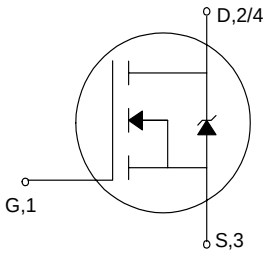
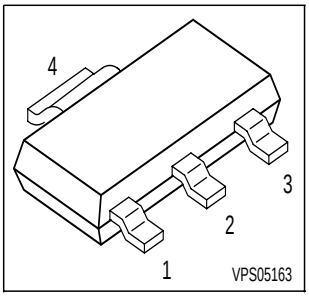
Preliminary data

SPN01N60S5

Cool MOS™ Small-Signal-Transistor

- New revolutionary high voltage technology
- Ultra low gate charge
- Extreme d*v*/d*t* rated
- Optimized capacitances
- Improved noise immunity





COOLMOS Power Semiconductors

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Marking	Ordering Code
SPN01N60S5	600 V	0.3 A	6 Ω	SOT-223	01N60S5	Q67040-S4208

Maximum Ratings, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current T_A = 25 °C T_A = 70 °C	I_D	 0.3 0.2	A
Pulsed drain current, t_p = 1ms [1)] T_A = 25 °C	$I_{D\ puls}$	1.6	
Reverse diode d*v*/d*t* I_S = 0.3 A, V_{DS}<V_{DSS}, d*i*/d*t* = 100 A/µs, T_{jmax} = 150 °C	d*v*/d*t*	6	kV/µs
Gate source voltage	V_{GS}	±20	V
Power dissipation T_A = 25 °C	P_{tot}	1.8	W
Operating and storage temperature	T_j , T_{stg}	-55... +150	°C

Electrical Characteristics

Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Thermal Characteristics					
Thermal resistance, junction - soldering point	R_{thJS}	-	35	-	K/W
SMD version, device on PCB:	R_{thJA}				K/W
@ min. footprint		-	110	-	
@ 6 cm^2 cooling area [2)]		-	-	72	
Static Characteristics					
Drain- source breakdown voltage V_{GS} = 0 V, I_D = 0.25 mA	$V_{(BR)DSS}$	600	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = 1 mA, T_j = 25 °C	$V_{GS(th)}$	2.3	3	3.7	
Zero gate voltage drain current, V_{DS}=V_{DSS}	I_{DSS}				µA
V_{GS} = 0 V, T_j = 25 °C		-	0.5	1	
V_{GS} = 0 V, T_j = 150 °C		-	-	50	
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0 V	I_{GSS}	-	-	100	nA
Drain-Source on-state resistance V_{GS} = 10 V, I_D = 0.2 A	$R_{DS(on)}$	-	5.5	6	Ω

[1] current limited by T_{jmax}

[2] Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6 cm2 (one layer, 70µm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics

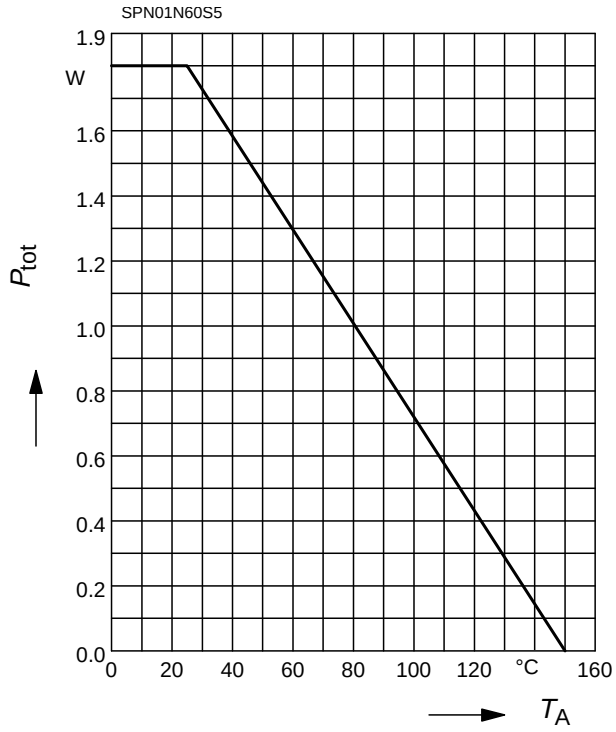
Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Transconductance $V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D = 0.2 A	g_{fs}	-	0.45	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	100	-	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	70	-	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	-	7	-	
Turn-on delay time V_{DD} = 350 V, V_{GS} = 10 V, I_D = 0.3 A, R_G = 100 Ω	$t_{d(on)}$	-	25	-	ns
Rise time V_{DD} = 350 V, V_{GS} = 10 V, I_D = 0.3 A, R_G = 100 Ω	t_r	-	15	-	
Turn-off delay time V_{DD} = 350 V, V_{GS} = 10 V, I_D = 0.3 A, R_G = 100 Ω	$t_{d(off)}$	-	100	-	
Fall time V_{DD} = 350 V, V_{GS} = 10 V, I_D = 0.3 A, R_G = 100 Ω	t_f	-	30	-	

