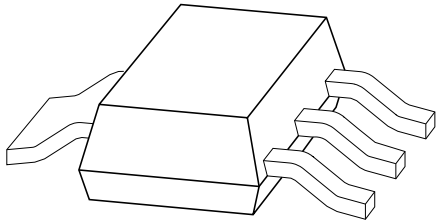
GaAs FET

CLY 5

Data Sheet

- Power amplifier for mobile phones
- For frequencies from 400 MHz to 2.5 GHz
- Wide operating voltage range: 2.7 to 6 V
- P_{OUT} at V_D = 3 V, f = 1.8 GHz typ. 26.5 dBm
- High efficiency better 55%

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



SOT-223

Type	Marking	Ordering Code (taped)	Pin Configuration				Package
			1	2	3	4	
CLY 5	CLY 5	Q62702-L90	G	S	D	S	P-SOT223-4-2

Maximum Ratings	Symbol	Value	Unit
Drain-source voltage	V_{DS}	9	V
Drain-gate voltage	V_{DG}	12	V
Gate-source voltage	V_{GS}	– 6	V
Drain current	I_D	1.2	A
Channel temperature	T_{Ch}	150	°C
Storage temperature	T_{stg}	– 55 … + 150	°C
Pulse peak power	P_{Pulse}	9	W
Total power dissipation ($T_s \leq 80$ °C) T_s: Temperature at soldering point	P_{tot}	2	W

Thermal Resistance	Symbol	Value	Unit
Channel-soldering point	R_{thChS}	≤ 35	K/W

Electrical Characteristics

T_A = 25 °C, unless otherwise specified.

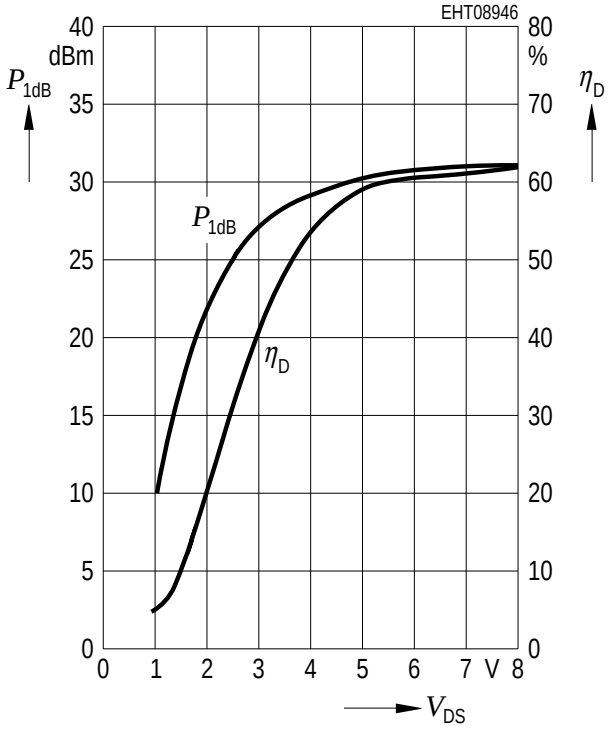
Characteristics	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Drain-source saturation current	I_{DSS}	600	800	1200	mA	V_{DS} = 3 V V_{GS} = 0 V
Drain-source pinch-off current	I_D	–	10	100	µA	V_{DS} = 3 V V_{GS} = – 3.8 V
Gate pinch-off current	I_G	–	5	20	µA	V_{DS} = 3 V V_{GS} = – 3.8 V
Pinch-off Voltage	$V_{GS(p)}$	– 3.8	– 2.8	– 1.8	V	V_{DS} = 3 V I_D = 100 µA
Small Signal Gain[1)]	G	10.5	11.0	–	dB	V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz P_{in} = 0 dBm
Small Signal Gain[1)]	G	11.5	12.0	–	dB	V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz P_{in} = 0 dBm
Small Signal Gain[2)]	G_p	9.0	9.5	–	dB	V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz P_{in} = 0 dBm
Output Power	P_o	26.5	27	–	dBm	V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz P_{in} = 19 dBm
Output Power	P_o	29.5	30	–	dBm	V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz P_{in} = 21 dBm
1 dB-Compression Point	$P_{1\,dB}$	–	26.5	–	dBm	V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz

Electrical Characteristics (cont'd)
T_A = 25 °C, unless otherwise specified.

