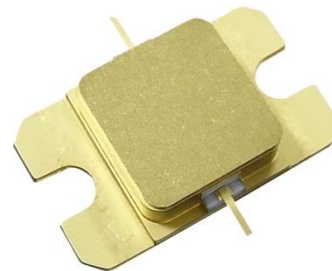


## ■ Features

- High Output Power: P5dB=48.0dBm (Typ.)
- High Linear 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	$V_{DS}$		$\leq 24$	V
Forward Gate Current	$I_{GF}$	$R_g=51\text{ohm}$	$\leq 12.2$	mA
Reverse Gate Current	$I_{GR}$	$R_g=51\text{ohm}$	$\geq -6.4$	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	$I_{DSS}$	$V_{DS}=10V, V_{GS}=0V$	-	13.0	-	A
Trans Conductance	$G_m$	$V_{DS}=24V, I_{DS}=2.6A$	-	6.0	-	S
Pinch-off Voltage	$V_P$	$V_{DS}=24V, I_{DS}=2.6mA$	-	-3.0	-	V
Output Power at 5dB G.C.P.	$P_{5dB}$	$V_{DS}=24V(\text{typ.})$ $I_{DS(DC)}=2.6A(\text{typ.})$ $f=7.7 \text{ to } 8.5 \text{ GHz}$ $V_{gs}=\text{constant}$	47.0	48.0	-	dBm
Linear Gain at Pin=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	$\Delta G$		-	-	1.6	dB
3rd Order Inter Modulation Distortion	$IM_3$	$f=7.7\text{GHz}, 8.5\text{GHz}$ $\Delta f=10\text{MHz}, 2\text{-tone Test}$ $P_{out}=32.0\text{dBm (S.C.L.)}$	-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	$\Delta T_{ch}$	$(V_{DS} \times I_{DSR} - P_{out} + P_{in}) \times R_{th}$	-	110	150	deg.C

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

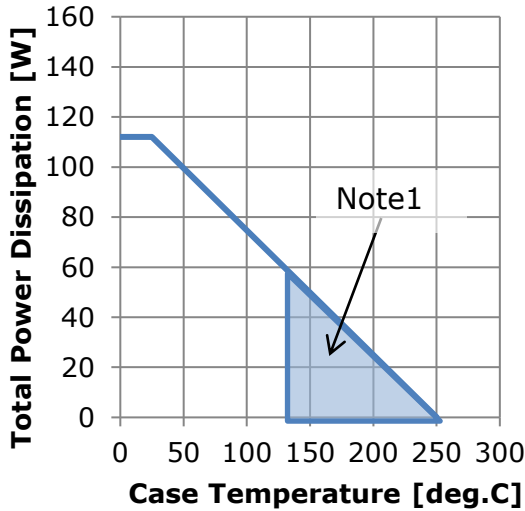
CASE STYLE	IBK
RoHS Compliance	YES
ESD	Class 1C

