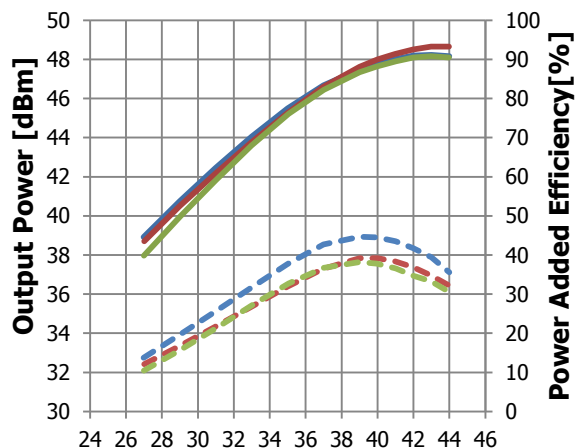
Power Derating Curve



Note 1: Shaded area exceeds Maximum Case Temperature (See Page1)

Input Power vs. Output Power and Power Added Efficiency

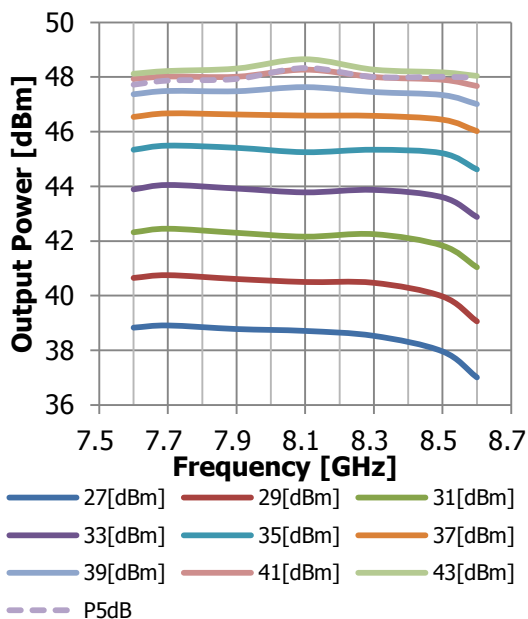
$V_{DS}=24V, I_{DS(DC)}=2600mA$



— 7.7[GHz] — 8.1[GHz] — 8.5[GHz]

