GaAs FET   CF 739

Data Sheet

- N-channel dual-gate GaAs MESFET
- Depletion mode transistor for tuned small-signal applications up to 2 GHz, e.g. VHF, UHF, Sat-TV tuners
- Low noise
- High gain
- Low input capacitance

ESD: **E**lectro**s**tatic **d**ischarge sensitive device, observe handling precautions!
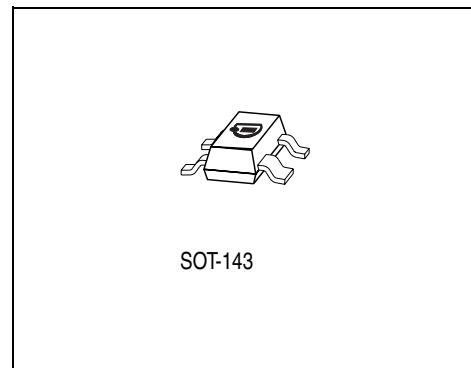
SOT-143

Type	Marking	Ordering Code	Pin Configuration				Package
			1	**2**	**3**	**4**	
CF 739	MSs	Q62702-F1215	S	D	G2	G1	P-SOT143-4-1

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	10	V
Gate1-source voltage	$-V_{G1S}$	6	V
Gate2-source voltage	$-V_{G2S}$	6	V
Drain current	I_D	80	mA
Gate1-source peak current	$+I_{G1SM}$	1	mA
Gate2-source peak current	$+I_{G2SM}$	1	mA
Total power dissipat. ($T_S \leq 66\ °C$)	P_{tot}	240	mW
Channel temperature	T_{Ch}	150	°C
Storage temperature	T_{stg}	$-55 \ldots +150$	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Channel-soldering point[1]	R_{thChS}	≤ 350	K/W

[1] T_S is measured on the collector lead at the soldering point to the pcb.

Electrical Characteristics

$T_A = 25\ °C$, unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
DC Characteristics						
Drain-Source Break-down Voltage	$V_{(BR)DS}$	10	–	–	V	$I_D = 100\ \mu A$, $-V_{G1S} = -V_{G2S} = 4\ V$
Gate 1 leakage current	$-I_{G1SS}$	–	–	20	µA	$-V_{G1S} = 5\ V$; $V_{G2S} = V_{DS} = 0$
Gate 2 leakage current	$-I_{G2SS}$	–	–	20	µA	$-V_{G2S} = 5\ V$; $V_{G1S} = V_{DS} = 0$
Drain Current	I_{DSS}	6	–	60	mA	$V_{G1S} = 0$, $V_{G2S} = 0$, $V_{DS} = 3\ V$
Gate 1-source pinch-off voltage	$-V_{G1S(P)}$	–	–	2.5	V	$V_{G2S} = 0$, $V_{DS} = 5\ V$, $I_D = 200\ \mu A$
Gate 2-source pinch-off voltage	$-V_{G2S(P)}$	–	–	2.5	V	$V_{G1S} = 0$, $V_{DS} = 5\ V$, $I_D = 200\ \mu A$

Electrical Characteristics (cont'd)

T_A = 25 °C, unless otherwise specified

| Parameter	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
AC Characteristics						
Forward transconductance	g_{FS}	–	25	–	mS	V_{DS} = 5 V, V_{G2S} = 2 V, I_D = 10 mA, f = 1 kHz
Gate 1 input capacitance	C_{GFSS}	–	0.95	–	pF	V_{G2S} = 2 V, V_{DS} = 5 V, I_D = 10 mA, f = 1 MHz
Output capacitance	C_{DSS}	–	0.5	–	pF	V_{G2S} = 2 V, V_{DS} = 5 V, I_D = 10 mA, f = 1 MHz
Noise figure f = 1.75 GHz f = 800 MHz	F	– –	1.8 1.1	– –	dB	V_{G2S} = 2 V, V_{DS} = 5 V, I_D = 10 mA
Power gain f = 1.75 GHz f = 800 MHz	G_{PS}	– –	17 22	– –	dB	V_{G2S} = 2 V, V_{DS} = 5 V, I_D = 10 mA
Control range	ΔG_{PSC}	–	50	–	dB	V_{G2S} = 2 V … – 3 V