1000V to < 2000V

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

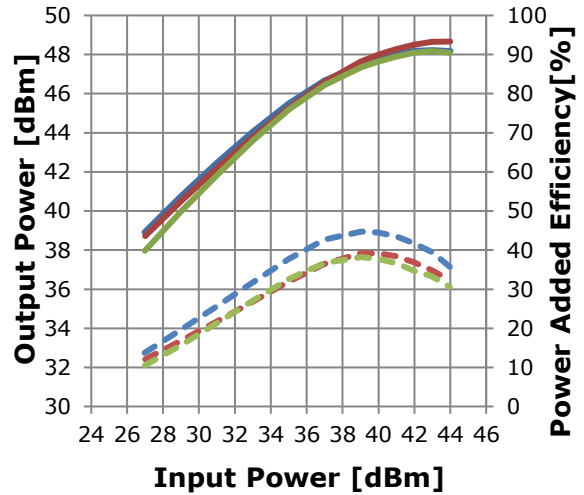
# ● RF Characteristics

**Power Derating Curve**

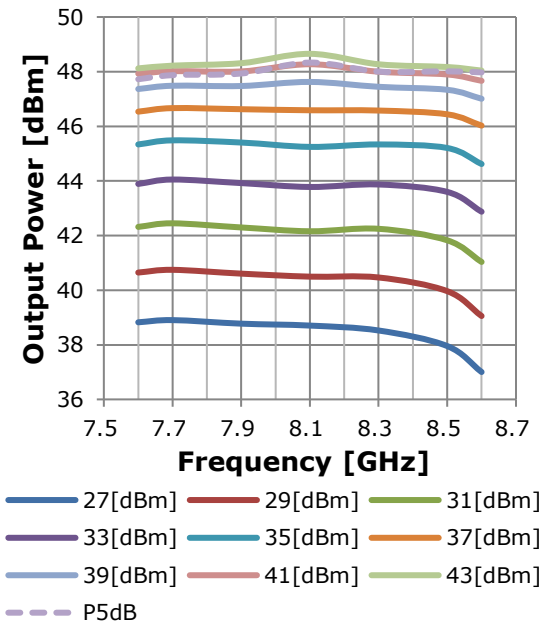


Note 1: Shaded area exceeds Maximum Case Temperature (See Page1)

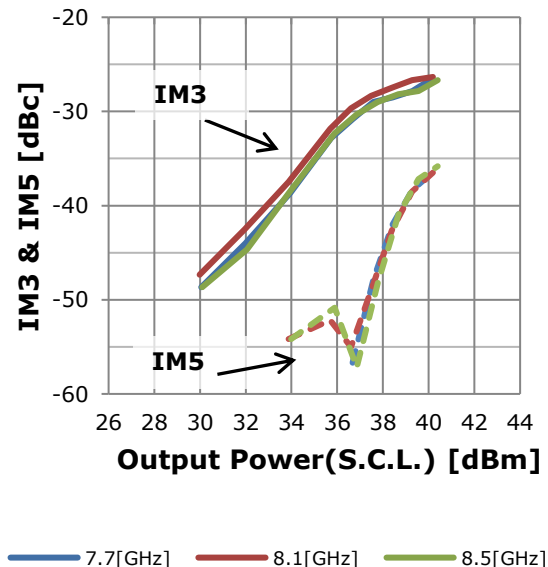
**Input Power vs. Output Power and Power Added Efficiency**  
**VDS=24V, IDS(DC)=2600mA**



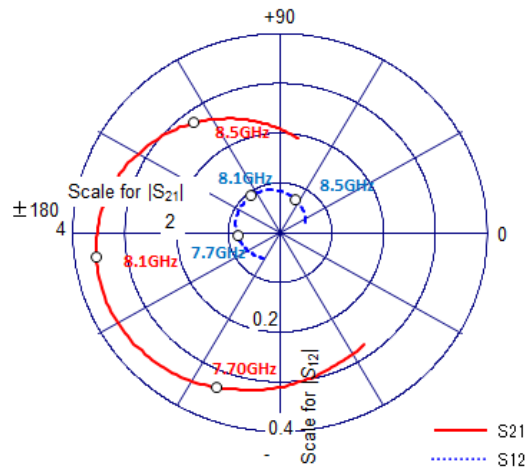
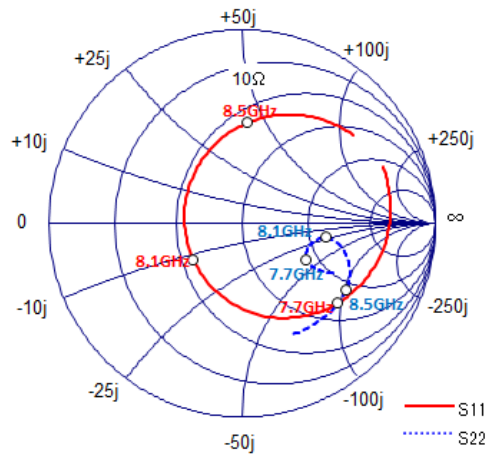
**Output Power vs. Frequency**  
**VDS=24V, IDS(DC)=2600mA**