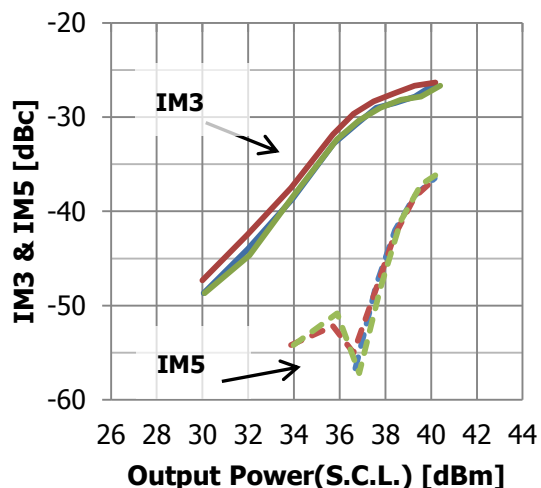
Output Power vs. Frequency

$V_{DS}=24V, I_{DS(DC)}=2600mA$



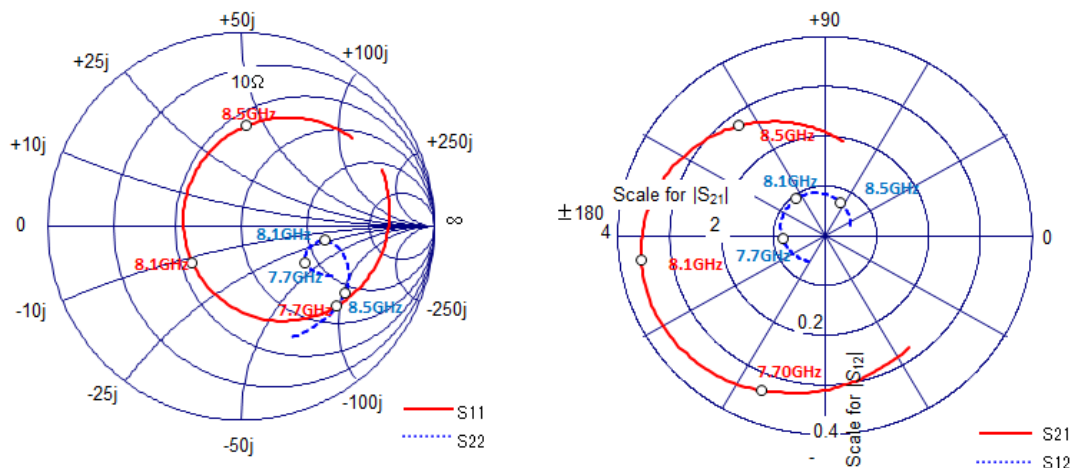
IMD vs. Output Power

$V_{DS}=24V, I_{DS(DC)}=2600mA$



— 7.7[GHz] — 8.1[GHz] — 8.5[GHz]

● S-Parameter



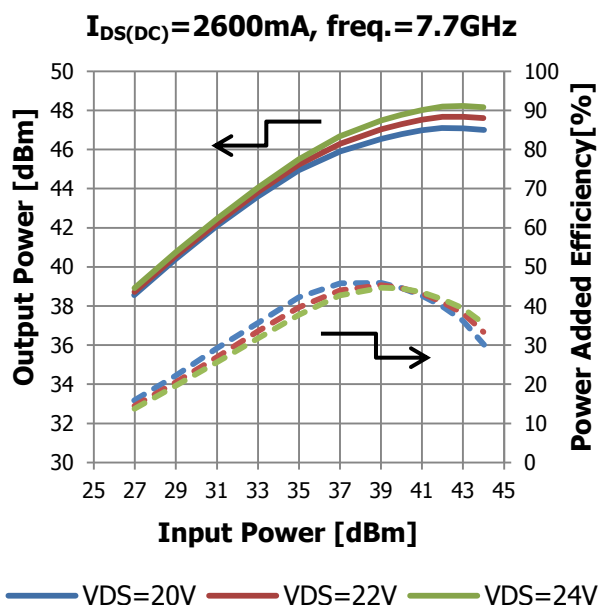
Bias Condition $V_{DS}=24V$, $I_{DS(DC)}=2.6A$

$R_g = 51\Omega$

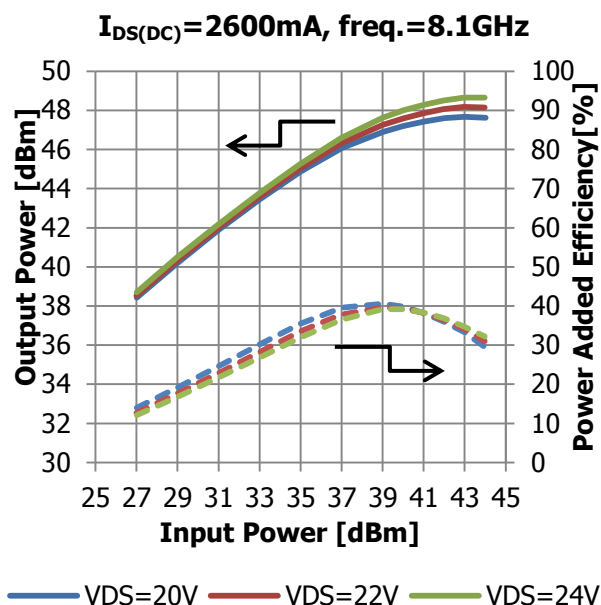
Freq.	S11		S21		S12		S22	
	mag	phase	mag	phase	mag	phase	mag	phase
7500MHz	0.737	-11.7	3.064	-86.5	0.073	-151.4	0.451	-31.4
7600MHz	0.697	-24.7	3.204	-98.5	0.077	-162.9	0.416	-31.6
7700MHz	0.643	-39.7	3.341	-111.2	0.082	-174.8	0.385	-29.9
7800MHz	0.572	-56.9	3.479	-125.1	0.086	172.1	0.364	-25.5
7900MHz	0.487	-78.1	3.590	-140.0	0.090	157.6	0.365	-18.6
8000MHz	0.391	-105.7	3.626	-155.8	0.092	142.5	0.395	-12.2
8100MHz	0.314	-142.7	3.584	-172.0	0.093	126.3	0.446	-9.9
8200MHz	0.301	173.1	3.464	171.8	0.090	109.7	0.510	-12.2
8300MHz	0.356	134.8	3.273	156.0	0.085	93.5	0.567	-17.8
8400MHz	0.439	107.2	3.021	141.0	0.079	78.2	0.615	-24.8
8500MHz	0.520	87.1	2.757	127.0	0.072	64.2	0.640	-32.5
8600MHz	0.591	71.3	2.515	114.1	0.065	50.7	0.645	-40.0
8700MHz	0.648	58.6	2.290	102.1	0.060	38.2	0.646	-48.5