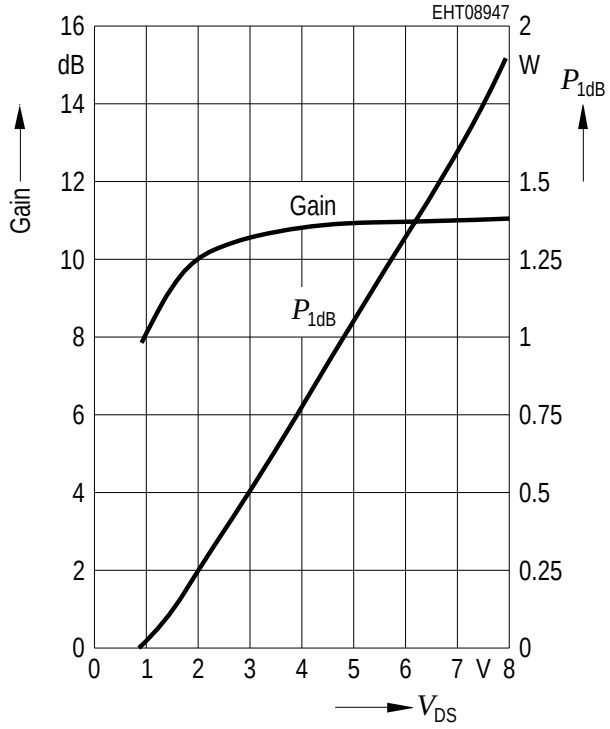
Characteristics	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
1 dB-Compression Point	P_{1dB}	–	30	–	dBm	V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz
Power Added Efficiency	PAE	40	55	–	%	V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz P_{in} = 21 dBm
Noise figure	NF	–	1.72	–	dB	V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz

1) Matching conditions for maximum small signal gain (not identical with power matching conditions!).
2) Power matching conditions: f = 1.8 GHz: Source Match: G_{ms}: MAG 0.58; ANG -143°; Load Match G_{ml}: MAG 0.76; ANG -116°

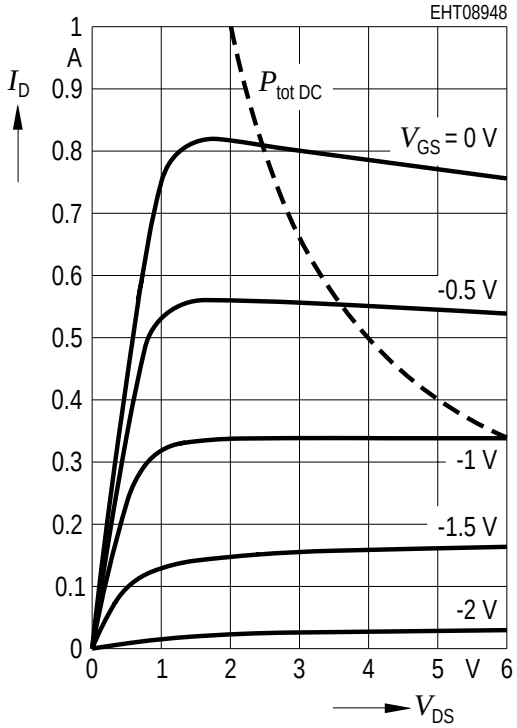
Compression Power vs. Drain-Source Voltage f = 1.8 GHz; $I_{DS} = 0.5 \times I_{DSS}$



Gain and $P_{1\,dB}$ vs. Drain Source Voltage, f = 1.8 GHz; $I_{DS} = 0.5 \times I_{DSS}$