Common Source Emitter S-Parameters

G2 RF-grounded, $V_{DS} = 5$ V, $V_{G2S} = 2$ V, $I_D = 10$ mA, $Z_0 = 50$ Ω

| f	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.06	0.999	− 2.4	3.21	176.9	0.001	81.8	0.963	− 1
0.08	0.998	− 3.2	3.21	175.5	0.001	85.8	0.963	− 1.4
0.1	0.998	− 4.1	3.21	174.3	0.001	90.8	0.962	− 1.7
0.15	0.997	− 6	3.22	171.4	0.002	84.2	0.962	− 2.5
0.2	0.993	− 8	3.22	168.4	0.002	88.1	0.962	− 3.4
0.25	0.989	− 10.1	3.21	165.5	0.003	84.4	0.962	− 4.3
0.3	0.987	− 12.1	3.21	162.5	0.003	83.3	0.962	− 5.2
0.4	0.975	− 16	3.18	156.6	0.004	79.6	0.961	− 6.8
0.5	0.965	− 19.9	3.15	150.7	0.005	78.6	0.96	− 8.5
0.6	0.951	− 23.8	3.12	145	0.006	78	0.96	− 10.3
0.7	0.935	− 27.5	3.09	139.3	0.007	76.6	0.961	− 12
0.8	0.918	− 31.4	3.05	134	0.008	73.3	0.958	− 13.7
0.9	0.9	− 35.2	3.03	128.5	0.009	70.4	0.956	− 15.4
1	0.877	− 39	3.02	122.9	0.009	69.5	0.955	− 17
1.2	0.883	− 46.6	2.96	111.4	0.01	66.4	0.953	− 20.6
1.4	0.773	− 53.7	2.85	99.7	0.011	59.9	0.949	− 24.3
1.5	0.744	− 56.8	2.77	94.4	0.012	59.9	0.949	− 26.2
1.6	0.72	− 60.1	2.74	89.2	0.012	57.5	0.949	− 27.9
1.8	0.666	− 66.2	2.64	78.9	0.012	54.1	0.948	− 31.5
2	0.614	− 72.8	2.59	68.6	0.012	49.2	0.945	− 35.3
2.2	0.556	− 80.3	2.53	57.4	0.012	43.7	0.941	− 39.4
2.4	0.497	− 87.2	2.45	45.6	0.01	39.4	0.937	− 44.4
2.5	0.466	− 90.2	2.38	40	0.009	35.2	0.936	− 47
2.6	0.449	− 92.8	2.34	34.5	0.008	32.2	0.936	− 49.6
2.8	0.408	− 97.1	2.24	23.6	0.005	25.1	0.937	− 54.6
3	0.375	− 101.7	2.17	12.2	0.002	− 25	0.934	− 59.1

Total Power Dissipation

$P_{tot} = f(T_A{}^{1)}, T_S)$;


Output Characteristics

$I_D = f(V_{DS})$; $V_{G2S} = 2$ V

Gate 1 Forward Transconductance

$g_{FS1} = f(V_{G1S})$; $V_{DS} = 5$ V, $f = 1$ kHz
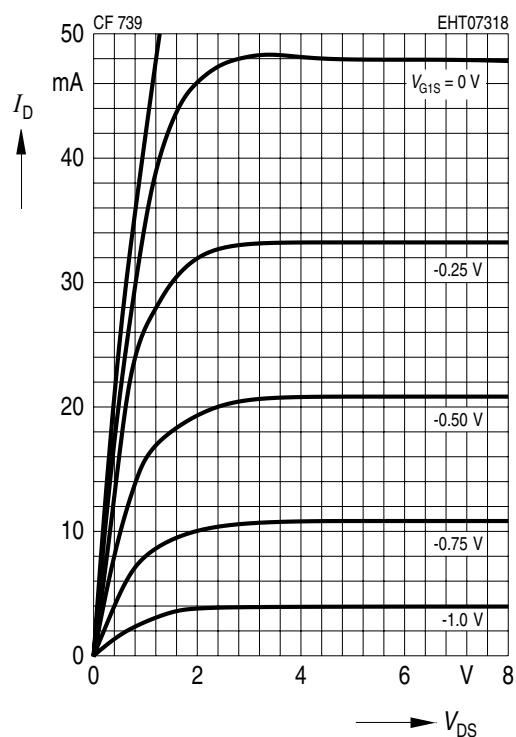
Gate 1 Forward Transconductance