- RF Characteristics—V_{DS} dependence

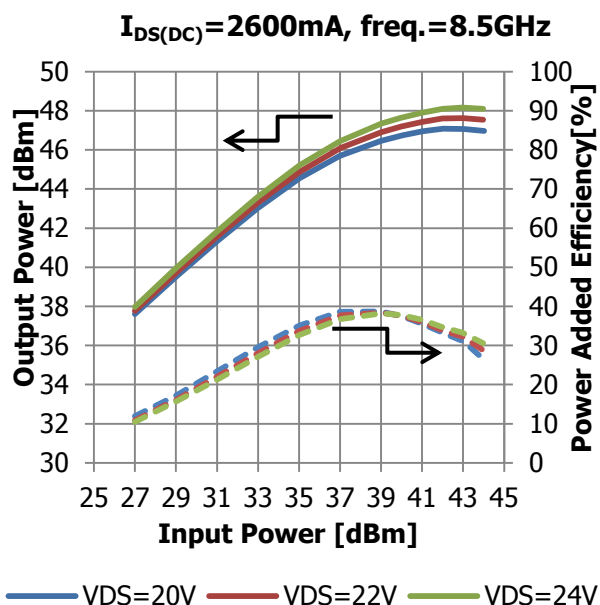
Input Power vs. Output Power and Power Added Efficiency



Input Power vs. Output Power and Power Added Efficiency



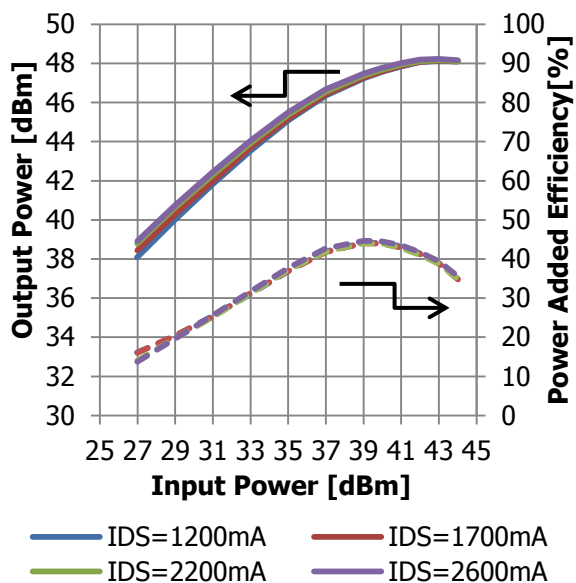
Input Power vs. Output Power and Power Added Efficiency



- RF Characteristics— $I_{DS}(DC)$ dependence

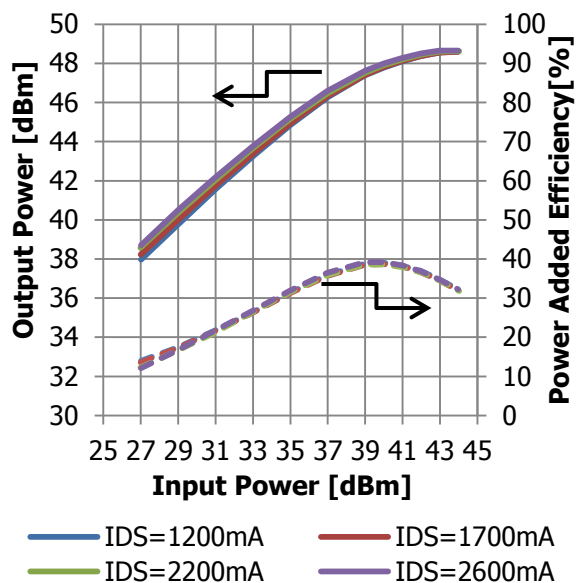
**Input Power vs. Output Power and
Power Added Efficiency**

