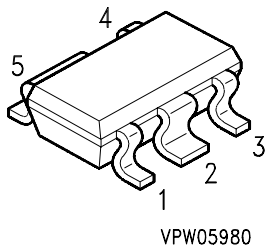
Datasheet

***** Broadband Power Amplifier [800..2000 Mhz]
***** GSM,AMPS or PCN
***** Operating voltage range: 2.7 to 5.0 V
* Pout = 35.0dBm at Vd=3.5V
***** Overall power added efficiency 55 %
***** Easy external matching



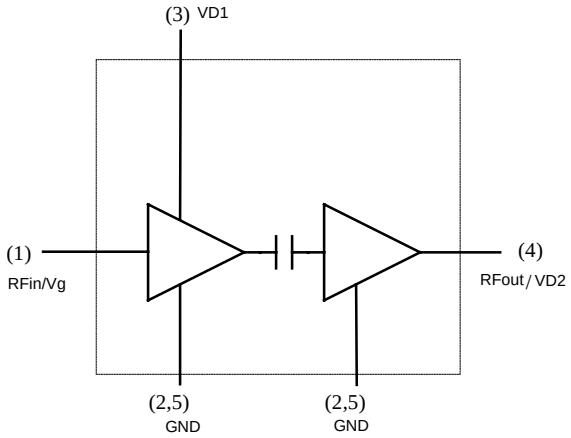
ESD: **E**lectro**s**tatic **d**ischarge sensitive device, observe handling precautions!

Type	Marking	Ordering code (taped)	Package
CGY98	G8s	Q62702-G0079	SCT595

Maximum ratings

Characteristics	Symbol	max. Value	Unit
Positive supply voltage	V_D	6	V
Supply current stage 1	I_D	0.6	A
Supply current stage 2	I_D	1.8	A
Channel temperature	T_{Ch}	150	°C
Storage temperature	T_{stg}	-55...+150	°C
Total power dissipation *(Ts ≤70°C)* *Ts: Temperature at soldering point*	P_{tot}	2.0	W
Pulse peak power (dissipated):			W
T_{on} [pulsed Mode] ≤ 2 ms	P_{Pulse}	4.5	
T_{on} [pulsed Mode] ≥ 2ms < 10 ms	P_{Pulse}	2.5	W
T_{on} [switching Mode] ≥ 10 ms and if accumulated number number of on/of switching cycles > $1 * 10^5$	P_{Pulse}	1.6	W
Thermal Resistance			
Channel-soldering point	R_{thChS}	40	K/W

Functional Block Diagram



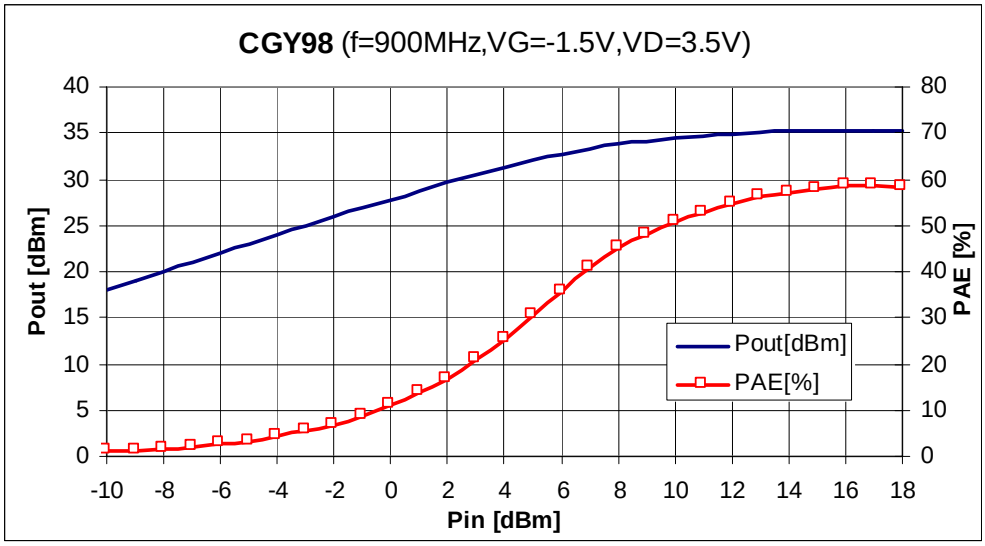
Pin #		Configuration
1	**RFin/VG**	RF input power + Gate voltage
2	**GND**	RF and DC ground
3	**VD1**	Pos. drain voltage 1st stage
4	**RFout/VD2**	RF output power / Pos. drain voltage 2nd stage
5	**GND**	RF and DC ground