Output Characteristics



Typ. Common Source S-Parameters and Noise Data

V_{DS} = 3 V, I_D = 350 mA, Z_o = 50 Ω

f	S11		S21		S12		S22	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
0.1	0.98	– 26.6	11.52	160.7	0.01024	79	0.3	– 171.8
0.15	0.96	– 39.4	11.15	151.4	0.015	74.3	0.31	– 169.3
0.2	0.93	– 51.5	10.6	142.8	0.01942	69.9	0.33	– 169.2
0.25	0.9	– 63.1	10.06	134.9	0.02323	66.1	0.36	– 169.4
0.3	0.87	– 73.8	9.49	127.4	0.02665	62.3	0.38	– 169.4
0.4	0.81	– 93.3	8.34	114.1	0.03245	57	0.4	– 172.7
0.5	0.77	– 110.3	7.33	102.5	0.03711	52.8	0.43	– 175.6
0.6	0.73	– 125.3	6.47	92.4	0.04138	49.7	0.45	– 179.4
0.7	0.71	– 138.5	5.75	83.5	0.04528	47.3	0.47	177.5
0.8	0.7	– 150.4	5.14	75.2	0.0489	45.2	0.49	174.2
0.9	0.69	– 161.1	4.64	67.6	0.05271	43.3	0.5	170.8
1	0.68	– 170.8	4.2	60.5	0.05646	41.6	0.51	168.1
1.2	0.69	172.1	3.51	47.2	0.06393	38	0.54	161.8
1.4	0.7	157.3	2.98	35.1	0.07181	34	0.57	155.6
1.5	0.71	150.5	2.76	29.2	0.07569	32	0.58	152.9
1.6	0.72	144.1	2.56	23.6	0.07941	29.7	0.59	149.4
1.8	0.74	132.2	2.22	12.6	0.08684	24.8	0.62	143.2
2	0.76	121.4	1.94	2.1	0.09377	19.7	0.65	137
2.2	0.78	111.5	1.7	– 7.9	0.0998	14.6	0.68	130.9
2.4	0.8	102.5	1.49	– 17.4	0.10532	9.4	0.7	124.7
2.5	0.81	98	1.39	– 21.9	0.1076	6.7	0.71	121.1
3	0.85	79.2	1.01	– 42.1	0.11638	– 6	0.76	105.6
3.5	0.87	64	0.75	– 58.1	0.12148	– 17.2	0.8	91.4
4	0.89	51.4	0.59	– 70.6	0.12571	– 27.3	0.84	78.2
4.5	0.9	39.8	0.48	– 82.2	0.12914	– 37.2	0.86	65.6
5	0.92	29	0.41	– 93.1	0.13429	– 47	0.88	53.1

Typ. Common Source S-Parameters and Noise Data (cont'd)
V_{DS} = 3 V, I_D = 350 mA, Z_o = 50 Ω

f	S11		S21		S12		S22	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
5.5	0.92	18.4	0.35	– 103.4	0.13892	– 57	0.9	40.3
6	0.92	8.3	0.31	– 112.4	0.14142	– 66.8	0.91	27

f	F_{min}	G_{opt}		R_n	r_n
GHz	**dB**	**MAG**	**ANG**	Ω	**–**
0.9	0.92	0.408	142	3.9	0.79
1.8	1.72	0.664	– 134	8.1	0.162