$g_{FS1} = f(V_{G2S})$; $V_{DS} = 5$ V, $f = 1$ kHz

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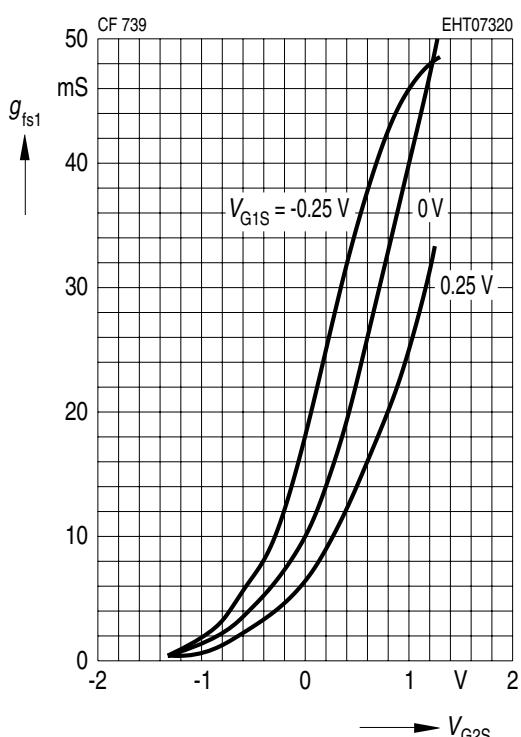
[1] Package mounted on pcb.

Drain Current

$I_D = f(V_{G1S})$; $V_{DS} = 5$ V
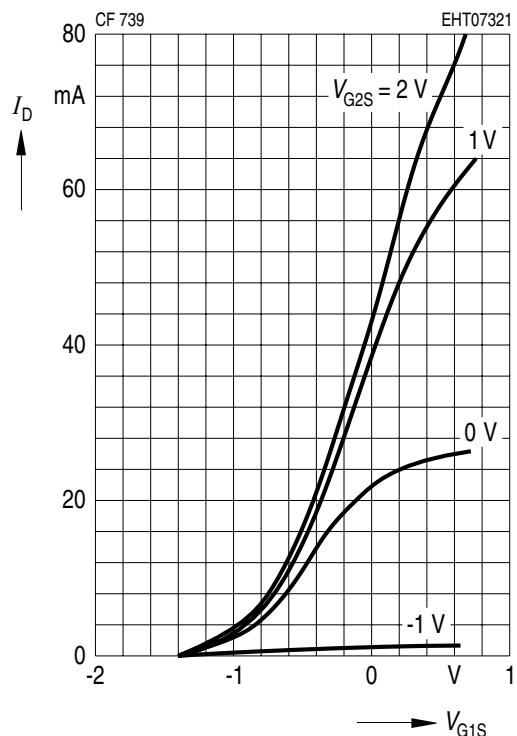
Drain Current

$I_D = f(V_{G2S})$; $V_{DS} = 5$ V
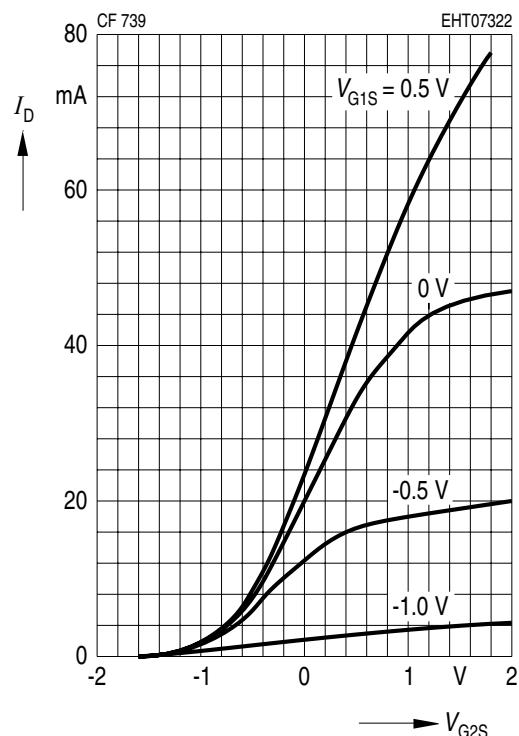
Gate 1 Input Capacitance