**IMD vs. Output Power**  
**VDS=24V, IDS(DC) =2600mA**



● **S-Parameter**

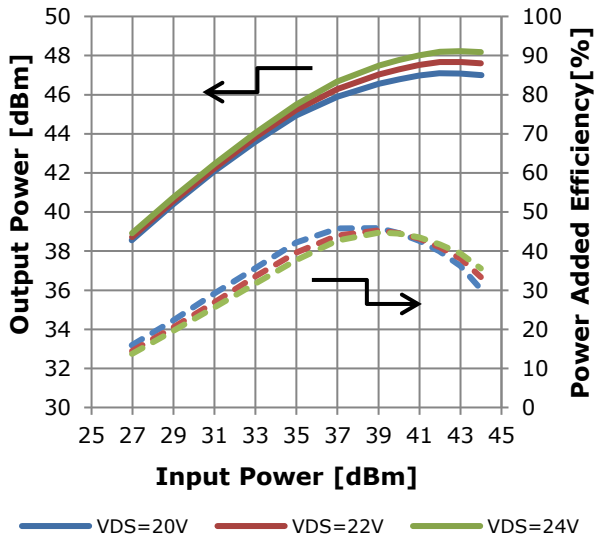


Bias Condition VDS=24V, IDS(DC)=2.6A  
Rg = 51ohm

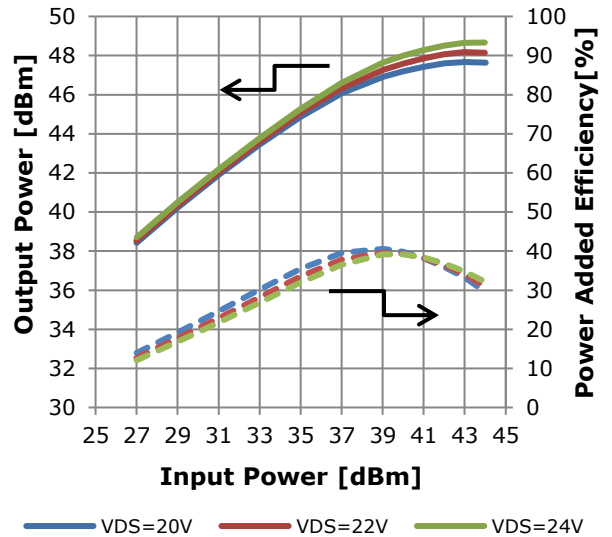
Freq.	S11		S21		S12		S22	
	mag	phase	mag	phase	mag	phase	mag	phase
7500MHz	0.737	-11.7	3.064	-86.5	0.073	-151.4	0.451	-31.4
7600MHz	0.697	-24.7	3.204	-98.5	0.077	-162.9	0.416	-31.6
7700MHz	0.643	-39.7	3.341	-111.2	0.082	-174.8	0.385	-29.9
7800MHz	0.572	-56.9	3.479	-125.1	0.086	172.1	0.364	-25.5
7900MHz	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 - VDS dependence

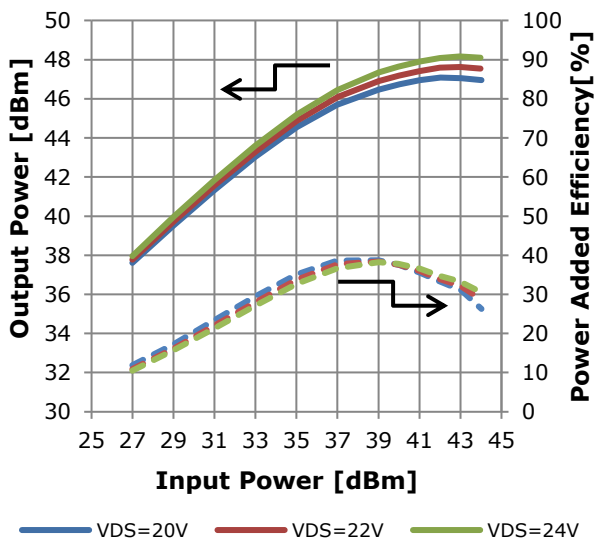
**Input Power vs. Output Power and Power Added Efficiency**  
 $I_{DS}(DC)=2600mA$ , freq.=7.7GHz