$V_{DS}=24V$, freq.=7.7GHz



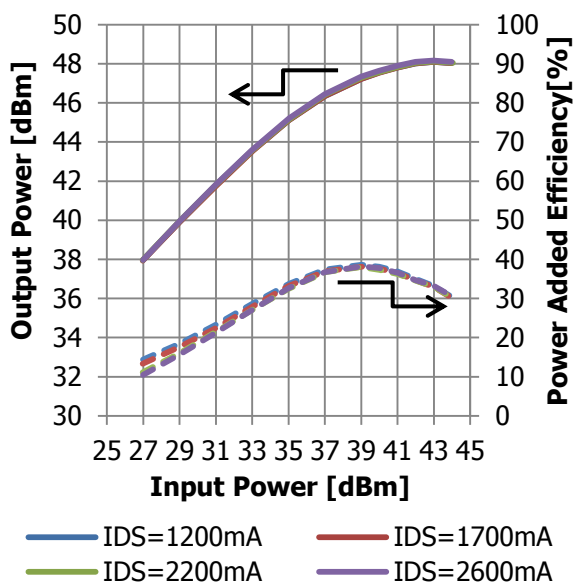
**Input Power vs. Output Power and
Power Added Efficiency**

$V_{DS}=24V$, freq.=8.1GHz

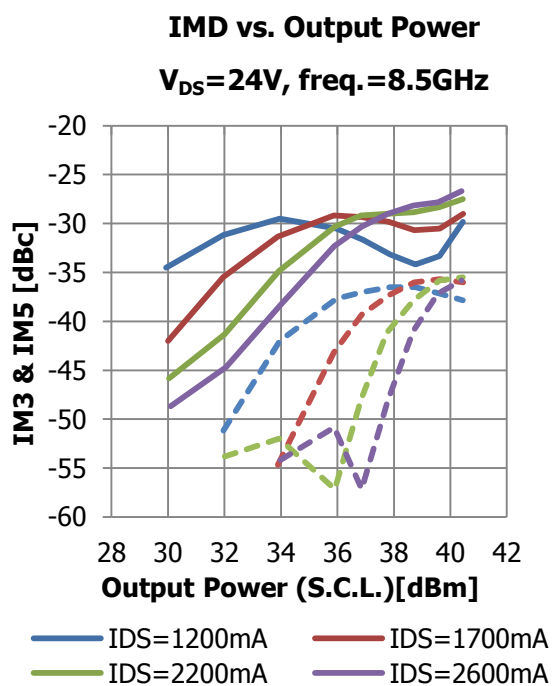
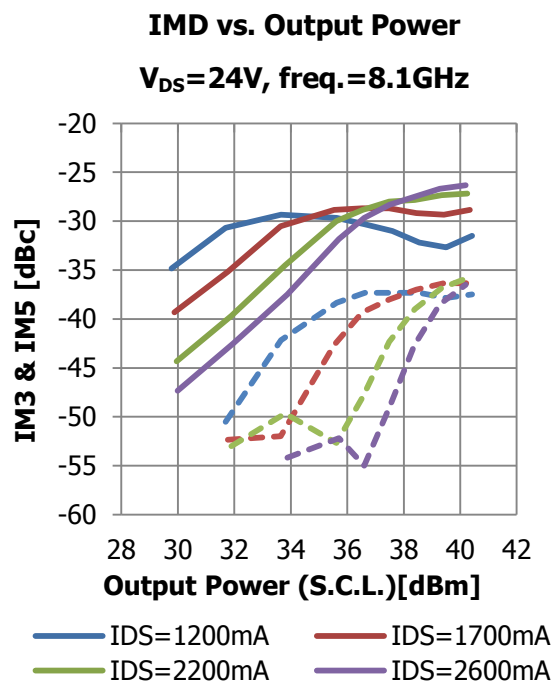
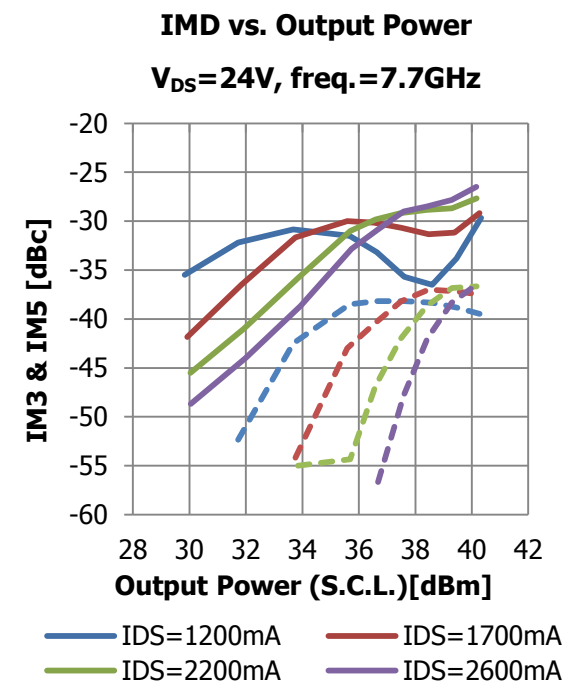