$C_{G1SS} = f(I_D)$;
$V_{G2S} = 2$ V, $V_{DS} = 5$ V, $f = 0.1 \ldots 1$ GHz
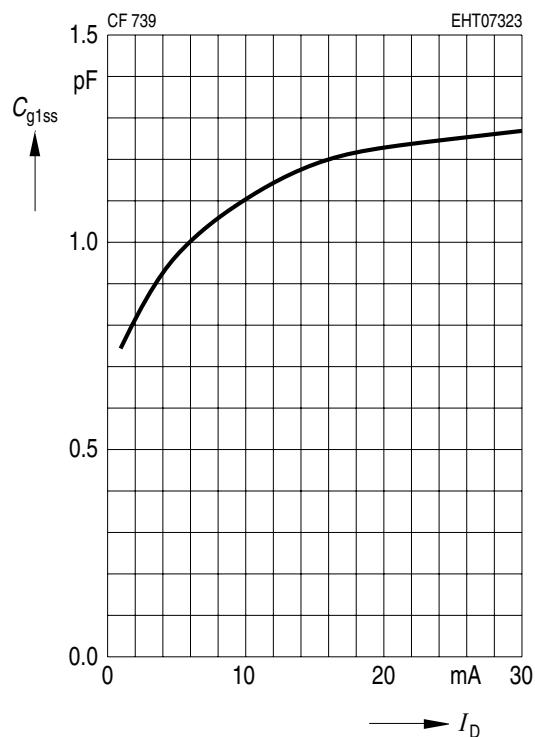
Output Capacitance

$C_{DSS} = f(V_{DS})$;
$V_{G2S} = 2$ V, $I_D = 10$ mA, $f = 0.1 \ldots 1$ GHz
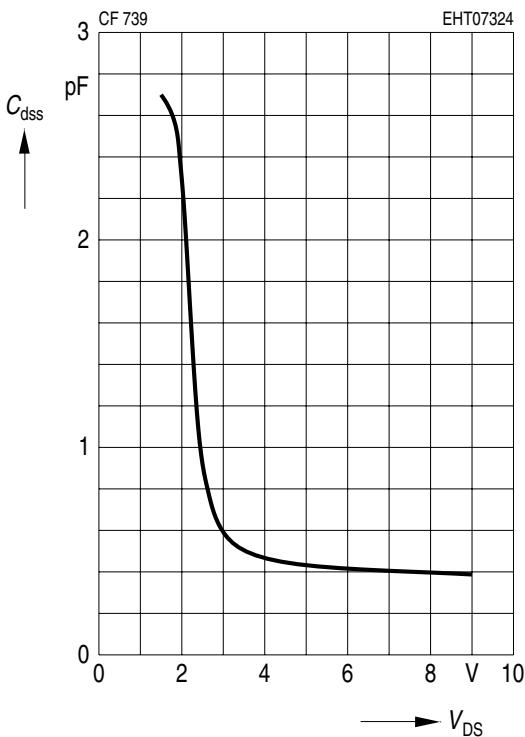
Common Source Admittance Parameters (G2 RF grounded)