Electrical Characteristics

Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Gate Charge Characteristics					
Gate to source charge V_{DD} = 350 V, I_D = 0.3 A	Q_{gs}	-	0.95	-	nC
Gate to drain charge V_{DD} = 350 V, I_D = 0.3 A	Q_{gd}	-	1.5	-	
Total gate charge V_{DD} = 350 V, I_D = 0.3 A, V_{GS} = 0 to 10 V	Q_g	-	2.9	-	
Reverse Diode					
Inverse diode continuous forward current T_C = 25 °C	I_S	-	-	0.3	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	1.6	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 0.3 A	V_{SD}	-	0.85	1.05	V
Reverse recovery time V_R = 100 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	200	-	ns
Reverse recovery charge V_R = 100 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	0.45	-	µC

Power Dissipation

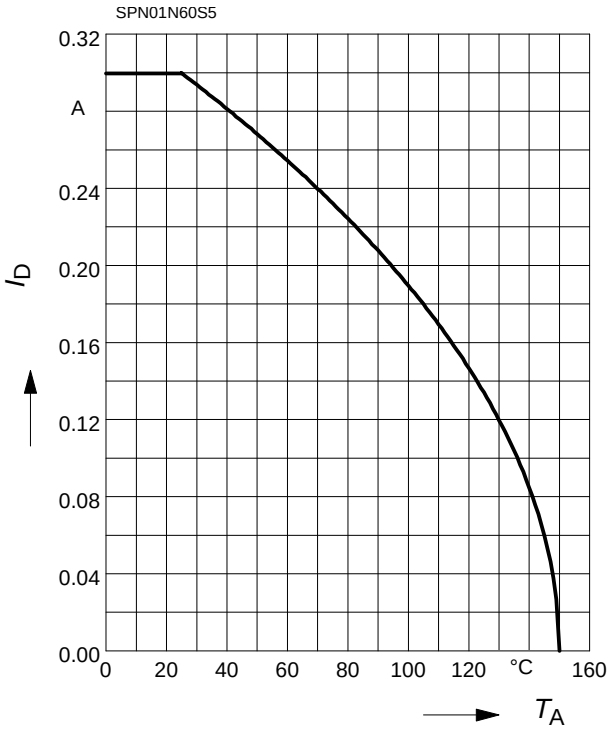
$P_{tot} = f(T_A)$



Drain current

$I_D = f(T_A)$

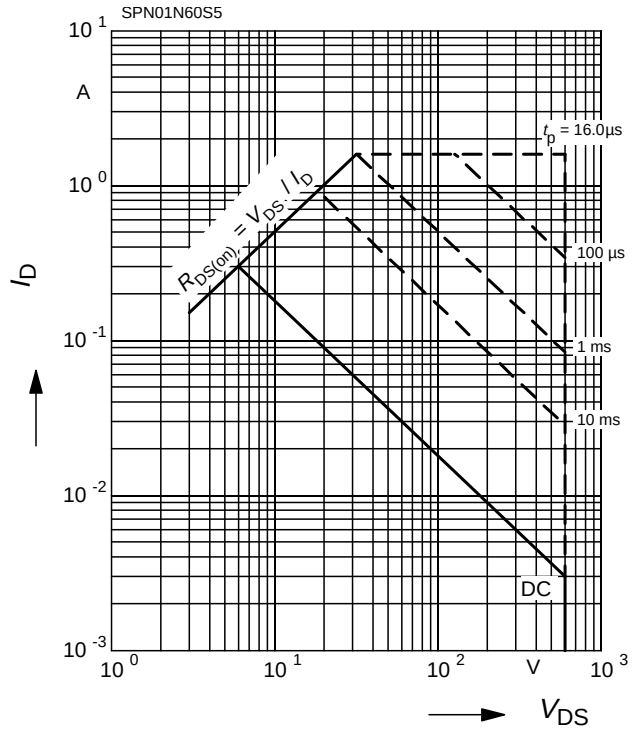
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