**Input Power vs. Output Power and
Power Added Efficiency**

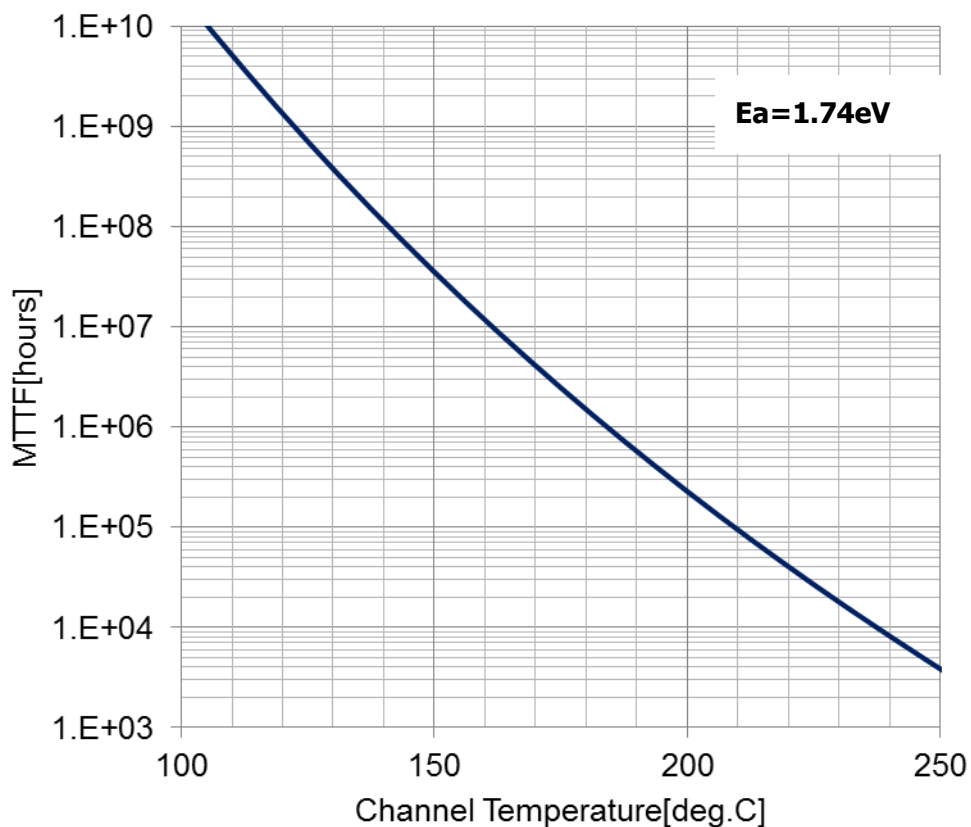
$V_{DS}=24V$, freq.=8.5GHz



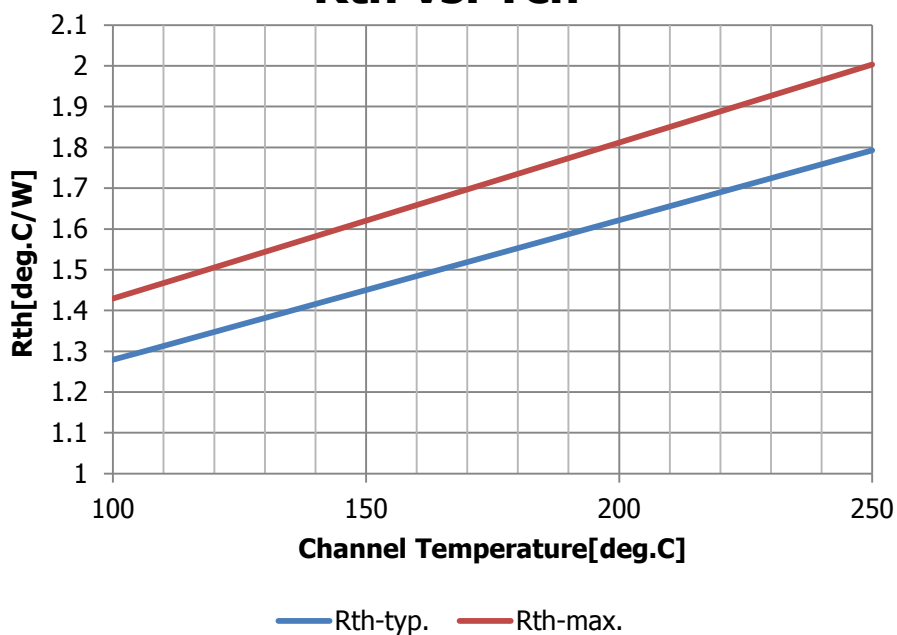
- RF Characteristics— $I_{DS}(DC)$ dependence



