

# 2SK2685

GaAs HEMT

# HITACHI

ADE-208-400A (Z)  
2nd. Edition  
Mar. 2001

## Application

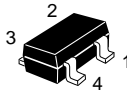
- UHF low noise amplifier

## Features

- Excellent low noise characteristics.  $F_{min} = 0.83\text{dB Typ (3V, 10mA, 2GHz)}$
- High associated gain.  $G_a = 17\text{ dB Typ (3V, 10mA, 2GHz)}$
- High voltage.  $V_{DS} = 6$  or more voltage.
- Small package. (CMPAK-4)

## Outline

CMPAK-4



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

Note: Marking is "ZT-".

Attention This device is very sensitive to electro static discharge. It is recommended to adopt appropriate cautions when handling this transistor.

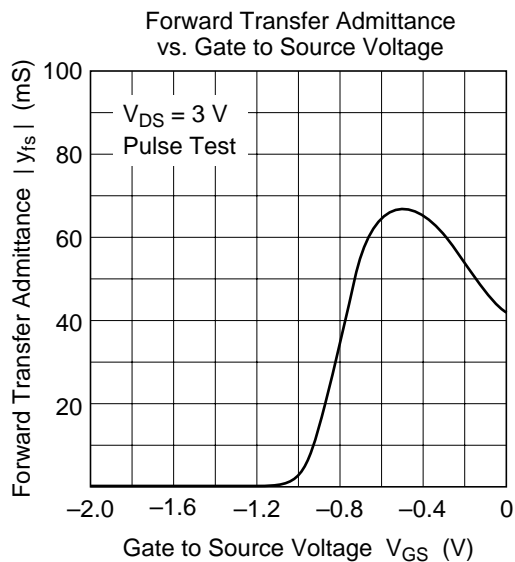
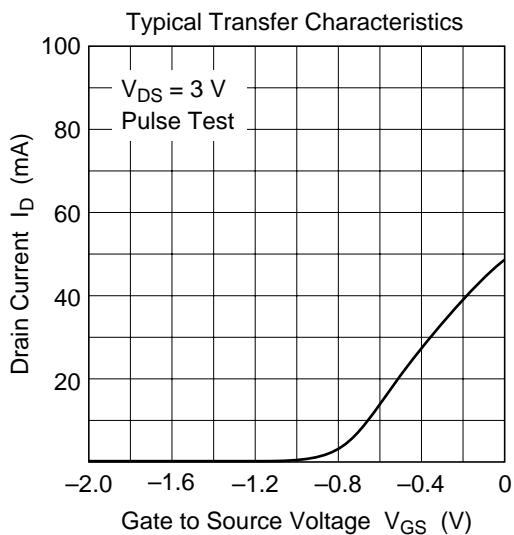
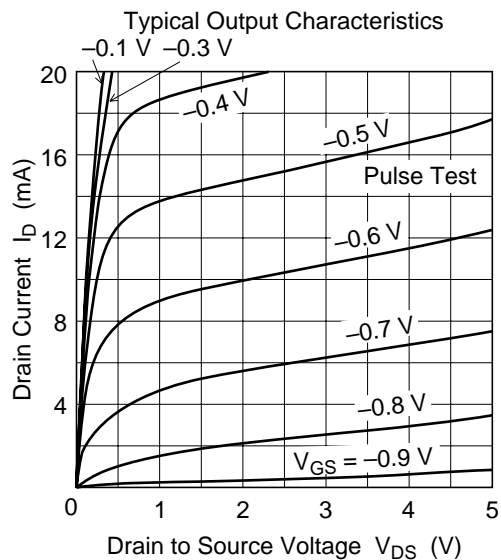
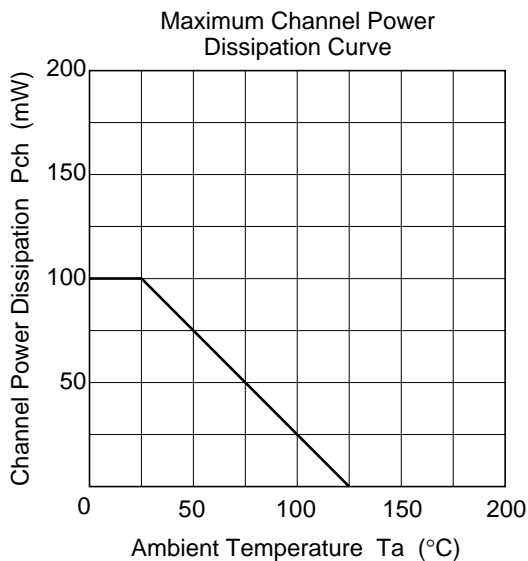
**Absolute Maximum Ratings** ( $T_a = 25^\circ\text{C}$ )