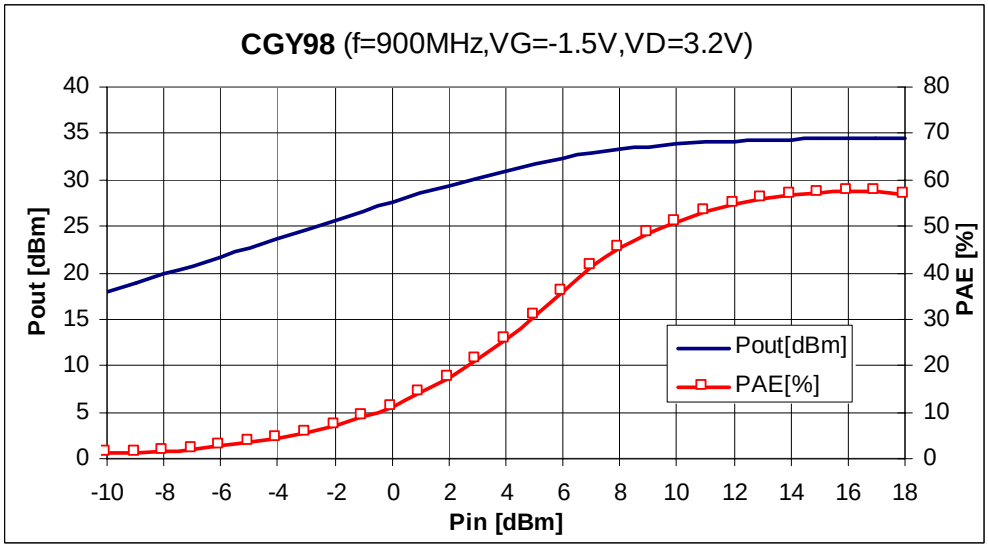
GSM-Operation

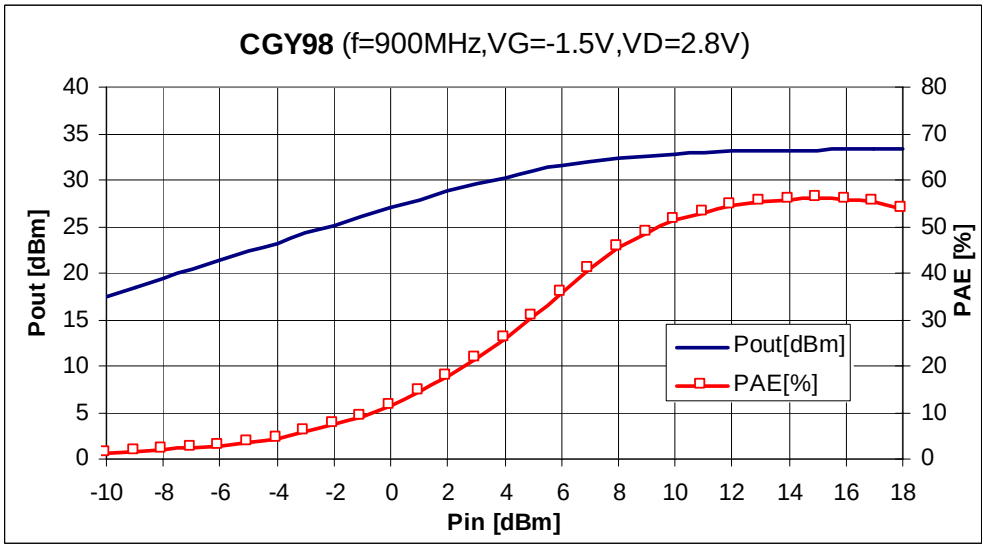
Electrical characteristics [On GSM Application Board]

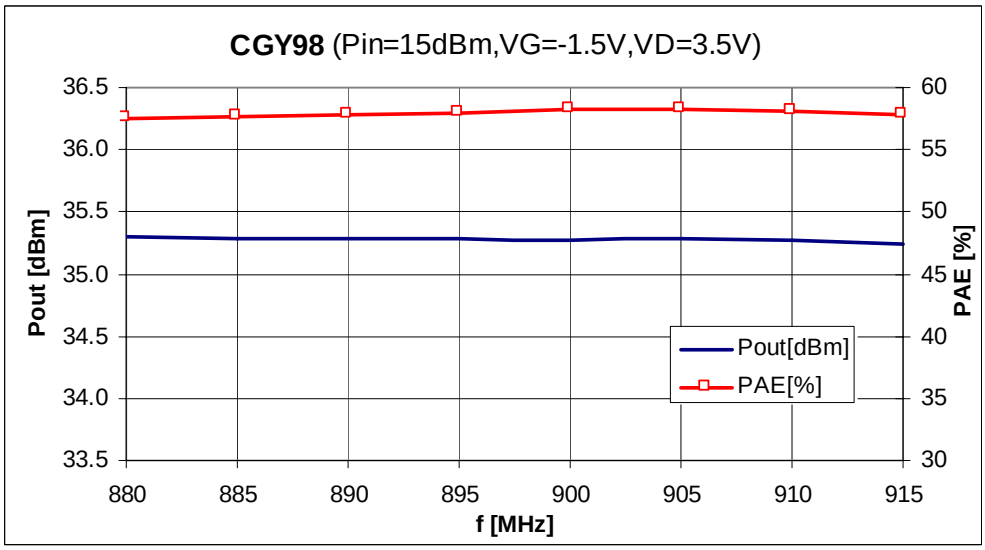
(T_A = 25°C, Z_S=Z_L=50 Ohm, duty cycle 12.5%, t_{on}=577us unless otherwise specified)

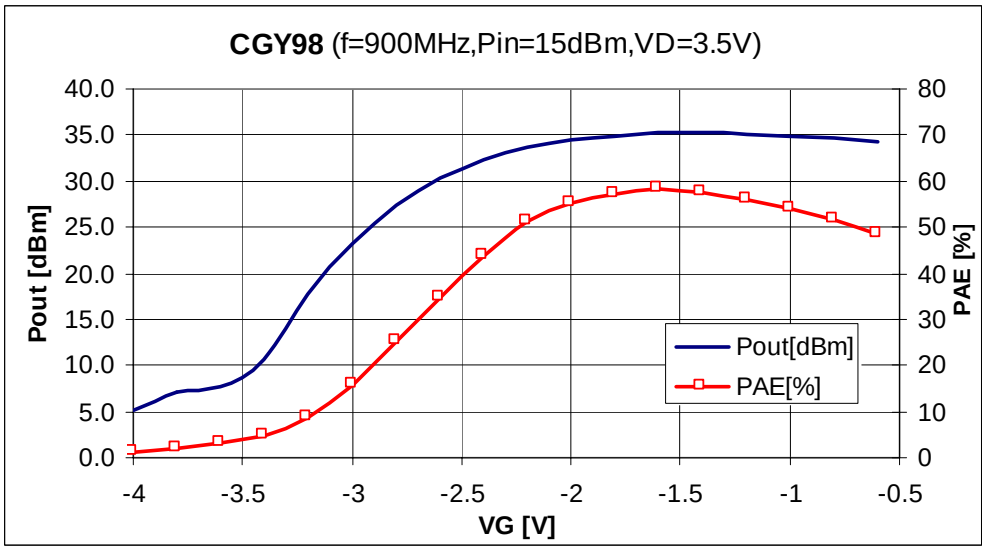
Characteristics	Symbol	min	typ	max	Unit
Frequenzy range	*f*	880	-	915	MHz
Supply current *VD=3.5V; Pin = +15 dBm*	I_{DD}	-	1.6	-	A
Power Gain *VD=3.5V; P_{in} = +15 dBm*	*G*		20		dB
Output Power *VD=2.8V; P_{in} = +15 dBm*	P_O		33.2		dBm
Output Power *VD=3.2V; P_{in} = +15 dBm*	P_O		34.4		dBm
Output Power *VD=3.5V; P_{in} = +15 dBm*	P_O		35.0		dBm
Overall Power added Efficiency *VD=3.5V; P_{in} = +15 dBm*	*PAE*		55	-	%
Harmonics $2f_0$ $3f_0$	- -	- -	-36 -36	- -	dBc
Input VSWR *VD=3.5V or VD=4.8V*	-	-	2 : 1	-	-
Load mismatch *Pin=10dBm , VD≤4.6V , Z_S=50 Ohm, Load VSWR = 20:1 for all phase,*		No module damage for 10 sec.			
Stability *Pin=10dBm, VD=4.6V, Z_S=50 Ohm, Load VSWR = 5:1 for all phase*		All spurious output more than 70 dB below desired signal level			

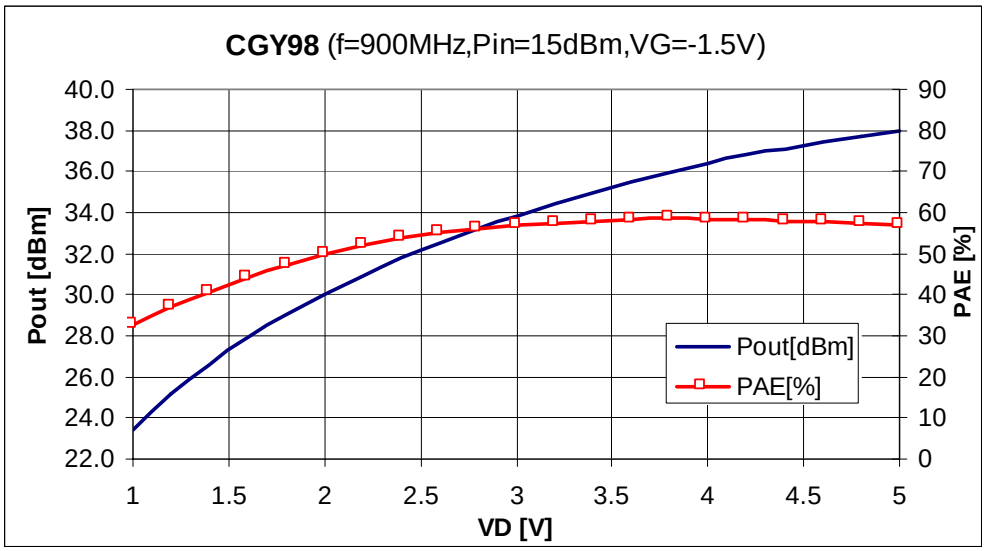

CGY98 (f=900MHz,VG=-1.5V,VD=3.5V)
Pout [dBm]
PAE [%]
Pout[dBm]
PAE[%]
Pin [dBm]


