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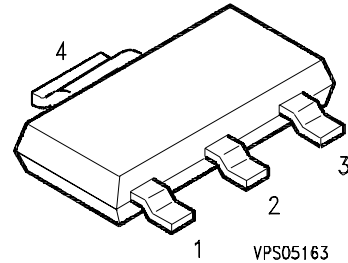
* Power amplifier for mobile phones
* For frequencies from 400 MHz to 2.5 GHz
* Wide operating voltage range: 2.7 to 6 V
* P_{OUT} at V_D=3V, f=1.8GHz typ. 26.5 dBm
* High efficiency better 55 %

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

Type	Marking	Ordering code (taped)	Pin Configuration				Package 1)
			1	2	3	4	
CLY 5	CLY 5	Q62702-L90	G	S	D	S	SOT 223

Maximum ratings	Symbol	Values	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

Channel-soldering point	R_{thChS}	$\leq$35	K/W

1) Dimensions see chapter Package Outlines

Electrical characteristics (T_A = 25°C , unless otherwise specified)

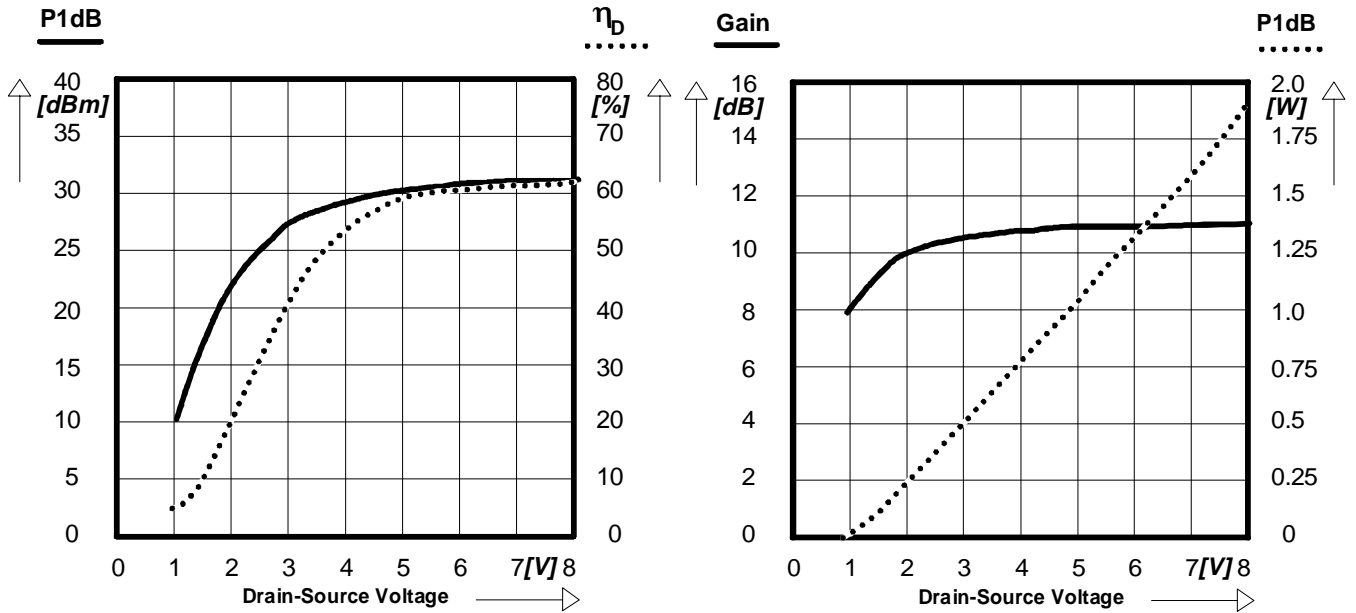| Characteristics	Symbol	min	typ	max	Unit
Drain-source saturation current V_{DS} = 3 V V_{GS} = 0 V	I_{DSS}	600	800	1200	mA
Drain-source pinch-off current V_{DS} = 3 V V_{GS} = -3.8 V	I_D	-	10	100	µA
Gate pinch-off current V_{DS} = 3 V V_{GS} = -3.8 V	I_G	-	5	20	µA
Pinch-off Voltage V_{DS}= 3 V I_D=100µA	$V_{GS(p)}$	-3.8	-2.8	-1.8	V
Small Signal Gain*) V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz P_{in} = 0 dBm	G	10.5	11.0	-	dB
Small Signal Gain*) V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz P_{in} = 0 dBm	G	11.5	12.0	-	dB
Small Signal Gain **) V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz P_{in} = 0 dBm	G_p	9.0	9.5	-	dB
Output Power V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz P_{in} = 19 dBm	P_O	26.5	27	-	dBm
Output Power V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz P_{in} = 21 dBm	P_O	29.5	30	-	dBm
1dB-Compression Point V_{DS} = 3 V I_D = 350 mA f = 1.8 GHz	P_{1dB}	-	26.5	-	dBm
1dB-Compression Point V_{DS} = 5 V I_D = 350 mA f = 1.8GHz	P_{1dB}	-	30	-	dBm
Power Added Efficiency V_{DS} = 5 V I_D = 350 mA f = 1.8 GHz P_{in} = 21 dBm	PAE	40	55	-	%