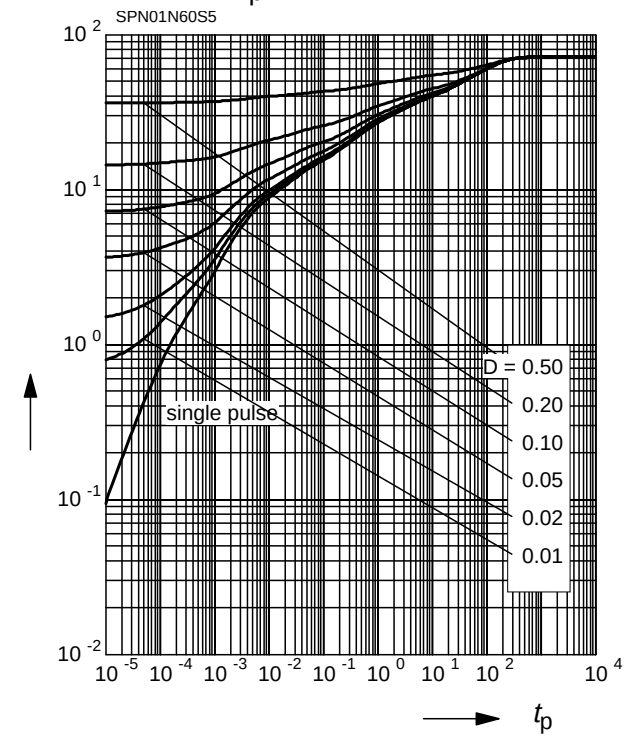
parameter: D=0.01, T_C=25°C



Transient thermal impedance

$Z_{thJS} = f(t_p)$

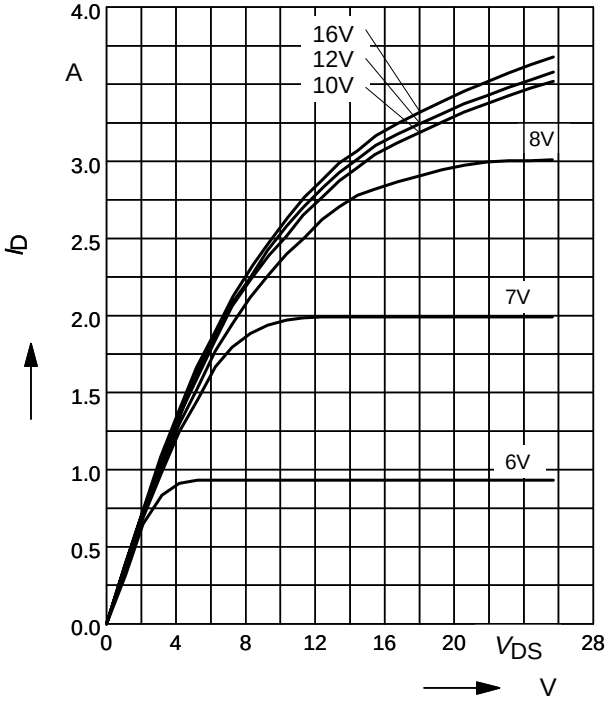
parameter : $D = t_p / T$



Typ. output characteristic

I_D = f (V_{DS})