CGY98 (f=900MHz,VG=-1.5V,VD=3.2V)
Pout [dBm]
PAE [%]
Pout[dBm]
PAE[%]
Pin [dBm]

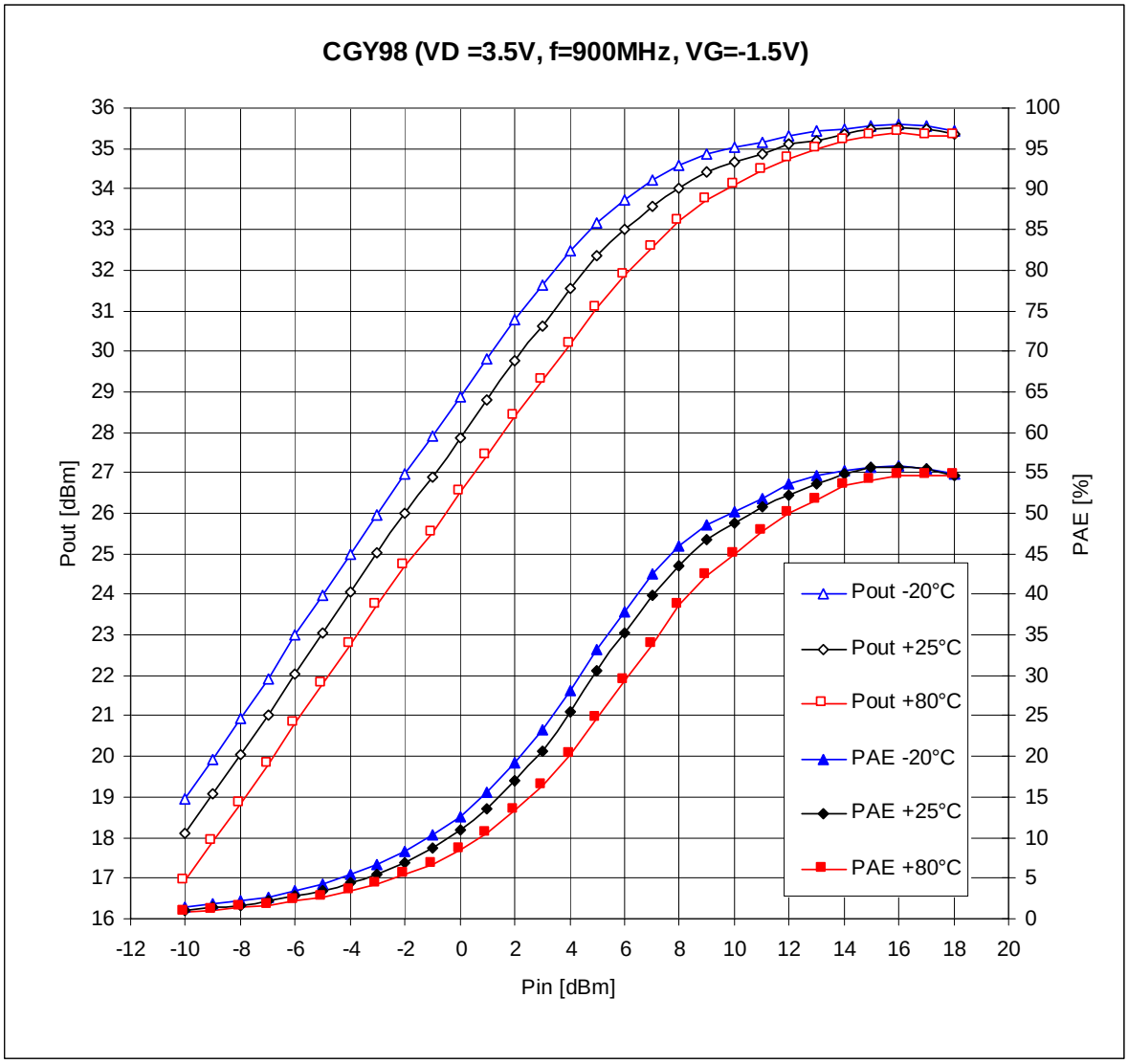

CGY98 (f=900MHz,VG=-1.5V,VD=2.8V)
Pout [dBm]
PAE [%]
Pout[dBm]
PAE[%]
Pin [dBm]


CGY98 (Pin=15dBm,VG=-1.5V,VD=3.5V)
Pout [dBm]
PAE [%]
f [MHz]
Pout[dBm]
PAE[%]
36.5
36.0
35.5
35.0
34.5
34.0
33.5
60
55
50
45
40
35
30
880
885
890
895
900
905
910
915


CGY98 (f=900MHz,Pin=15dBm,VD=3.5V)
Pout [dBm]
PAE [%]
VG [V]
Pout[dBm]
PAE[%]
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
80
70
60
50
40
30
20
10
0
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5


CGY98 (f=900MHz,Pin=15dBm,VG=-1.5V)
Pout [dBm]
PAE [%]
VD [V]
Pout[dBm]
PAE[%]
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
90
80
70
60
50
40
30
20
10
0
1
1.5
2
2.5
3
3.5
4
4.5
5

Temperature Characteristic GSM:

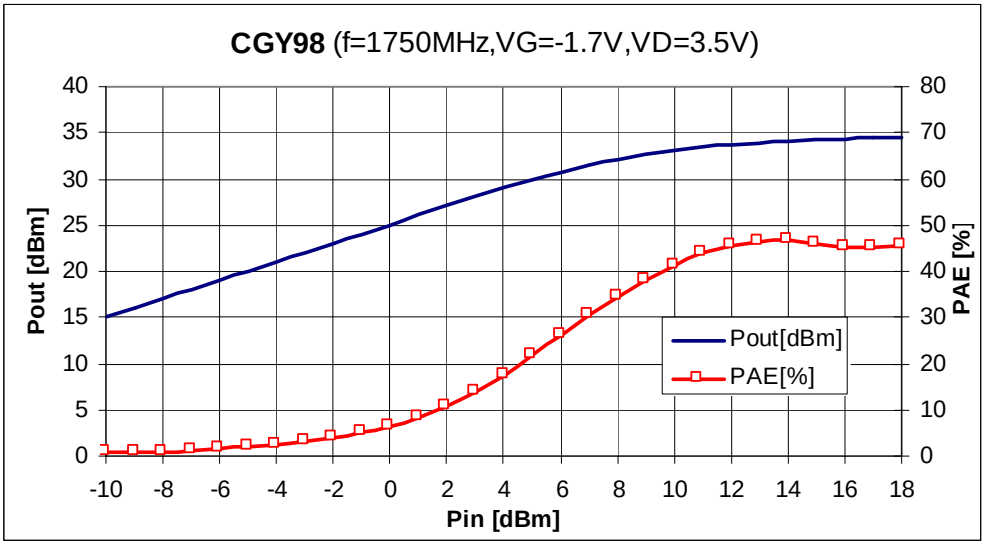


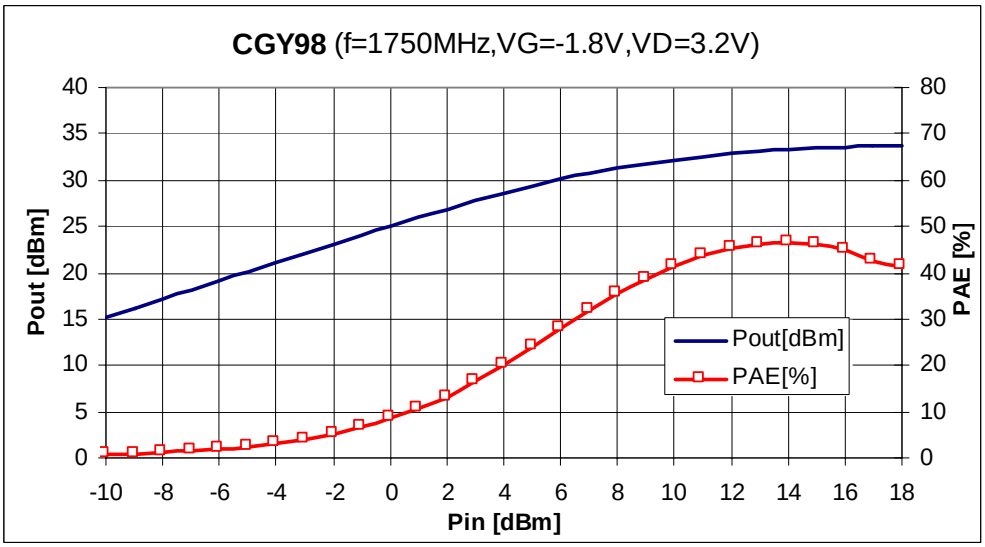
PCN(DCS1800)-Operation

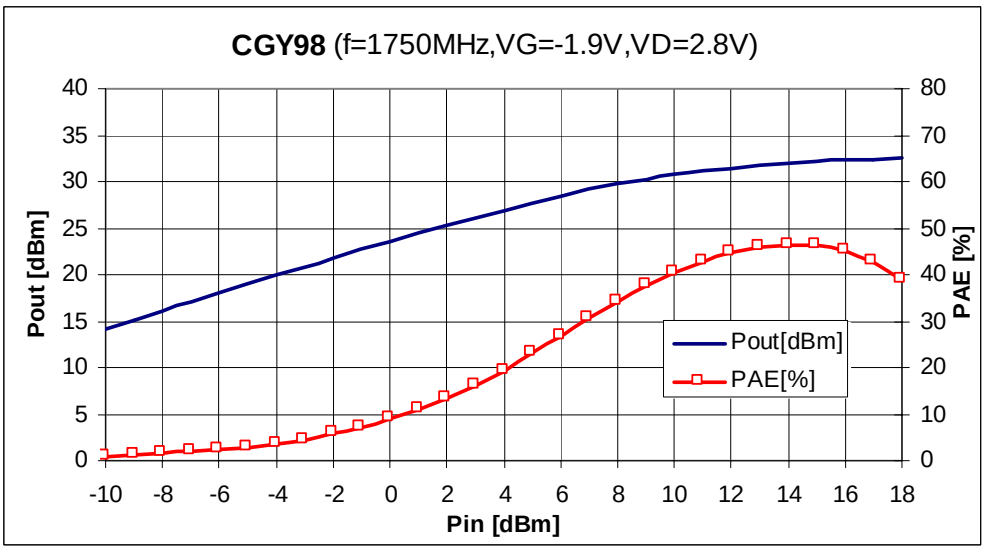
Electrical characteristics [On PCN Application Board]

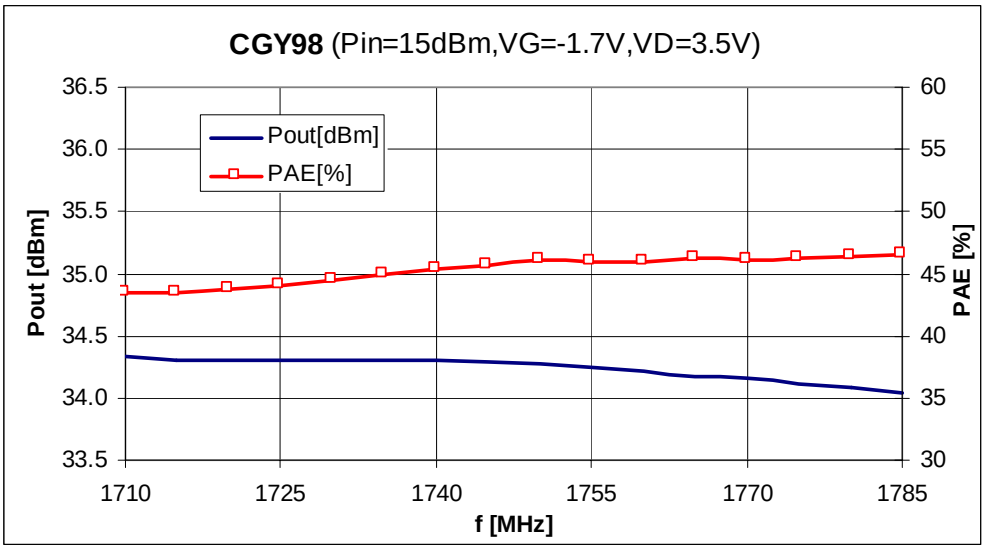
(T_A = 25°C, Z_S=Z_L=50 Ohm, duty cycle 12.5%, t_{on}=577us unless otherwise specified)