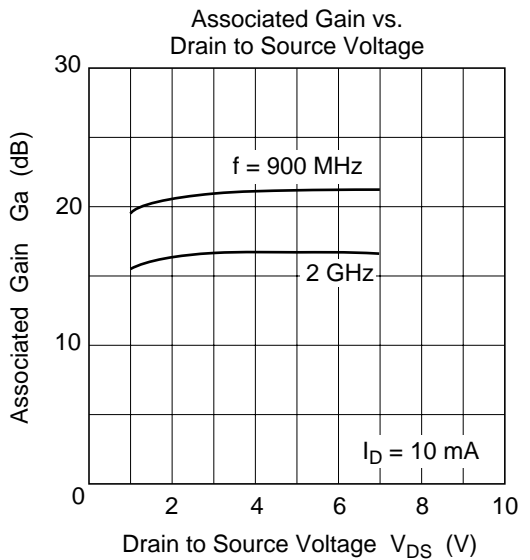
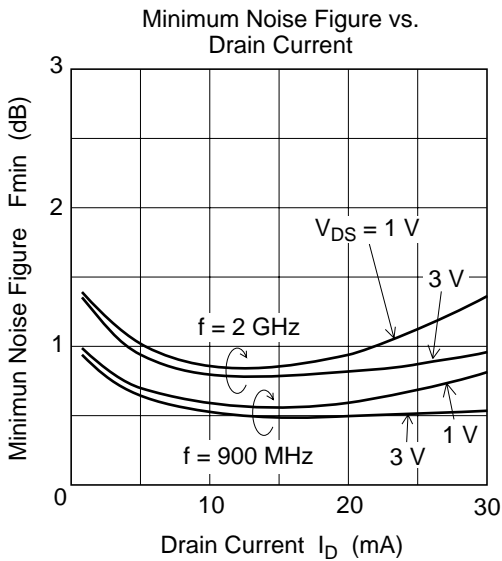
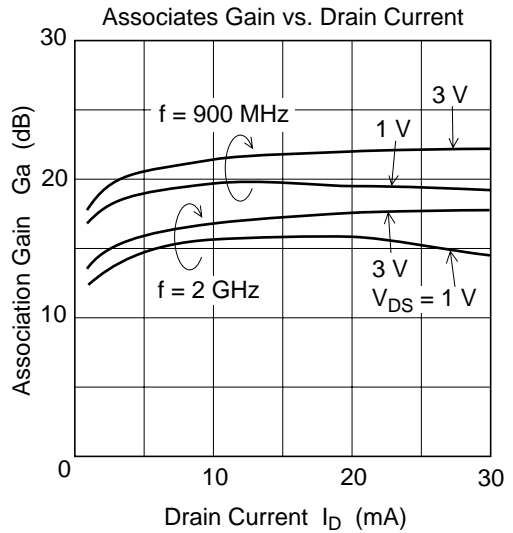
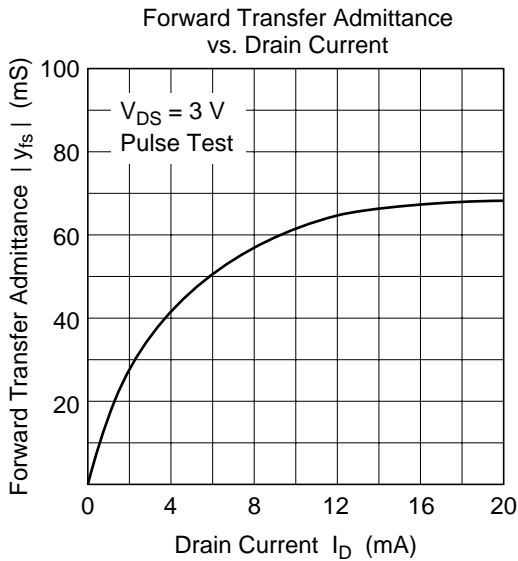
Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	6	V
Gate to source voltage	$V_{GSO}$	-6	V
Gate to drain voltage	$V_{GDO}$	-7	V
Drain current	$I_D$	20	mA
Channel Power dissipation	Pch	100	mW
Channel temperature	Tch	125	$^\circ\text{C}$
Storage temperature	Tstg	-55 to +125	$^\circ\text{C}$