**Input Power vs. Output Power and Power Added Efficiency**  
 $I_{DS}(DC)=2600mA$ , freq.=8.1GHz

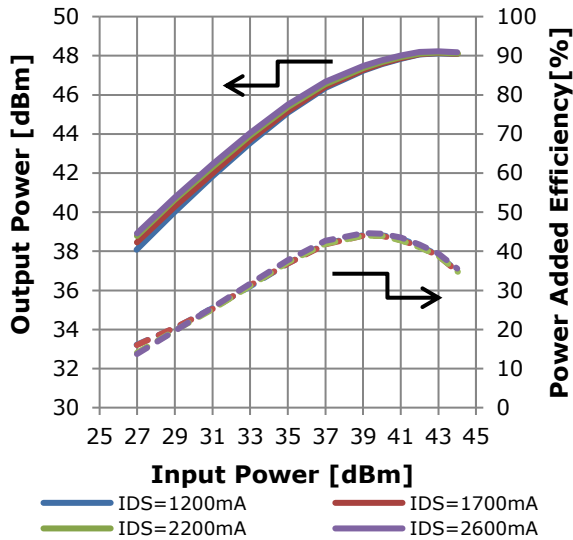


**Input Power vs. Output Power and Power Added Efficiency**  
 $I_{DS}(DC)=2600mA$ , freq.=8.5GHz

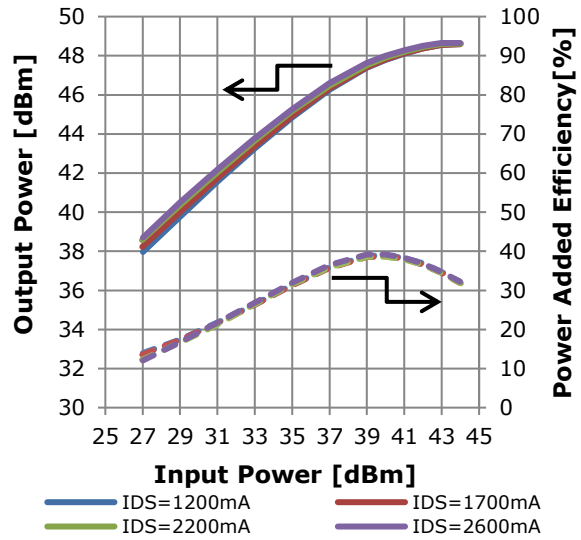


● RF Characteristics -  $I_{DS(DC)}$  dependence

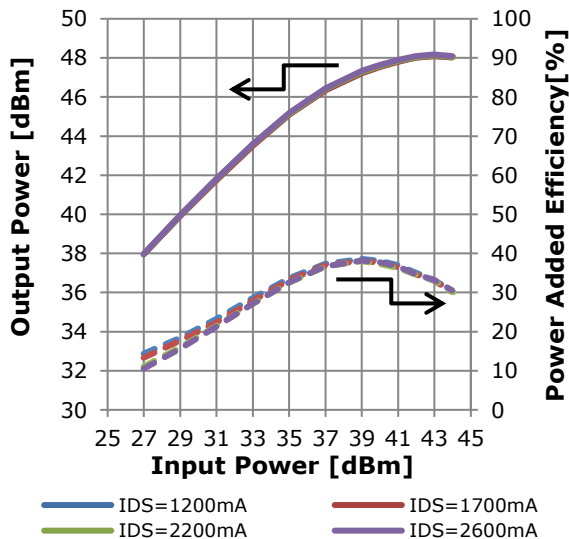
**Input Power vs. Output Power and Power Added Efficiency**  
 **$V_{DS}=24V$ , freq.=7.7GHz**