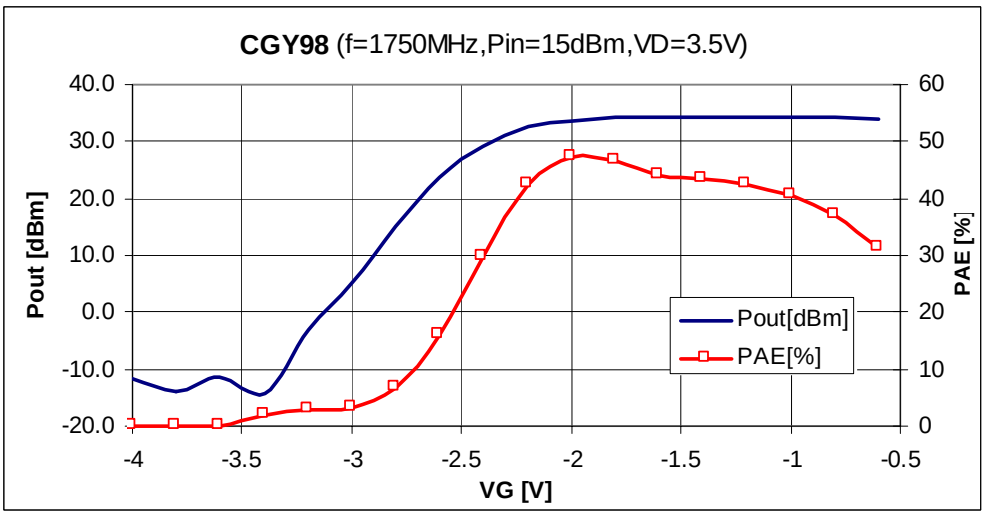
Characteristics	Symbol	min	typ	max	Unit
Frequenzy range	*f*	1710		1785	MHz
Supply current *VD=3.5V; Pin = +15 dBm*	I_{DD}	-	1.6	-	A
Power Gain *VD=3.5V; P_{in} = +15 dBm*	*G*		19		dB
Output Power *VD=2.8V; P_{in} = +15 dBm*	P_O		32.1		dBm
Output Power *VD=3.2V; P_{in} = +15 dBm*	P_O		33.4		dBm
Output Power *VD=3.5V; P_{in} = +15 dBm*	P_O		34.0		dBm
Overall Power added Efficiency *VD=3.5V; P_{in} = +15 dBm*	*PAE*		45	-	%
Harmonics $2f_0$ $3f_0$	- -	- -	-36 -36	- -	dBc
Input VSWR *VD=3.5V or VD=4.8V*	-	-	2 : 1	-	-
Load mismatch *Pin=10dBm , VD≤4.6V , Z_S=50 Ohm, Load VSWR = 20:1 for all phase,*		No module damage for 10 sec.			
Stability *Pin=10dBm, VD=4.6V, Z_S=50 Ohm, Load VSWR = 5:1 for all phase*		All spurious output more than 70 dB below desired signal level			

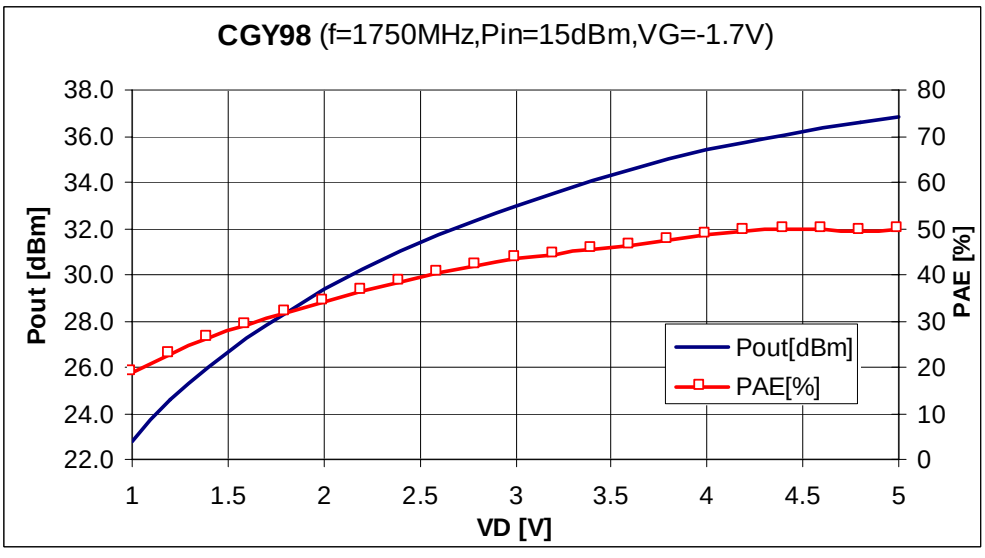

CGY98 (f=1750MHz,VG=-1.7V,VD=3.5V)
Pout [dBm]
PAE [%]
Pin [dBm]
Pout[dBm]
PAE[%]


CGY98 (f=1750MHz,VG=-1.8V,VD=3.2V)
Pout [dBm]
PAE [%]
Pin [dBm]
Pout[dBm]
PAE[%]