Typ. Common Source S-Parameters and Noise Data

V_{DS} = 5 V, I_D = 350 mA, Z_o = 50 Ω

f	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.1	0.98	– 26.3	13.02	160.1	0.00906	79.1	0.15	– 153.9
0.15	0.95	– 38.8	12.58	150.7	0.01326	73.7	0.17	– 148.4
0.2	0.92	– 50.8	11.98	141.9	0.01702	69.3	0.2	– 148.5
0.25	0.89	– 62.1	11.34	133.7	0.02026	65.6	0.23	– 149.9
0.3	0.86	– 72.6	10.68	126.1	0.02304	61.8	0.26	– 150.6
0.4	0.8	– 91.7	9.39	112.4	0.02771	57	0.29	– 155.5
0.5	0.76	– 108.3	8.24	100.6	0.03151	53.4	0.33	– 159.4
0.6	0.72	– 122.9	7.27	90.2	0.0348	51.2	0.35	– 164.1
0.7	0.7	– 135.9	6.45	80.9	0.03798	49.7	0.37	– 167.6
0.8	0.69	– 147.6	5.77	72.4	0.04099	48.8	0.4	– 171.3
0.9	0.68	– 158.1	5.2	64.5	0.04435	47.9	0.41	– 174.9
1	0.68	– 167.7	4.7	57	0.04784	47.1	0.44	– 177.8
1.2	0.68	175.3	3.92	43	0.05543	45.2	0.47	175.4
1.4	0.7	160.4	3.31	30.1	0.06413	42.2	0.51	168.7
1.5	0.71	153.6	3.06	24	0.06865	40.6	0.54	165.5
1.6	0.72	147.1	2.83	17.9	0.07318	38.5	0.55	161.7
1.8	0.75	135	2.43	6.2	0.08237	33.7	0.6	154.6
2	0.77	123.9	2.1	– 5	0.09121	28.3	0.64	147.5
2.2	0.8	113.7	1.82	– 15.6	0.09917	22.5	0.67	140.4
2.4	0.82	104.3	1.58	– 25.7	0.10617	16.7	0.7	133.3
2.5	0.83	99.7	1.47	– 30.4	0.10916	13.6	0.72	129.1
3	0.87	80.1	1.02	– 51.4	0.12055	– 0.8	0.78	111.6
3.5	0.89	64.4	0.74	– 67.4	0.12631	– 13.4	0.83	95.8
4	0.91	51.5	0.56	– 79.4	0.13053	– 24.5	0.86	81.3
4.5	0.92	39.6	0.45	– 90.2	0.13384	– 35	0.88	67.9
5	0.93	28.8	0.37	– 100	0.13894	– 45.2	0.91	54.9

Typ. Common Source S-Parameters and Noise Data (cont'd)
V_{DS} = 5 V, I_D = 350 mA, Z_o = 50 Ω

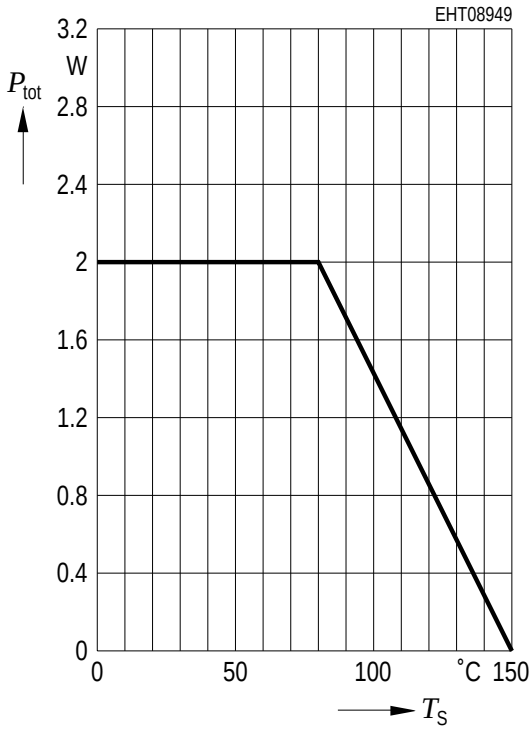
f	S11		S21		S12		S22	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
5.5	0.93	18.1	0.31	– 109.2	0.1434	– 55.5	0.92	41.7
6	0.93	8	0.27	– 117.1	0.14538	– 65.6	0.92	28

f	F_{min}	G_{opt}		R_n	r_n
GHz	**dB**	**MAG**	**ANG**	Ω	**–**
0.9	1.05	0.369	139	4.9	0.097
1.8	1.94	0.603	– 132	10.9	0.218

Additional S-Parameter available on data disc!