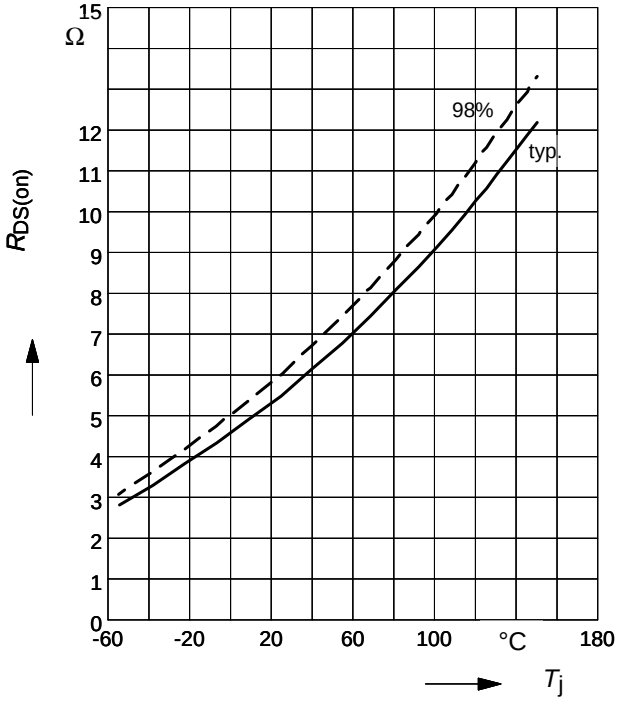
Parameter: V_{GS}, T_j = 25 °C



Drain-source on-resistance

$R_{DS(on)} = f(T_j)$

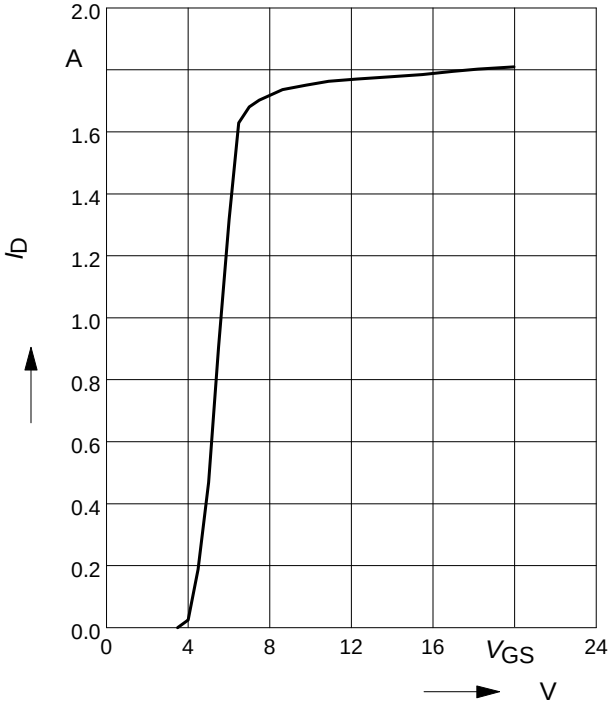
parameter : I_D = 0.2 A, V_{GS} = 10 V



Typ. transfer characteristics

$I_D = f(V_{GS})$

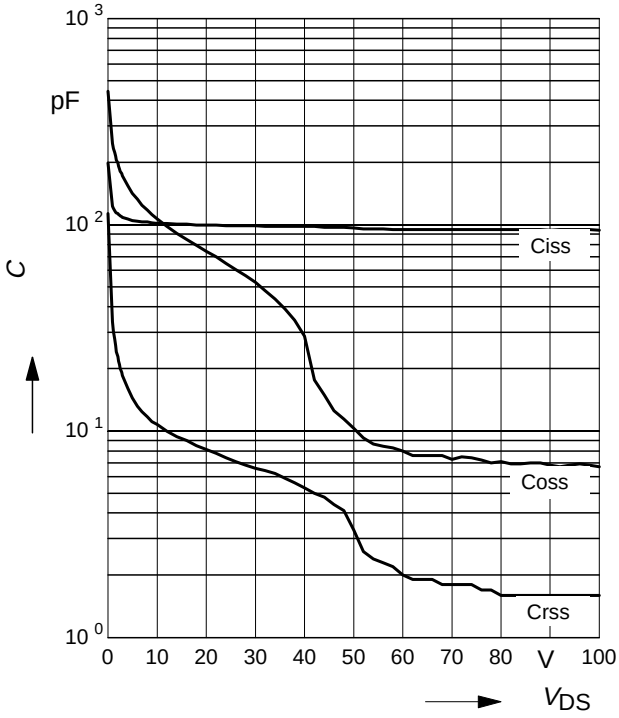
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Typ. capacitances