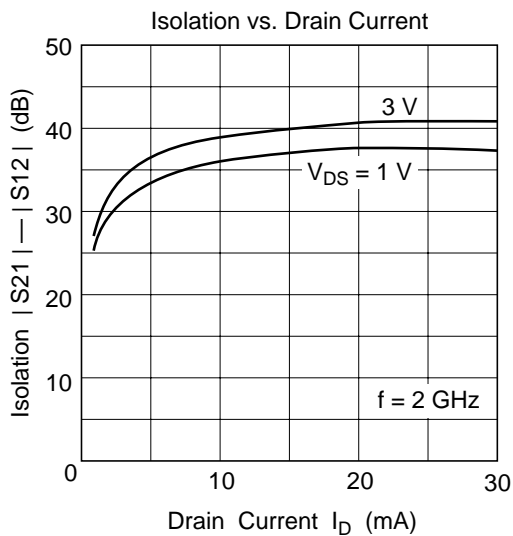
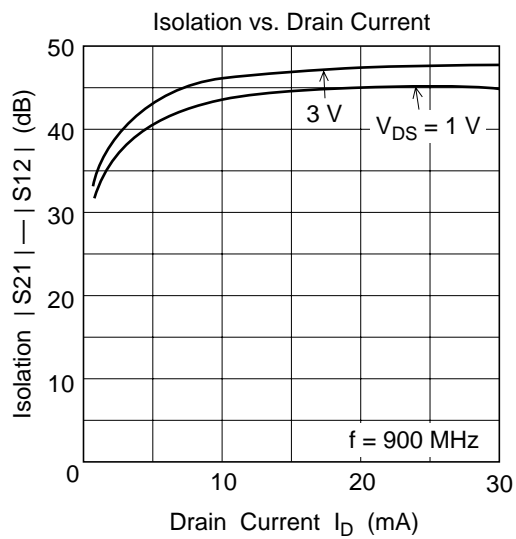
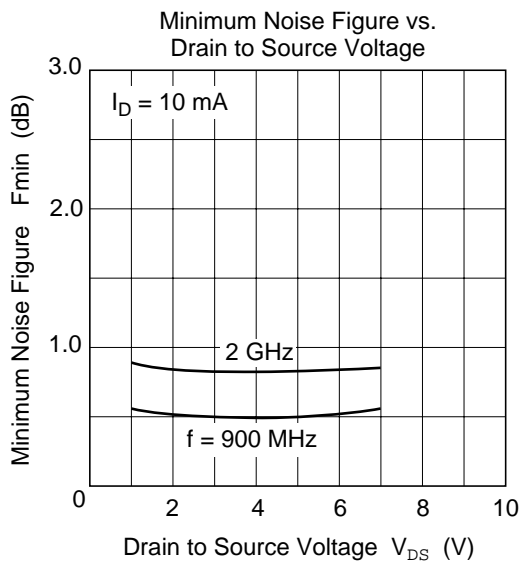
**Electrical Characteristics** ( $T_a = 25^\circ\text{C}$ )

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Gate to source leak current	$I_{GSS}$	—	—	-20	$\mu\text{A}$	$V_{GS} = -6\text{V}$ , $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	-0.3	—	-2.0	V	$V_{DS} = 3\text{V}$ , $I_D = 100\mu\text{A}$
Drain to source leak current	$I_{DSS}$	35	50	70	mA	$V_{DS} = 3\text{V}$ , $V_{GS} = 0$ , Pulse Test
Forward transfer admittance	$ y_{fs} $	40	60	—	mS	$V_{DS} = 3\text{V}$ , $I_D = 10\text{mA}$ , $f = 1\text{kHz}$
Associated gain	Ga	—	17.0	—	dB	$V_{DS} = 3\text{V}$ , $I_D = 10\text{mA}$ , $f = 2\text{GHz}$
Associated gain	Ga	—	15.2	—	dB	$V_{DS} = 3\text{V}$ , $I_D = 3\text{mA}$ , $f = 2\text{GHz}$
Associated gain	Ga	16	21.4	—	dB	$V_{DS} = 3\text{V}$ , $I_D = 10\text{mA}$ , $f = 900\text{MHz}$
Associated gain	Ga	—	19.7	—	dB	$V_{DS} = 3\text{V}$ , $I_D = 3\text{mA}$ , $f = 900\text{MHz}$
Minimum noise figure	Fmin	—	0.83	—	dB	$V_{DS} = 3\text{V}$ , $I_D = 10\text{mA}$ , $f = 2\text{GHz}$
Minimum noise figure	Fmin	—	1.08	—	dB	$V_{DS} = 3\text{V}$ , $I_D = 3\text{mA}$ , $f = 2\text{GHz}$
Minimum noise figure	Fmin	—	0.52	1.0	dB	$V_{DS} = 3\text{V}$ , $I_D = 10\text{mA}$ , $f = 900\text{MHz}$
Minimum noise figure	Fmin	—	0.74	—	dB	$V_{DS} = 3\text{V}$ , $I_D = 3\text{mA}$ , $f = 900\text{MHz}$