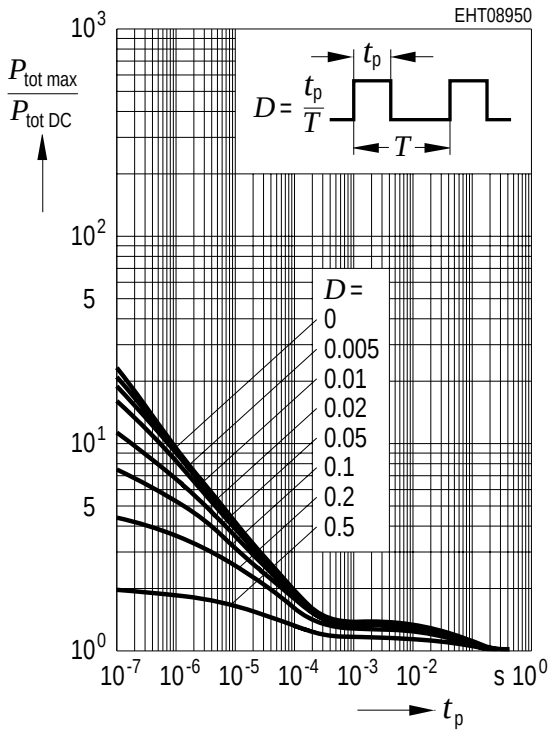
Total Power Dissipation

$P_{tot} = f(T_s)$



Permissible Pulse Load

$P_{tot\_max}/P_{tot\_DC} = f(t_p)$



Increased Power Handling Capability Pulsed Applications

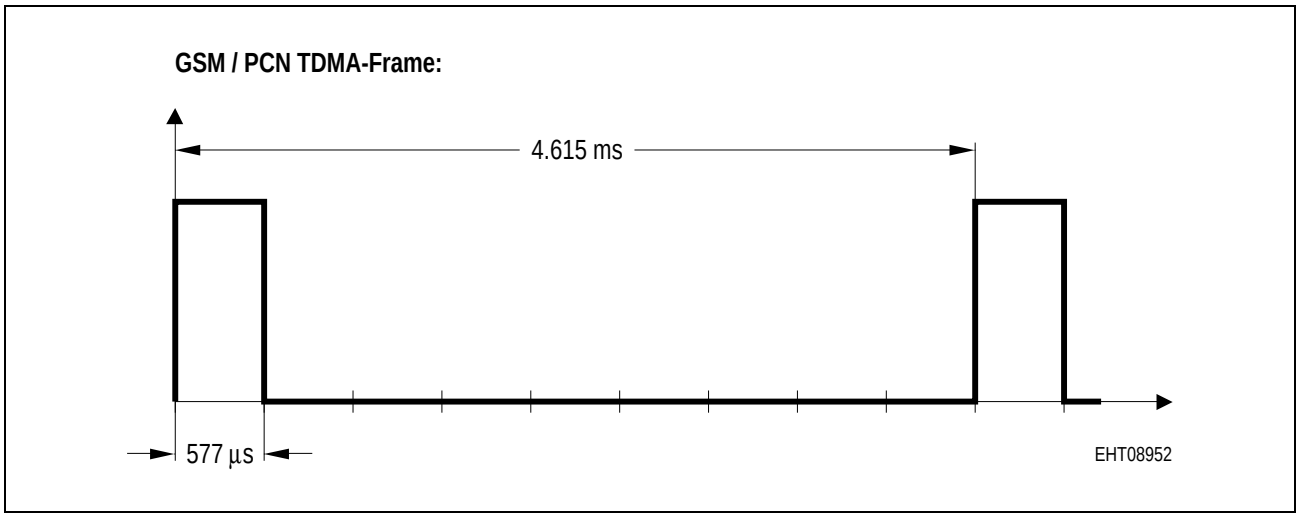


Figure 1 GSM/PCN TDMA-Frame (D = t_p/T = 0.577 ms/4.615 ms = 0.125)

Take value $P_{tot\ max}/P_{tot\ DC}$ from diagram permissible pulse load --> $P_{tot\ max}/P_{tot\ DC} \approx 1.4$