**Input Power vs. Output Power and Power Added Efficiency**  
 **$V_{DS}=24V$ , freq.=8.1GHz**

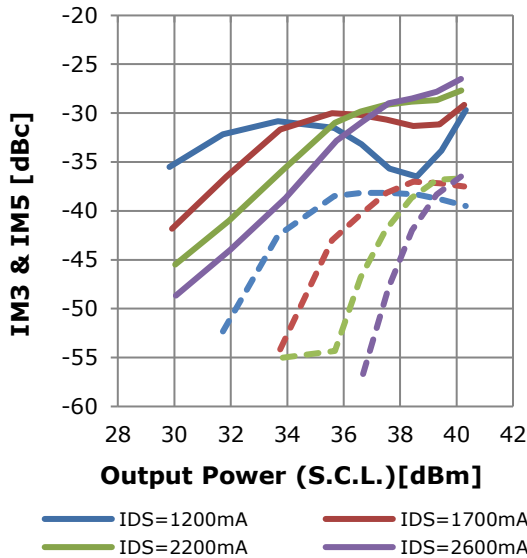


**Input Power vs. Output Power and Power Added Efficiency**  
 **$V_{DS}=24V$ , freq.=8.5GHz**

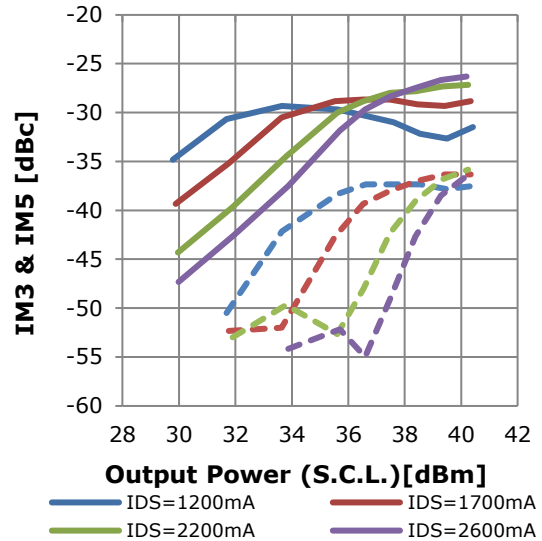


● RF Characteristics -  $I_{DS(DC)}$  dependence

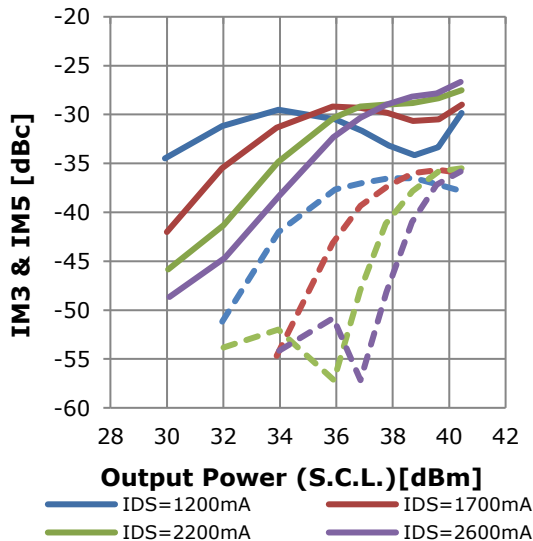
**IMD vs. Output Power**  
 **$V_{DS}=24V$ , freq.=7.7GHz**