● **MTTF vs. Tch**

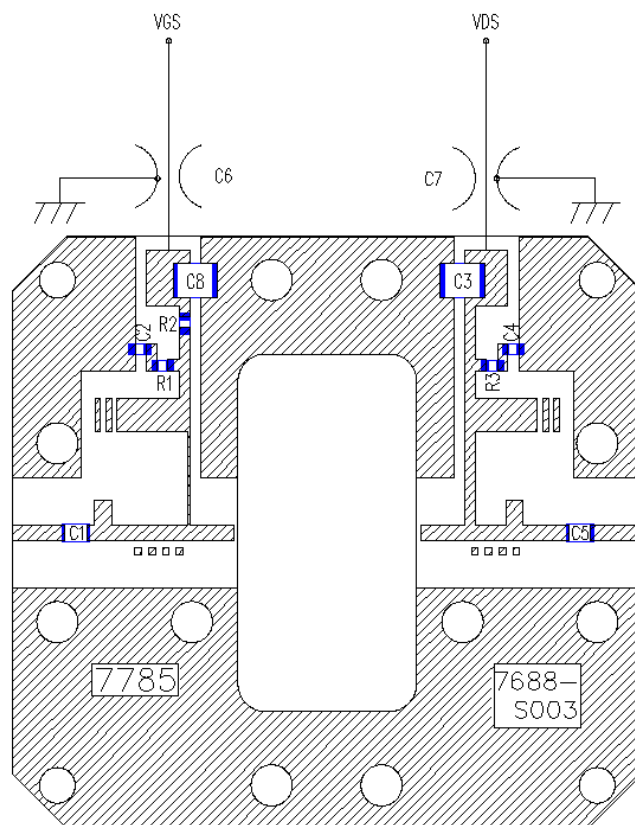


Rth vs. Tch



- **Amplifier Circuit Outline**

SGK7785-60A



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

Substrate : Rogers RO4003C

$$h=0.542\text{mm}, \epsilon_r=3.38$$

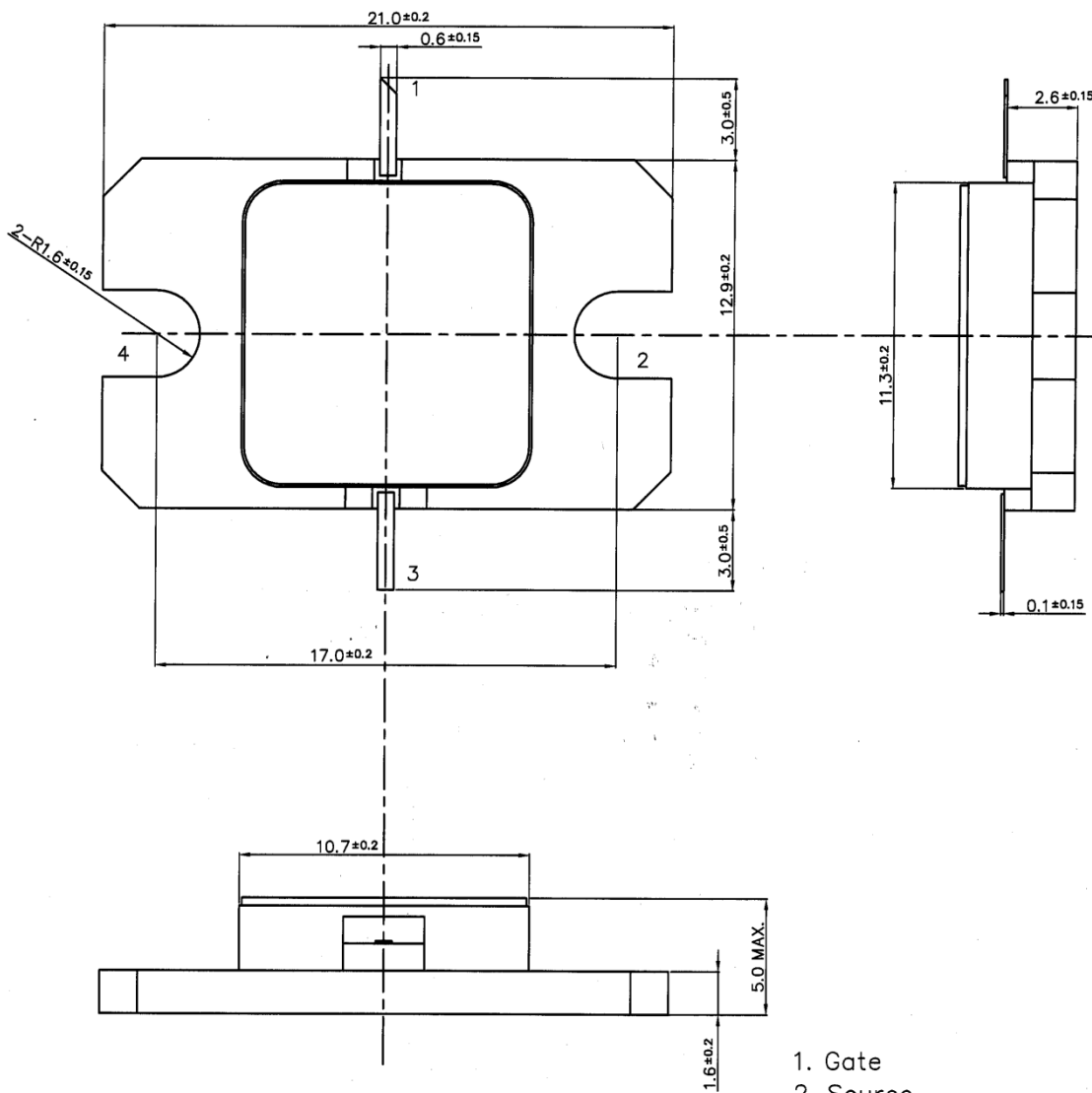
$C_u = 18 \mu m$

C1, C5 : ATC600F(size:0805), +/- 0.1pF

C6, C7 : EMI FILTER MARUWA(FTA352AR102S-S)

● Package Outline

Case Style : IBK



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