$C = f(V_{DS})$

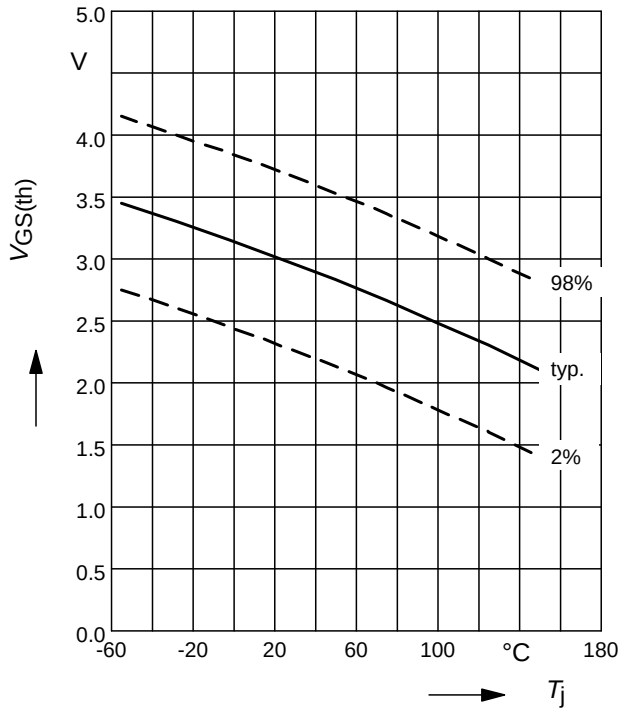
parameter: V_{GS}=0 V, f=1 MHz



Gate threshold voltage

$V_{GS(th)} = f(T_j)$

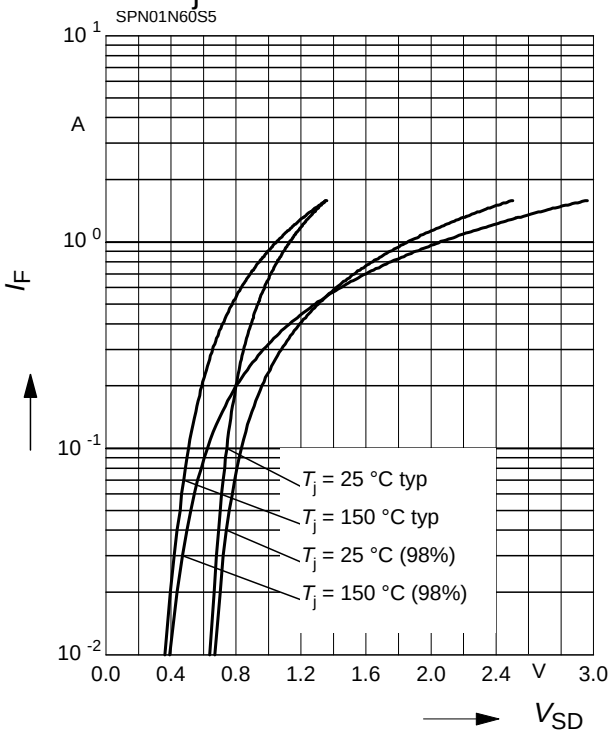
parameter: $V_{GS} = V_{GS}$, I_D = 1 mA