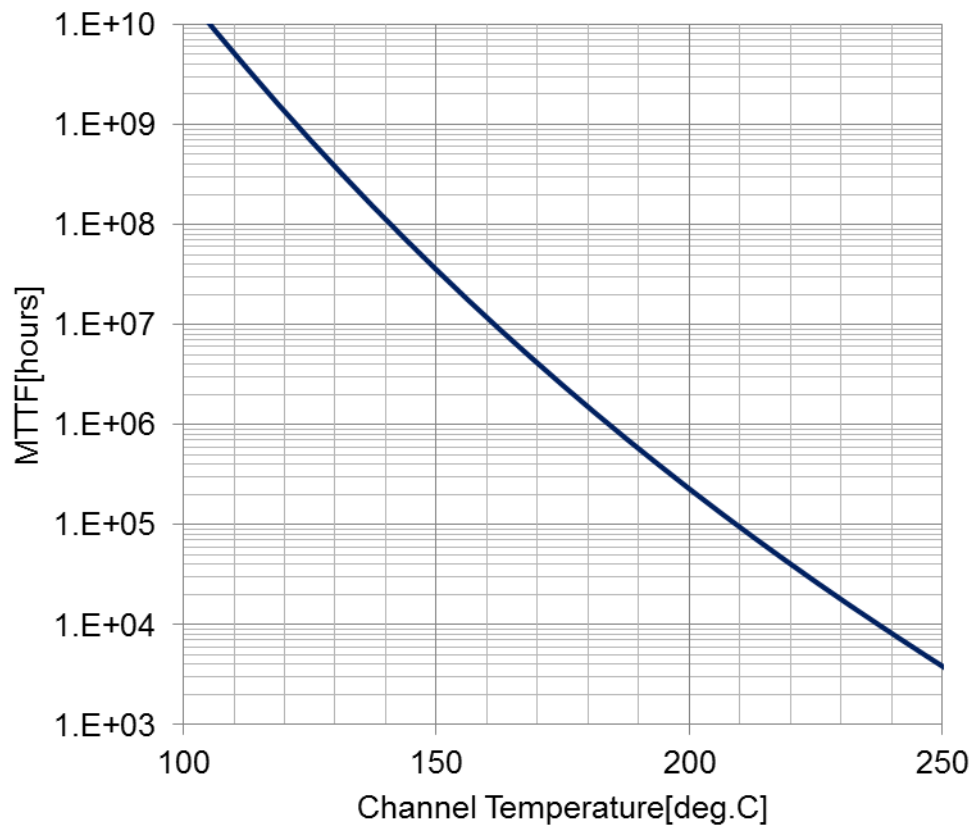
**IMD vs. Output Power**  
 **$V_{DS}=24V$ , freq.=8.1GHz**



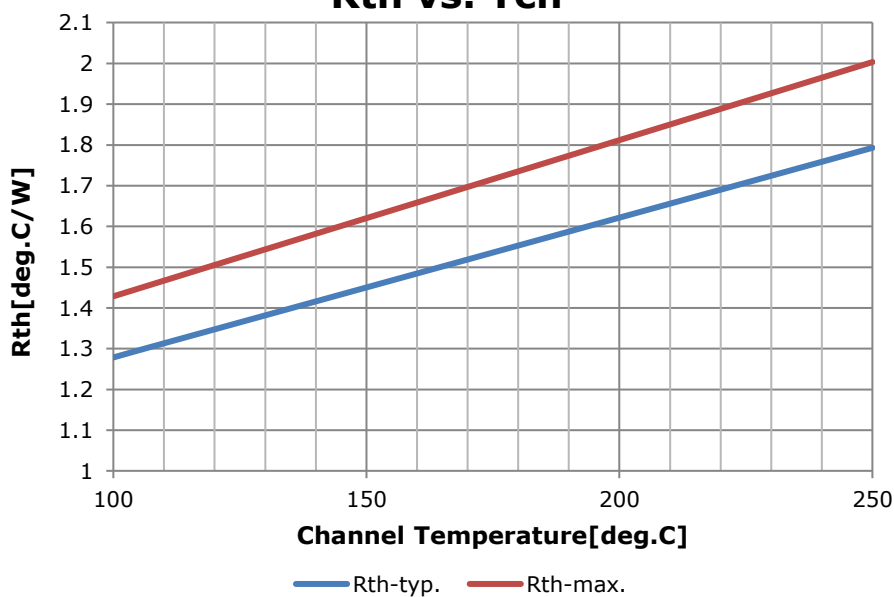
**IMD vs. Output Power**  
 **$V_{DS}=24V$ , freq.=8.5GHz**