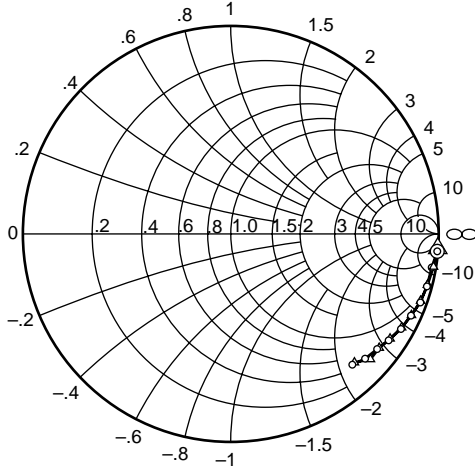
## Main Characteristics





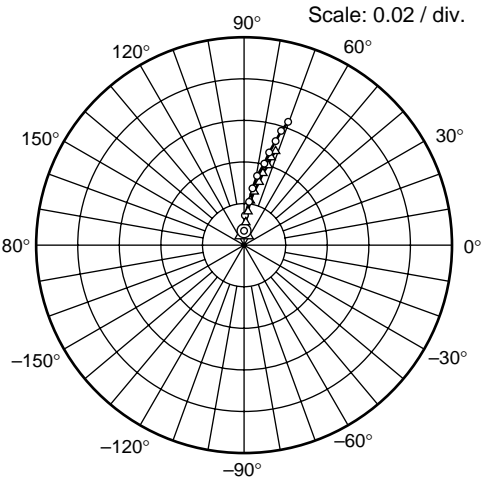


S11 Parameter vs. Frequency



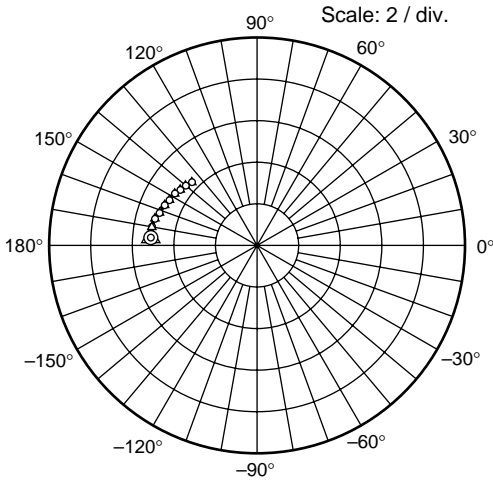
Condition:  $I_D = 10 \text{ mA}$ ,  $Z_o = 50 \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $V_{DS} = 1 \text{ V}$ )  
 △ — △ ( $V_{DS} = 3 \text{ V}$ )

S12 Parameter vs. Frequency



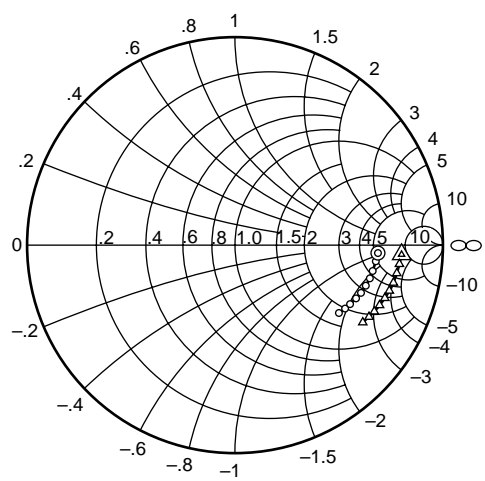
Scale: 0.02 / div.  
 Condition:  $I_D = 10 \text{ mA}$ ,  $Z_o = 50 \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $V_{DS} = 1 \text{ V}$ )  
 △ — △ ( $V_{DS} = 3 \text{ V}$ )