Forward characteristics of reverse diode

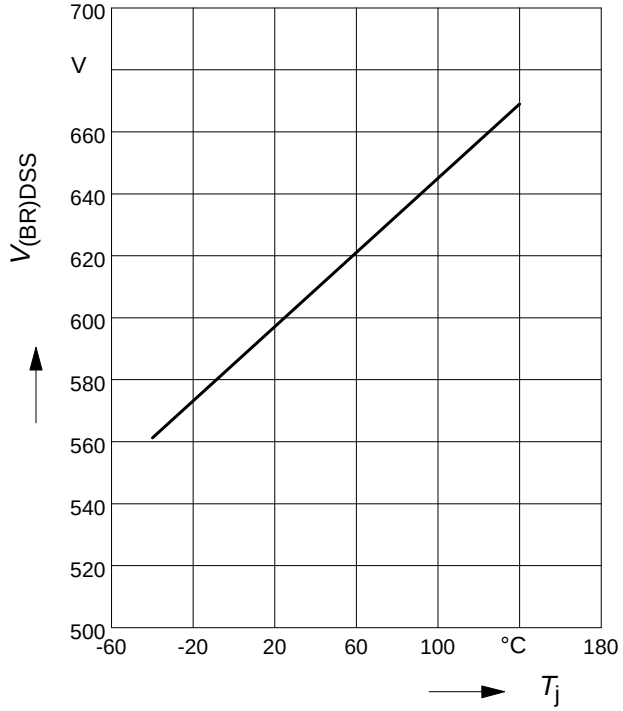
$I_F = f(V_{SD})$

parameter: T_j , tp = 80 µs



Drain-source break down voltage

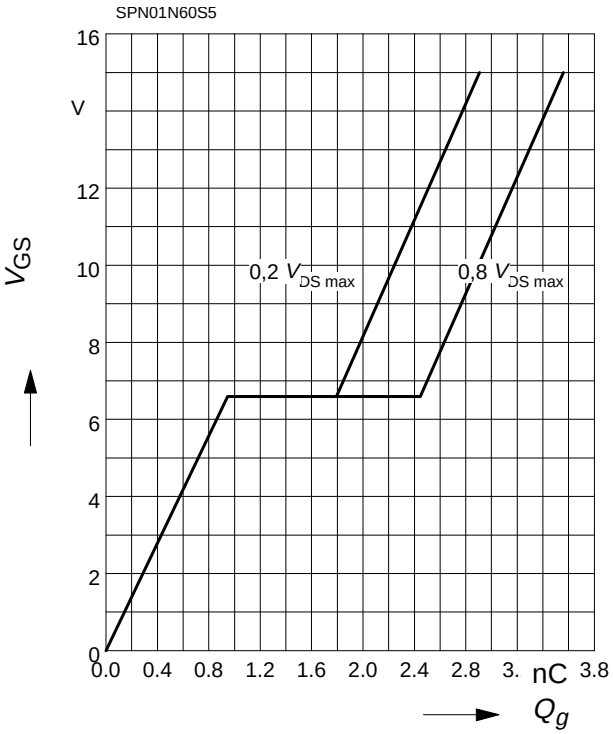
$V_{(BR)DSS} = f(T_j)$

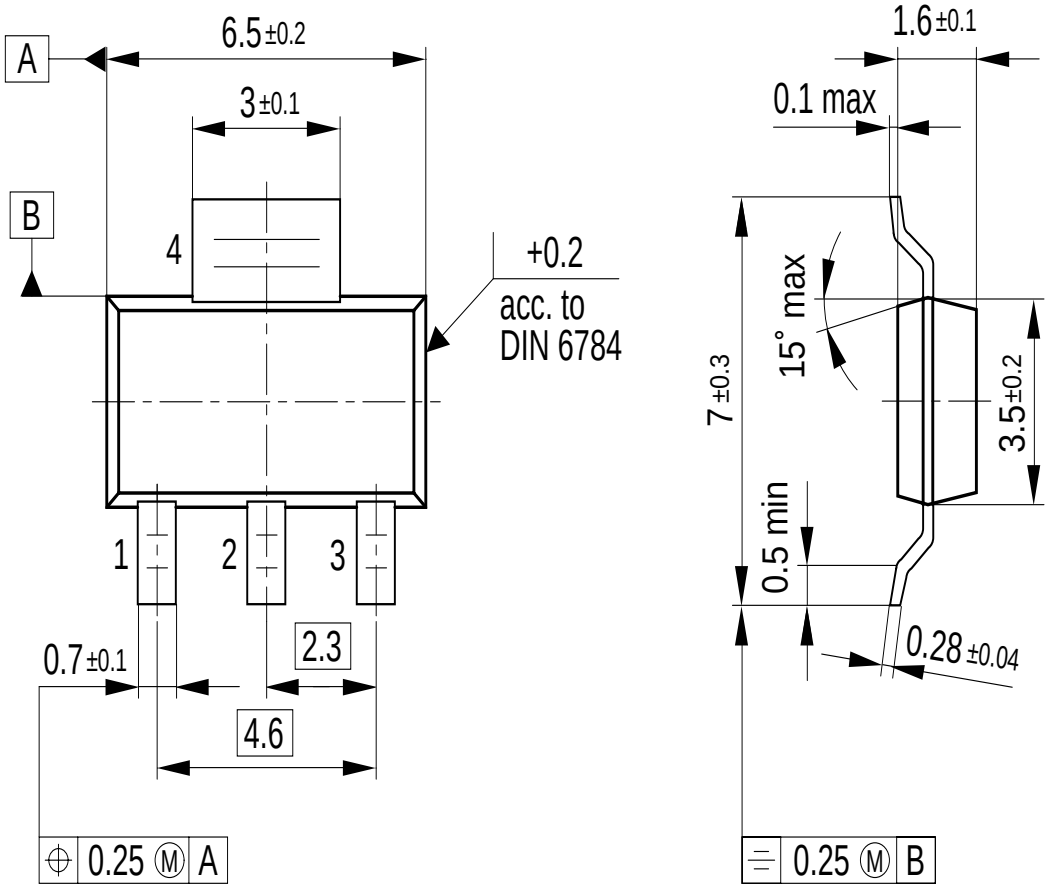


Typ. gate charge

$V_{GS} = f(Q_{Gate})$

parameter: I_D = 0.3 A pulsed




A
6.5±0.2
3±0.1
B
4
+0.2
acc. to
DIN 6784
1
2
3
0.7±0.1
2.3
4.6
0.25 M A
1.6±0.1
0.1 max
15° max
7±0.3
3.5±0.2
0.5 min
0.28±0.04
0.25 M B

GPS05560

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