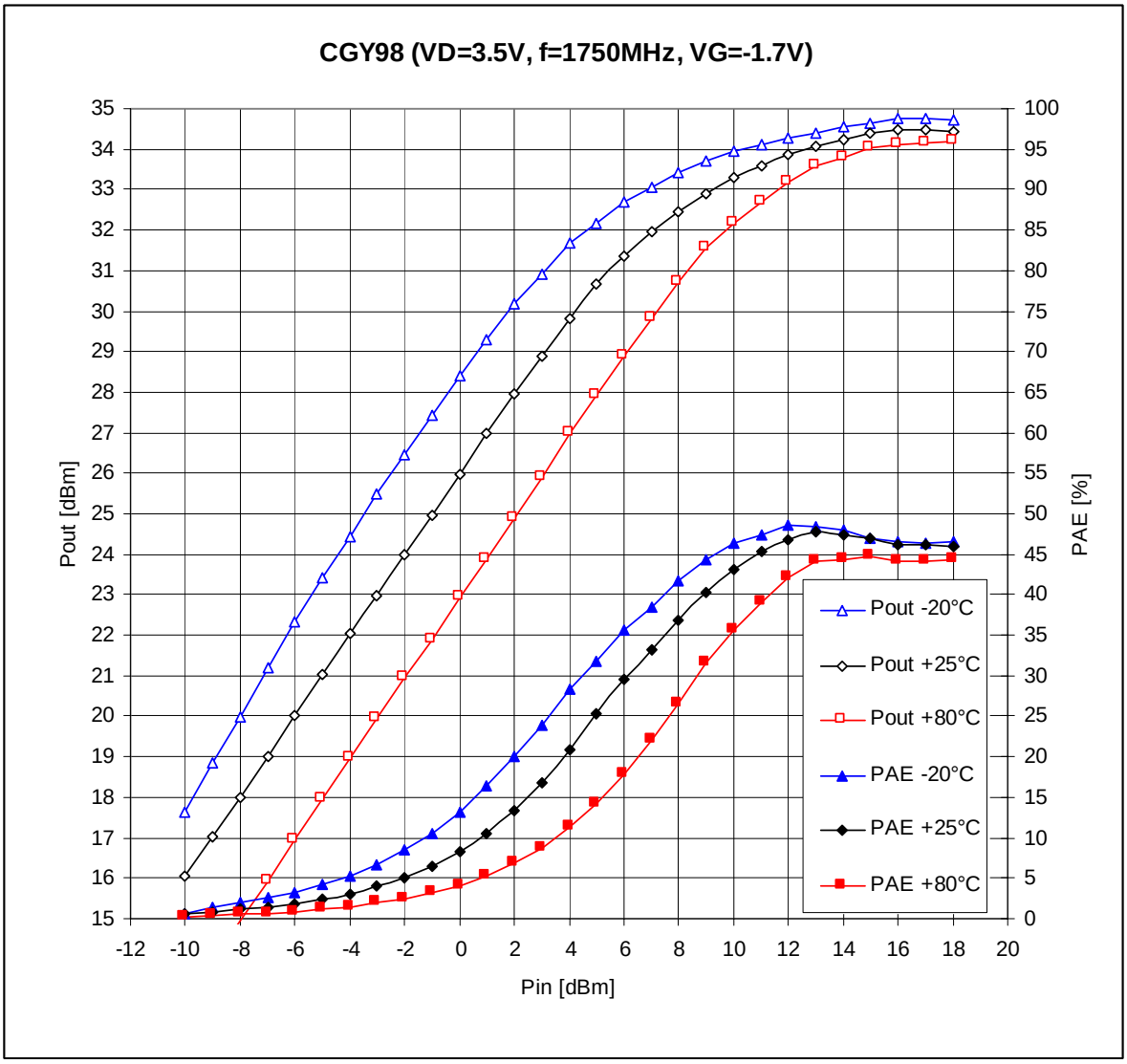

CGY98 (f=1750MHz,VG=-1.9V,VD=2.8V)
Pout [dBm]
PAE [%]
Pin [dBm]
Pout[dBm]
PAE[%]


CGY98 (Pin=15dBm,VG=-1.7V,VD=3.5V)
Pout[dBm]
PAE[%]
Pout [dBm]
PAE [%]
f [MHz]
36.5
36.0
35.5
35.0
34.5
34.0
33.5
60
55
50
45
40
35
30
1710
1725
1740
1755
1770
1785

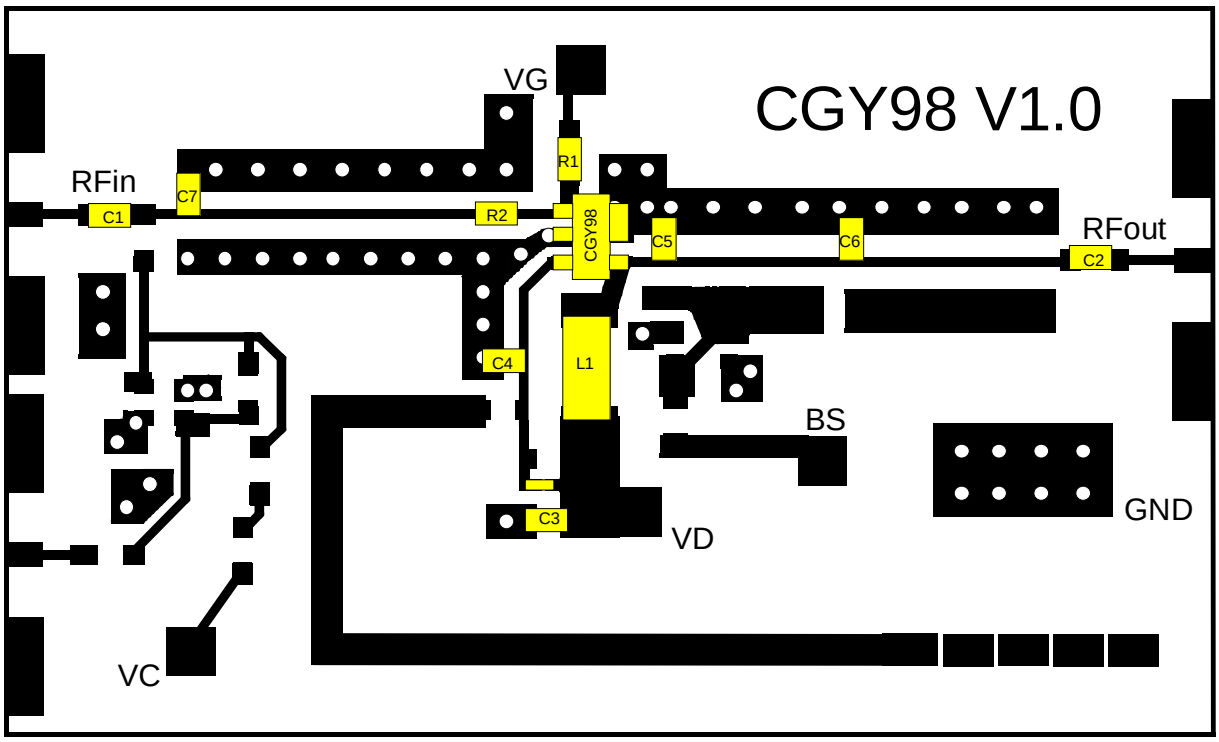

CGY98 (f=1750MHz,Pin=15dBm,VD=3.5V)
Pout[dBm]
PAE[%]
Pout [dBm]
PAE [%]
VG [V]
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
60
50
40
30
20
10
0
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5


CGY98 (f=1750MHz,Pin=15dBm,VG=-1.7V)
Pout[dBm]
PAE[%]
Pout [dBm]
PAE [%]
VD [V]
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
80
70
60
50
40
30
20
10
0
1
1.5
2
2.5
3
3.5
4
4.5
5

Temperature Characteristic PCN:



CGY98 GSM Application Board



Bordmaterial: FR4 / 0.2mm
Boardsize:49mm x 30mm

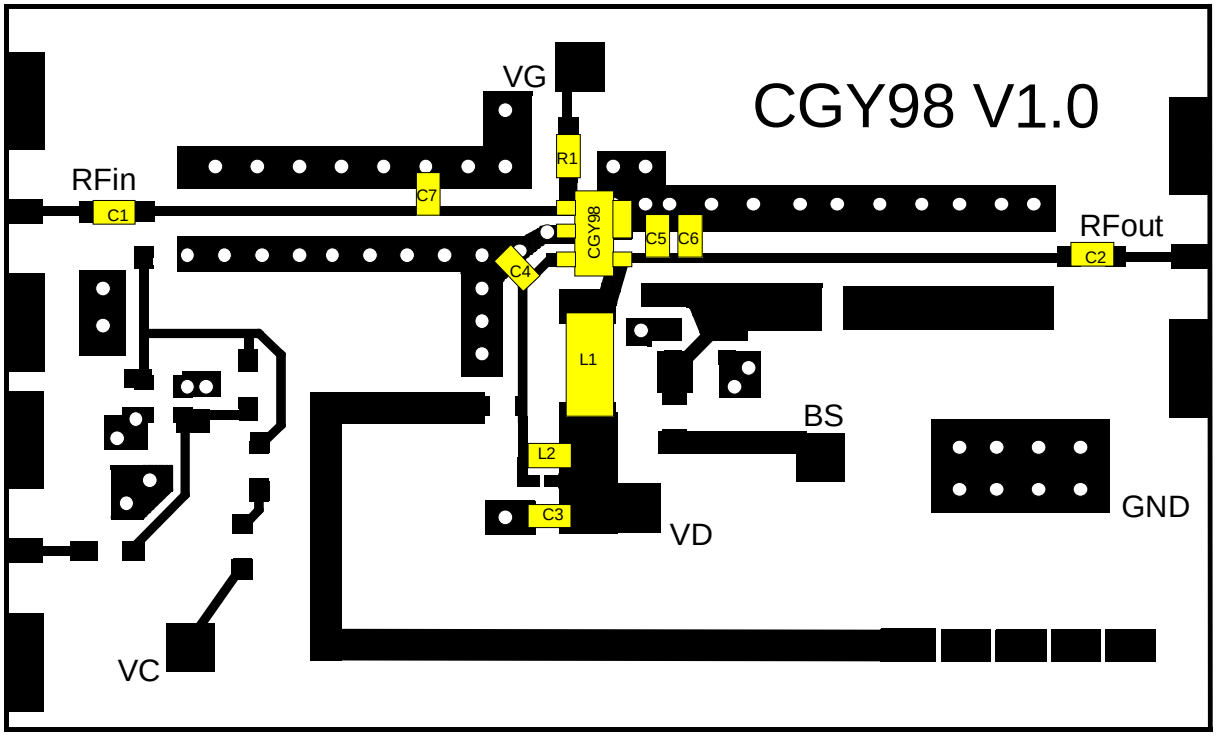
Part List:

	Value	Part Type		Value	Part Type
L1	33nH	*	C5	12pF	0603**
C1	1nF	0603	C6	6.8pF	0603**
C2	1nF	0603	C7	6.8pF	0603
C3	100nF	0603	R1	150 Ohm	0603
C4	1nF	0603	R2	6.8 Ohm	0603

* 33nH SMD-Inductor for drain3: Part Number BV1250
distribution by
Horst David GmbH, 85375 Neufarn, Germany
Phone-No ..8165/9548-0 , Fax-No ..8165/9548-28

** for maximum efficiency use high quality capacitors for the output matching: Part Number ACCU-P0603
distribution by
AVX GmbH, 85757 Karlsfeld, Germany
Phone-No ..8131/9004-0

CGY98 PCN Application Board



Bordmaterial: FR4 / 0.2mm
Boardsize:4.9mm x 3.0mm

Part List:

	Value	Part Type		Value	Part Type
L1	33nH	*	C5	3pF	0603**
L2	33nH	TOKO 0603 - LL1608	C6	3pF	0603**
C1	1nF	0603	C7	5.5pF	0603
C2	1nF	0603	R1	150 Ohm	0603
C3	100nF	0603			
C4	8pF	0402			

* 33nH SMD-Inductor for drain3: Part Number BV1250
distribution by
Horst David GmbH, 85375 Neufarn, Germany
Phone-No ..8165/9548-0 , Fax-No ..8165/9548-28

** for maximum efficiency use high quality capacitors for the output matching: Part Number ACCU-P0603
distribution by
AVX GmbH, 85757 Karlsfeld, Germany
Phone-No ..8131/9004-0

Determination of Permissible Total Power Dissipation for Continuous and Pulse Operation

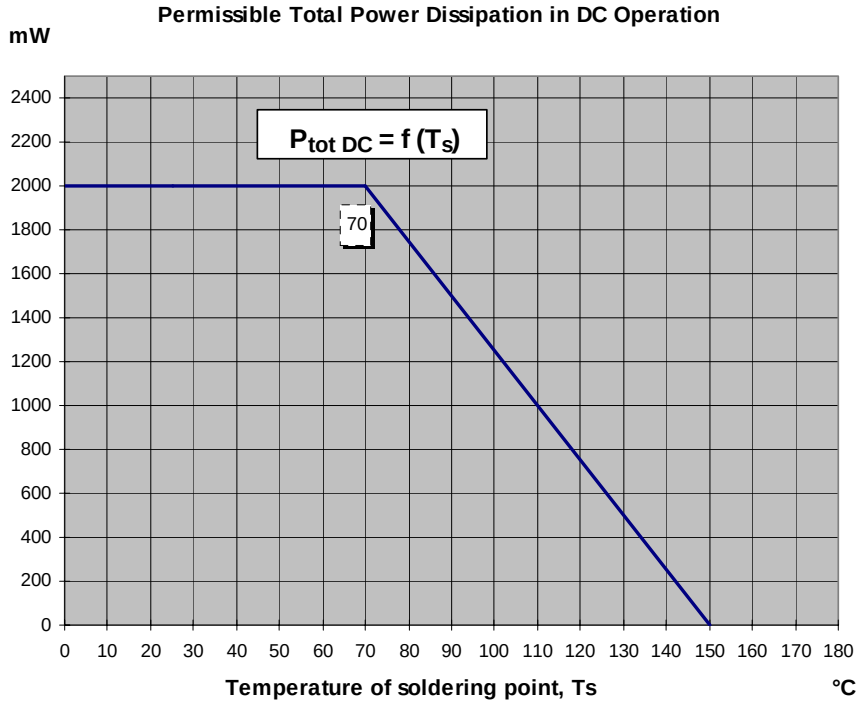
The dissipated power is the power which remains in the chip and heats the device. It does not contain RF signals which are coupled out consistently.

a) Continuous Wave / DC Operation

For the determination of the permissible total power dissipation $\mathbf{P_{tot\text{-}DC}}$ from the diagram below it is necessary to obtain the temperature of the soldering point T_S first. There are two cases:

- When R_{thSA} (soldering point to ambient) is not known: Measure T_S with a temperature sensor at the leads were the heat is transferred from the device to the board (normally at the widest source or ground lead for GaAs). Use a small sensor of low heat transport, for example a thermoelement (< 1mm) with thin wires or a temperature indicating paper while the device is operating.