● **MTTF vs. Tch**

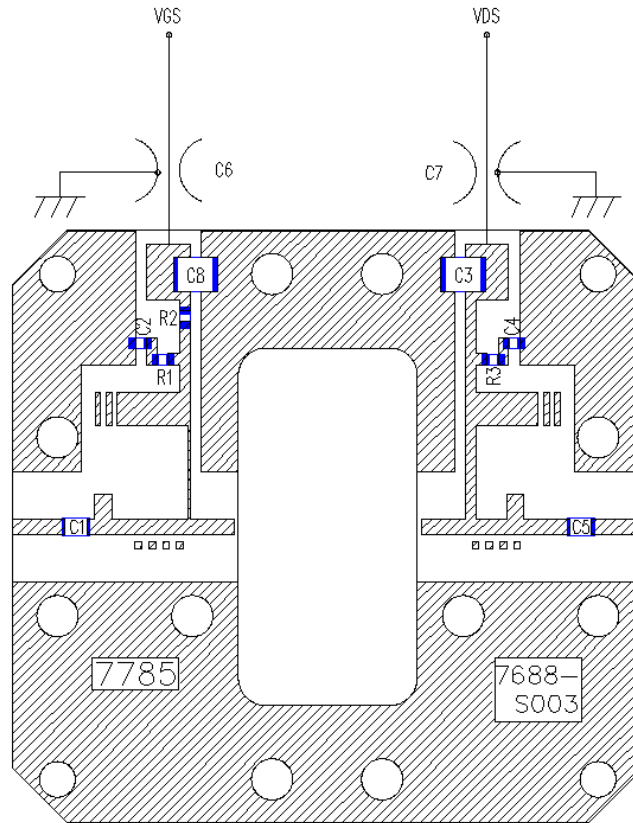


**Rth vs. Tch**



# ● 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=0.542mm,  $\epsilon_r=3.38$   
 Cu=18um

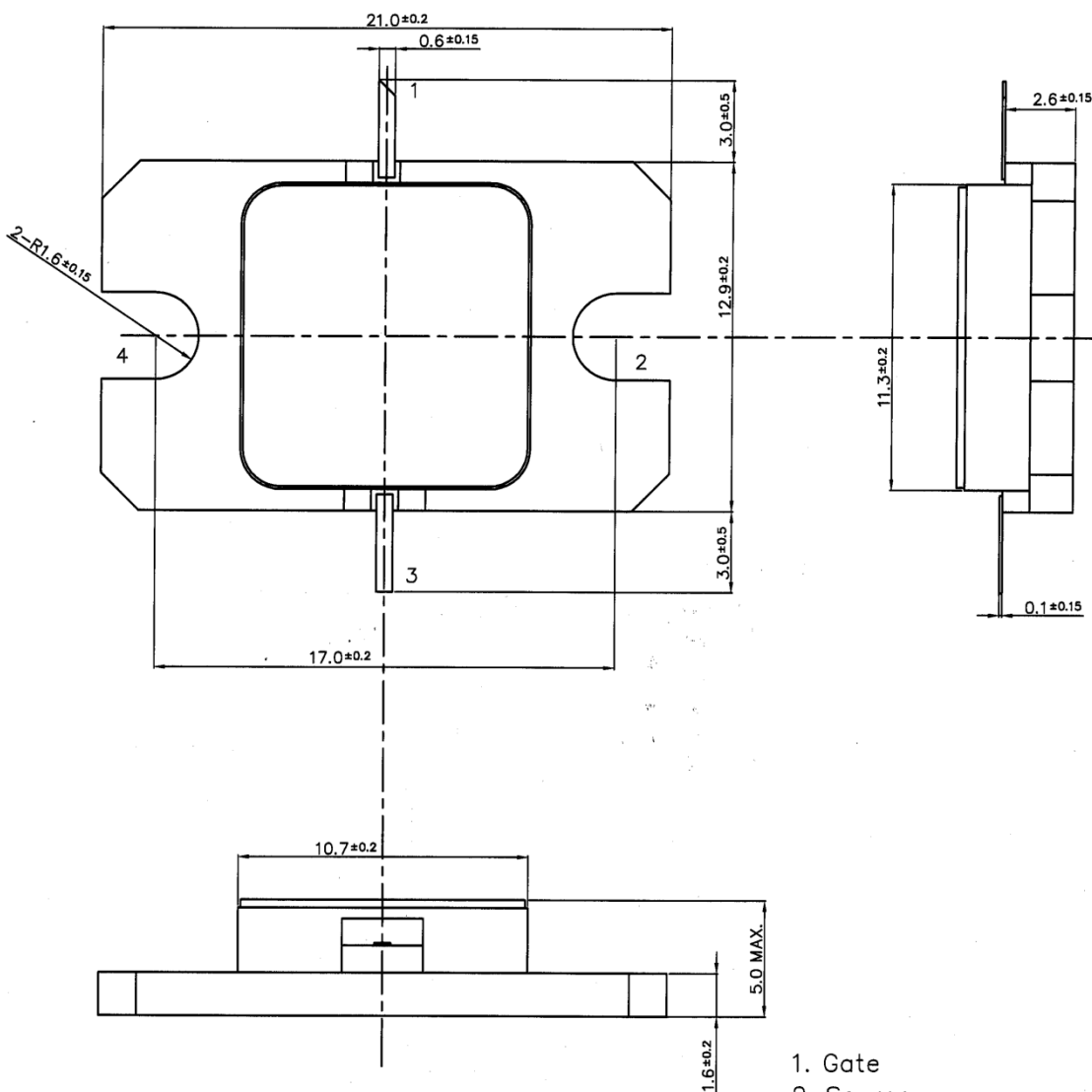
C1, C5 : ATC600F(size:0805), +/- 0.1pF  
 C6, C7 : EMI FILTER MARUWA(FTA352AR102S-S)





● **Package Outline**

**Case Style : IBK**



- 1. Gate
- 2. Source
- 3. Drain
- 4. Source

Unit: mm

Tolerance : ±0.15

## **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.

Any information, such as descriptions of a function and examples of application circuits, in this document are presented solely as a reference for the purpose to show examples of operations and uses of Sumitomo Electric semiconductor device(s); Sumitomo Electric does not warrant the proper operation of the device(s) with respect to its use based on such information. When the user develops equipment incorporating the device(s) based on such information, they must assume full responsibility arising out of using such information. Sumitomo Electric assumes no liability for any damages whatsoever arising out of the use of the information.

Any information in this document, including descriptions of function and schematic diagrams, shall not be construed as a license for the use or exercise of any intellectual property right, such as patent right or copyright, or any other right of Sumitomo Electric or any third party nor does Sumitomo Electric warrant non-infringement of any third-party's intellectual property right or other right by using such information. Sumitomo Electric assumes no liability for any infringement of the intellectual property rights or other rights of third parties which would result from the use of information contained herein.

The products described in this document are designed, developed and manufactured as contemplated for general use, including, without limitation, ordinary industrial use, general office use, personal use, and household use, but are not designed, developed and manufactured as contemplated (1) for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2) for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite). Please note that Sumitomo Electric will not be liable to the user and/or any third party for any claims or damages arising from the aforementioned uses of the products.

Any semiconductor devices have an inherent chance of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of excessive current levels and other abnormal operating conditions.

If any products described in this document represent goods or technologies subject to certain restrictions on export under the Foreign Exchange and Foreign Trade Law of Japan, the prior authorization of the Japanese government will be required for export of those products from Japan.

<http://www.sedi.co.jp/>

### **ATTENTION**

Information in this document is subject to change without notice.