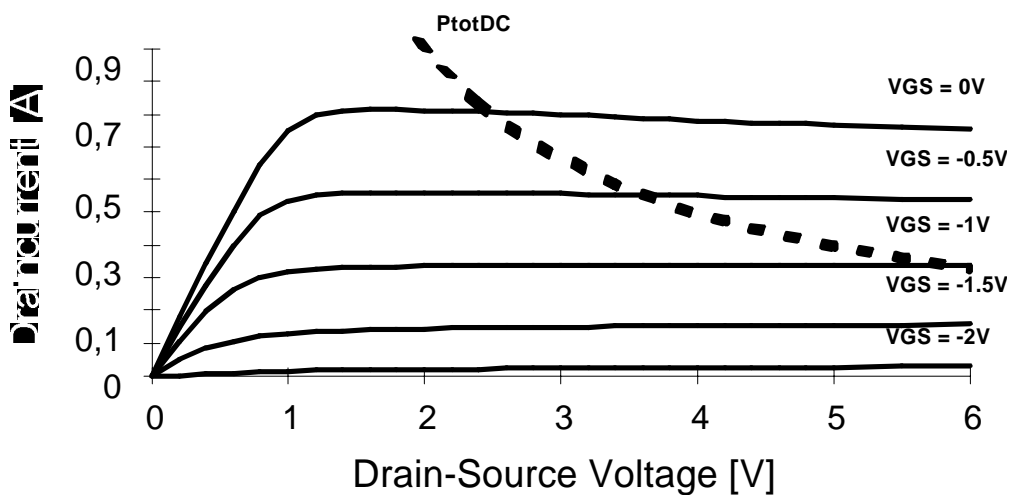*) Matching conditions for maximum small signal gain (not identical with power matching conditions!)
**) Power matching conditions: f=1.8GHz:
    Source Match: Γ_{ms} : MAG 0.58; ANG -143°; Load Match: Γ_{ml} : MAG 0.76; ANG -116°

Compression Power vs. Drain-Source Voltage
f = 1.8GHz; IDS=0.5IDSS

P1dB　　　　　　　　　　　η_D　　　**Gain**　　　　　　　　　　**P1dB**

Output Characteristics

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typ. Common Source S-Parameters
V_{DS} = 3 V I_D = 350 mA Z_O = 50 Ω

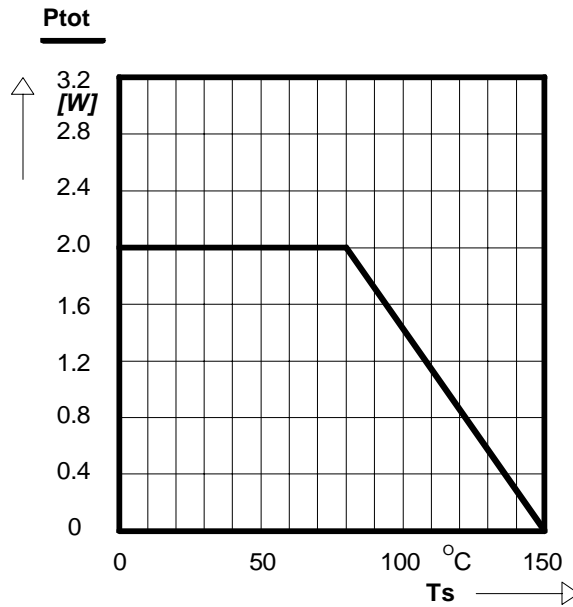| f	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0,1	0,98	-26,6	11.52	160.7	0.01024	79	0.3	-171.8
0.15	0.96	-39.4	11.15	151.4	0.015	74.3	0.31	-169.3
0.2	0.93	-51.5	10.6	142.8	0.01942	69.9	0.33	-169.2
0.25	0.9	-63.1	10.06	134.9	0.02323	66.1	0.36	-169.4
0.3	0.87	-73.8	9.49	127.4	0.02665	62.3	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
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

typ. Common Source S-Parameters
$V_{DS} = 5\ V$ $I_D = 350\ mA$ $Z_O = 50\ \Omega$

f GHz	S11 MAG	ANG	S21 MAG	ANG	S12 MAG	ANG	S22 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
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