- When R_{thSA} is already known: $T_S = P_{diss} \times R_{thSA} + T_A$



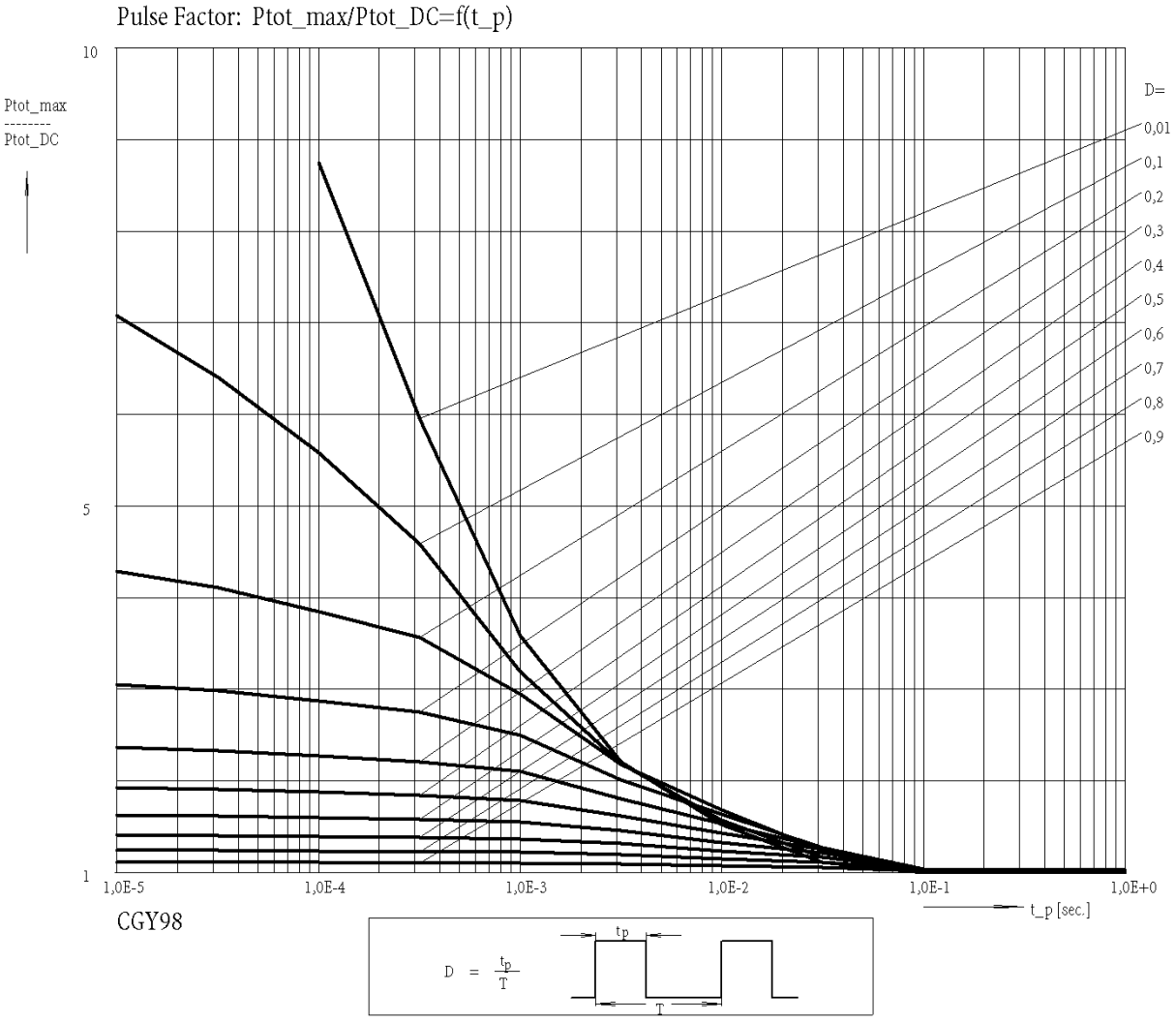
b) Pulsed Operation

For the calculation of the permissible pulse load $P_{tot\text{-}max}$ the following formula is applicable:

$$P_{tot\text{-}max} = P_{tot\text{-}DC} \times \text{Pulse factor}$$
$$= P_{tot\text{-}DC} \times (P_{tot\text{-}max} / P_{tot\text{-}DC})$$

Use the values for $P_{tot\text{-}DC}$ as derived from the above diagram and for the pulse factor $= P_{tot\text{-}max} / P_{tot\text{-}DC}$ from the following diagram to get a specific value.

Pulse factor:



$P_{tot\text{-}max}$ should not exceed the absolute maximum ratings for the dissipated power P_{Pulse} = " Pulse peak power "

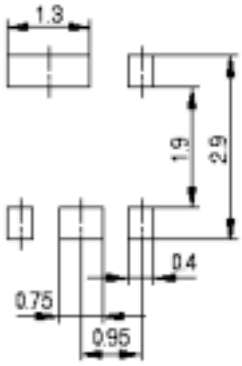
c) Reliability Considerations

This procedure yields the upper limit for the power dissipation for continuous wave (cw) and pulse applications which corresponds to the maximum allowed channel temperature. For best reliability keep the channel temperature low. The following formula allows to track the individual contributions which determine the channel temperature.

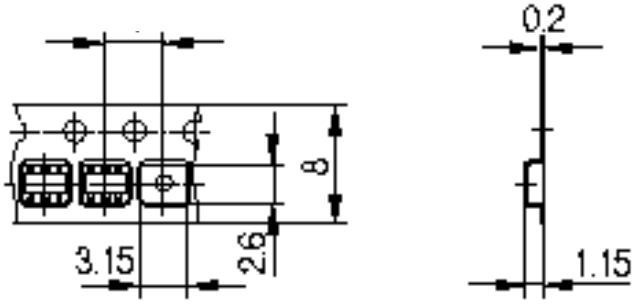
T_{ch} =	(P_{diss} / Pulse Factor x	R_{thChS}) +	T_S
Channel temperature (= junction temperature)	Power dissipated in the chip, devided by the applicable puls factor (= 1 for DC and CW). It does not contain decoupled RF-power	Rth of device from channel to soldering point	Temperature of soldering point, measured or calculated

Packaging :

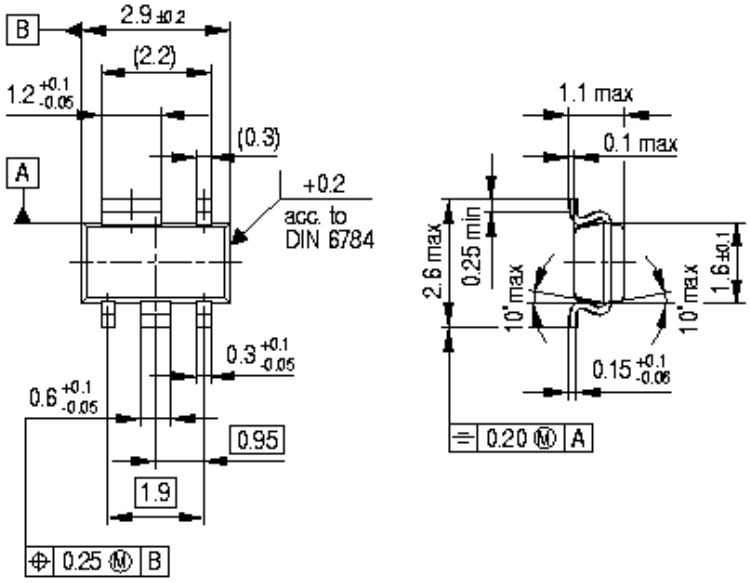
Recommended footprint



Tape and Reel



Package dimensions



soldering recommendation

• **Foot Print**	drawing C63060-A2120-A001-01-0027	
• **Soldering**	wave soldering:	unsuitable
	reflow soldering: (IR or VPR)	suitable, max. 3 times
soldering profile:		
ramp-up preheating	temperature gradient:	max. + 2 K/sec
	time at 100 - 150 °C:	min. 90 sec.
ramp-up peak	temperature gradient	max. + 6 K/sec
exposure to molten solder	above 183°C	max. 150 sec
typ. solder temperature	typ. 215-245°C	max. 30 sec.
peak temperature	max. peak 260°C	max. 10 sec.
ramp-down	temperature gradient:	min. **-** 6°C/sec
	(see also soldering standard profile of databook 'package information')	
comments	slow ramp-up, long preheating phase and low max. temperature recommended	
• **Solder paste thickness**	150 - 200 µm	
• **Control of soldering** (voids)	- visual inspection - cross sectioning - measurement of case temperature / thermal resistance case to ambient	
• **Jedec A-112A**	level 1	storage floor life at 30°C/90% unlimited
• **IPC-9501 (IPC-4202)**	level 111	storage floor life at 30°C/60% unlimited IR/Convection; max. 245°C; < 6K/sec.

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