P_{tot} = 2 W × 1.4 = 2.8 W

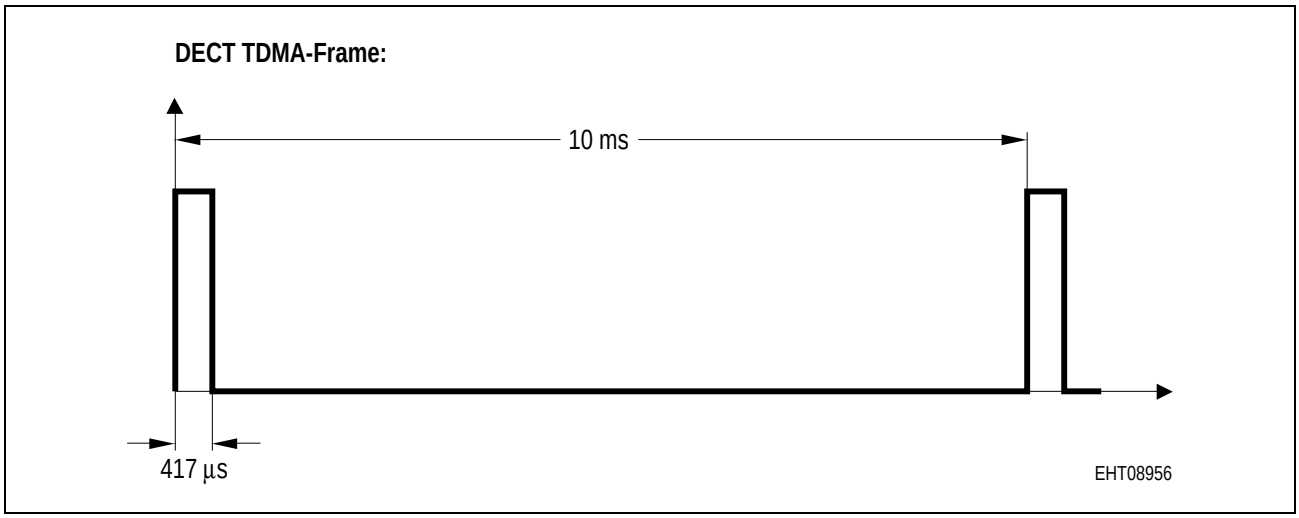


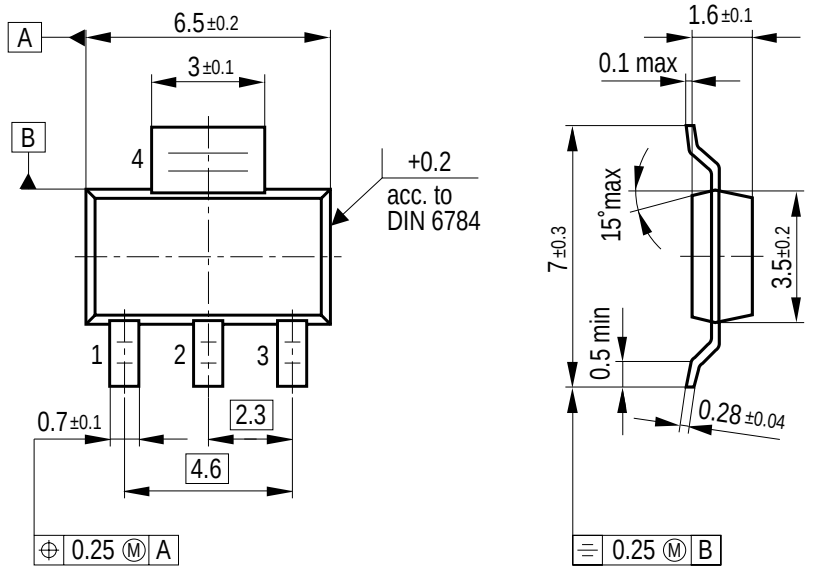
Figure 2 DECT TDMA-Frame (D = t_p/T = 0.417 ms/10 ms = 0.0417)

Take value $P_{tot\ max}/P_{tot\ DC}$ from diagram permissible pulse load --> $P_{tot\ max}/P_{tot\ DC} \approx 1.5$

P_{tot} = 2 W × 1.5 = 3 W

Package Outlines

P-SOT223-4-2
(Small Outline Transistor)



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

SMD = Surface Mounted Device

Dimensions in mm