### Gate 1 Input Admittance y_{11S}
$V_{DS} = 5$ V, $V_{G2S} = 2$ V, $I_D = 10$ mA
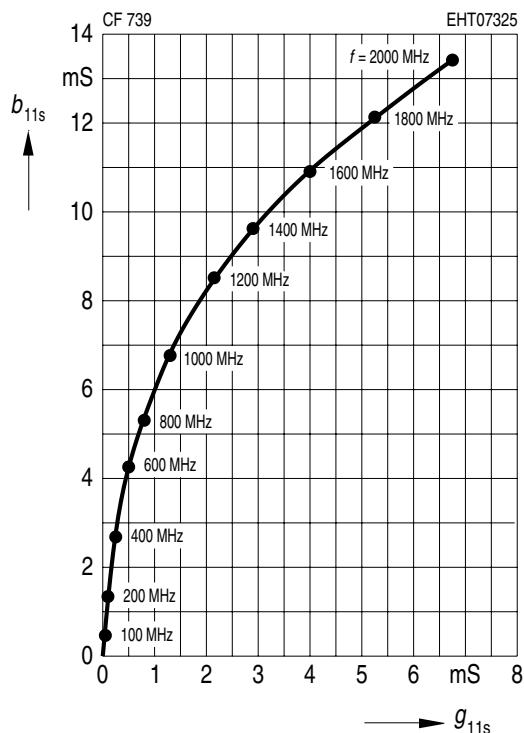
### Gate 1 Forward Transfer Admit. y_{21S}
$V_{DS} = 5$ V, $V_{G2S} = 2$ V, $I_D = 10$ mA
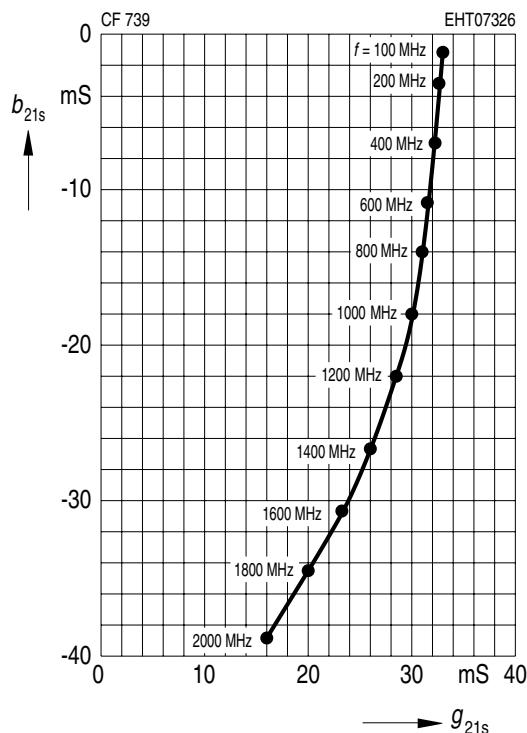
Output Admittance y_{22S}
$V_{DS} = 5$ V, $V_{G2S} = 2$ V, $I_D = 10$ mA
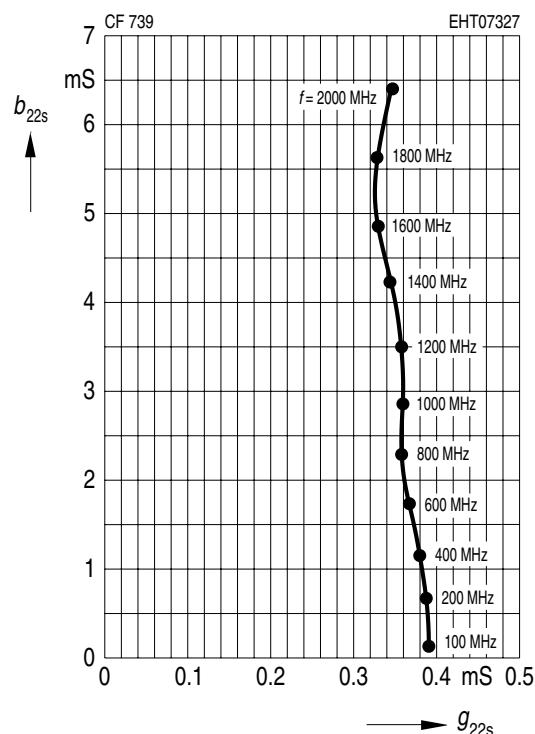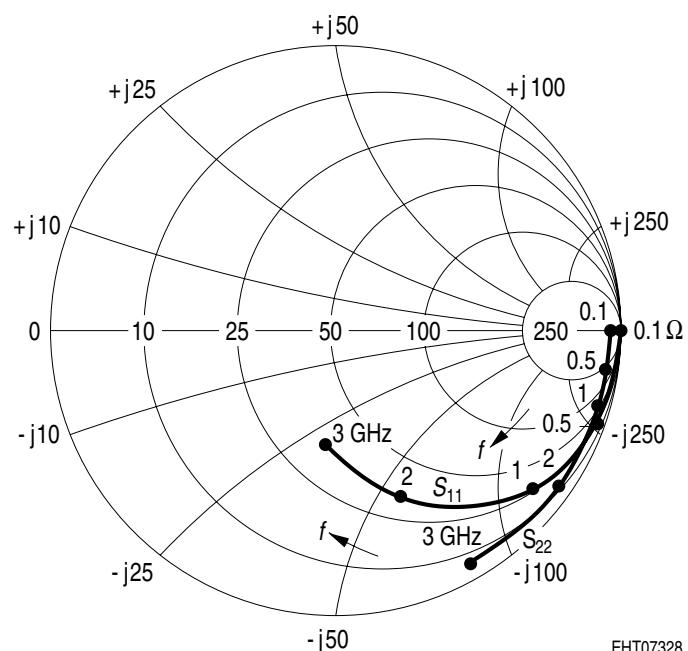
Figure 1 S_{11}, S_{22} = $f(f)$, **Z-Plane**
V_{DS} = 5 V, V_{G2S} = 2 V, I_D = 10 mA, Z_0 = 50 Ω
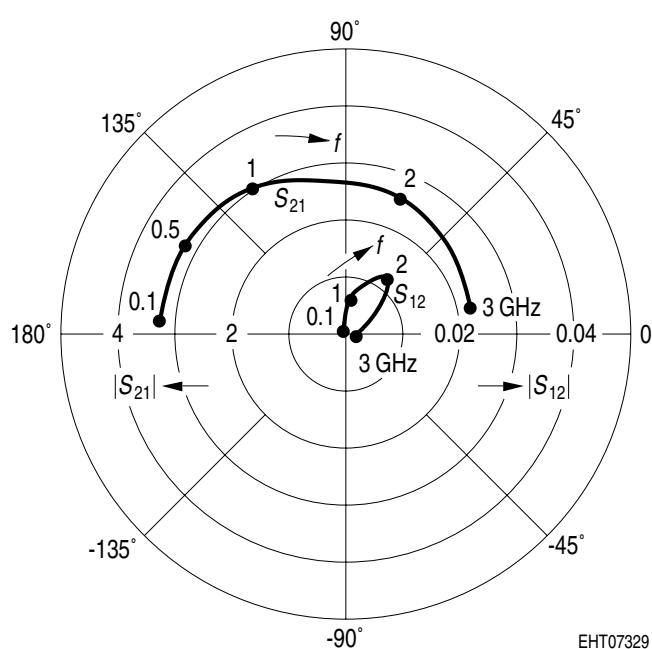
Figure 2 S_{12}, S_{21} = $f(f)$
V_{DS} = 5 V, V_{G2S} = 2 V, I_D = 10 mA, Z_0 = 50 Ω