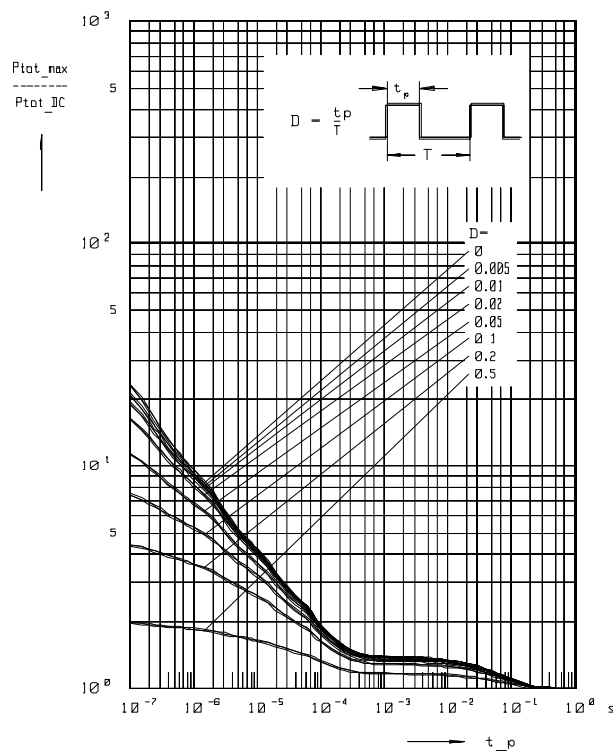Additional S-Parameter available on CD
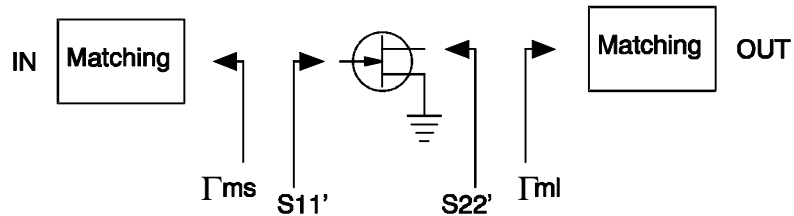
Total Power Dissipation

$$P_{tot} = f(T_S)$$

Permissible Pulse Load

$$P_{totmax}/P_{totDC} = f(t_p)$$
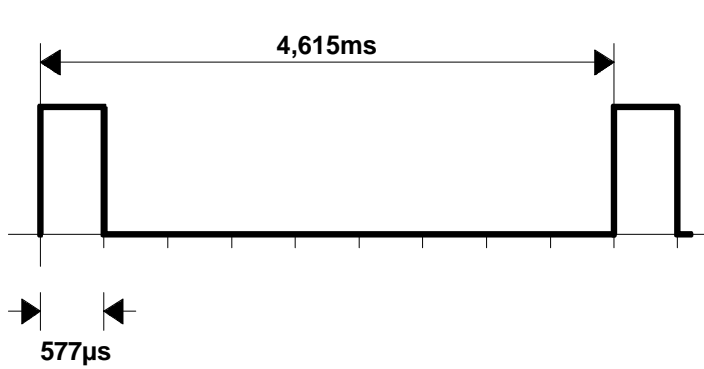
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CLY5 Power GaAs-FET Matching Conditions

Definition:

IN | Matching | Γ_{ms} S11'   S22' Γ_{ml} | Matching | OUT

Measured Data:

Typ	f [GHz]	V_{DS} [V]	I_D [mA]	P_{-1dB} [dBm]	Gain [dB]	Γ_{ms} MAG	Γ_{ms} ANG	Γ_{ml} MAG	Γ_{ml} ANG
CLY5	0.9	3	350	25.8	15.6	0.50	133	0.70	-154
		5	350	29.2	16.3	0.52	144	0.61	-156
		6	350	29.8	17.2	0.58	143	0.54	-168
	1.5	3	350	26.5	11.0	0.63	-167	0.74	-126
		5	350	30.0	11.5	0.59	-164	0.69	-126
		6	350	30.6	12.6	0.64	-165	0.55	-132
	1.8	3	350	26.5	9.5	0.58	-143	0.76	-116
		5	350	30.0	10.0	0.56	-140	0.71	-118
		6	350	30.5	10.0	0.58	-133	0.69	-119
	2.4	3	350	25.0	8.4	0.62	-108	0.68	-105
		5	350	29.1	8.7	0.60	-109	0.66	-105
		6	350	30.5	8.9	0.65	-112	0.68	-106

Note: Gain is small signal gain @ Γ_{ms} and Γ_{ml}

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Increased Power Handling Capability Pulsed Applications
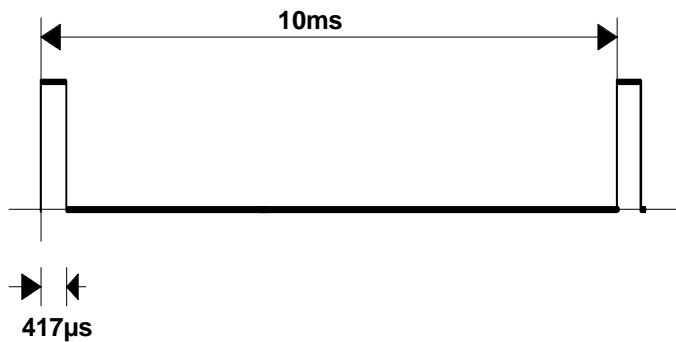
GSM/PCN TDMA-Frame:

4,615ms

577µs

$$D = \frac{t_p}{T} = \frac{0.577\,ms}{4.615\,ms} = 0.125$$

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

$$P_{tot} = 2W \times 1.4 = 2.8W$$

DECT TDMA-Frame:

10ms

417µs

$$D = \frac{t_p}{T} = \frac{10\,ms}{4.615\,ms} = 0.0417$$

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

$$P_{tot} = 2W \times 1.5 = 3W$$