S21 Parameter vs. Frequency



Scale: 2 / div.  
 Condition:  $I_D = 10 \text{ mA}$ ,  $Z_o = 50 \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $V_{DS} = 1 \text{ V}$ )  
 △ — △ ( $V_{DS} = 3 \text{ V}$ )

S22 Parameter vs. Frequency



Condition:  $I_D = 10 \text{ mA}$ ,  $Z_o = 50 \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $V_{DS} = 1 \text{ V}$ )  
 △ — △ ( $V_{DS} = 3 \text{ V}$ )

**S Parameter** ( $V_{DS} = 1V$ ,  $I_D = 10mA$ ,  $Z_O = 50\Omega$ )

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.996	-4.8	5.12	175.8	0.00691	89.8	0.688	-3.2
400	0.980	-9.5	5.13	169.9	0.0143	88.2	0.682	-6.5
600	0.977	-15.0	5.07	165.4	0.0210	83.3	0.674	-10.6
800	0.970	-19.9	4.94	161.6	0.0276	81.5	0.668	-13.8
1000	0.952	-24.4	4.84	156.5	0.0399	79.3	0.658	-17.2
1200	0.938	-29.2	4.74	152.7	0.0404	76.0	0.648	-20.7
1400	0.916	-34.0	4.67	147.7	0.0462	74.8	0.636	-23.7
1600	0.896	-38.2	4.55	144.1	0.0523	73.1	0.622	-27.1
1800	0.882	-42.9	4.47	140.0	0.0578	72.0	0.611	-29.9
2000	0.859	-47.1	4.36	135.8	0.0630	70.3	0.597	-33.1

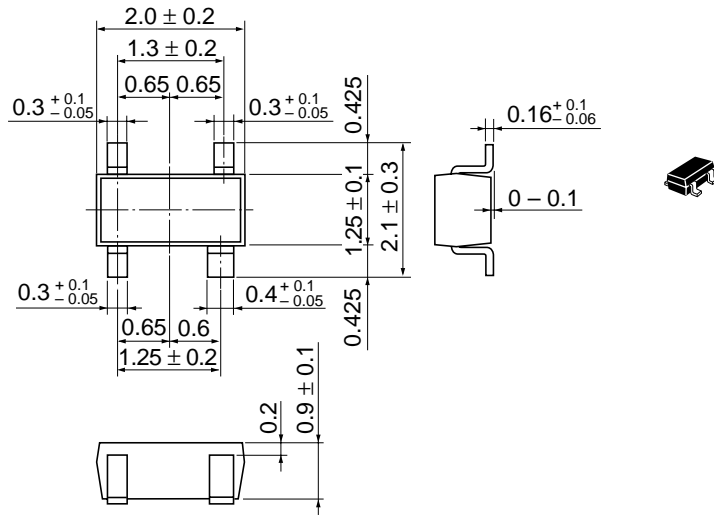
**S Parameter** ( $V_{DS} = 3V$ ,  $I_D = 10mA$ ,  $Z_O = 50\Omega$ )

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.998	-4.0	5.13	175.8	0.00581	89.8	0.802	-3.2
400	0.988	-9.2	5.14	170.1	0.0110	85.5	0.796	-6.5
600	0.978	-14.5	5.08	165.2	0.0163	83.3	0.790	-9.8
800	0.968	-19.4	4.95	161.4	0.0216	82.0	0.783	-13.3
1000	0.953	-24.2	4.85	156.4	0.0363	79.2	0.774	-16.4
1200	0.937	-28.7	4.75	152.5	0.0312	76.5	0.764	-19.4
1400	0.917	-33.3	4.68	147.8	0.0358	75.3	0.753	-22.5
1600	0.900	-37.5	4.57	144.0	0.0401	73.2	0.742	-25.4
1800	0.883	-41.9	4.49	140.1	0.0442	72.8	0.731	-28.1
2000	0.858	-46.1	4.37	135.9	0.0477	71.4	0.718	-31.1

Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	CMPAK-4(T)
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.006 g



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