Package Outlines

P-SOT143-4-1
(Small Outline Transistor)

2.9 ±0.1
1.9
0.7 ±0.2
+0.2
acc. to
DIN 6784
4   3
1   2
0.8 +0.1 -0.05
0.4 +0.1 -0.05
1.7
⊕ 0.25 Ⓜ B

1.1 max
0.1 max
0.3 ±0.1
2.6 max
10° max
10° max
1.3 ±0.1
0.55 -0.1
0.08...0.15
2°... 30°
⊥ 0.20 Ⓜ A
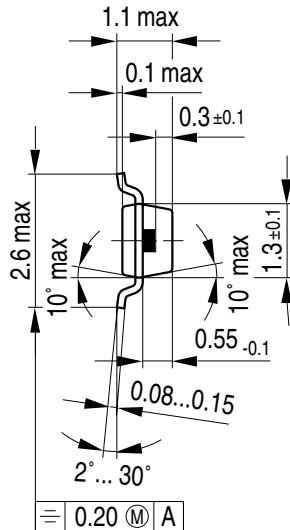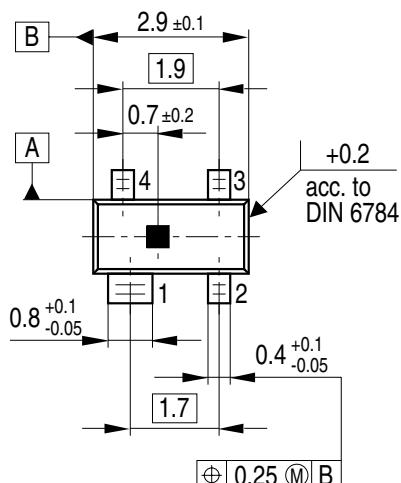
GPS05559

Sorts of Packing
Package outlines for tubes, trays etc. are contained in
our Data Book "Package Information".

SMD = Surface Mounted Device

Dimensions in mm