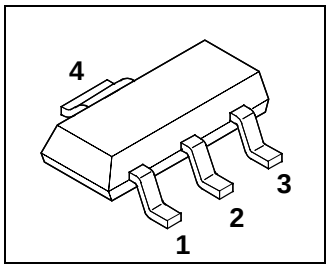
MiniPROFET

- High-side switch
- Short-circuit protection
- Overtemperature protection with hysteresis
- Overload protection
- Overvoltage protection
- Reverse battery protection[1)]
- Switching inductive load
- Clamp of negative output voltage with inductive loads
- Maximum current internally limited



Package: SOT 223

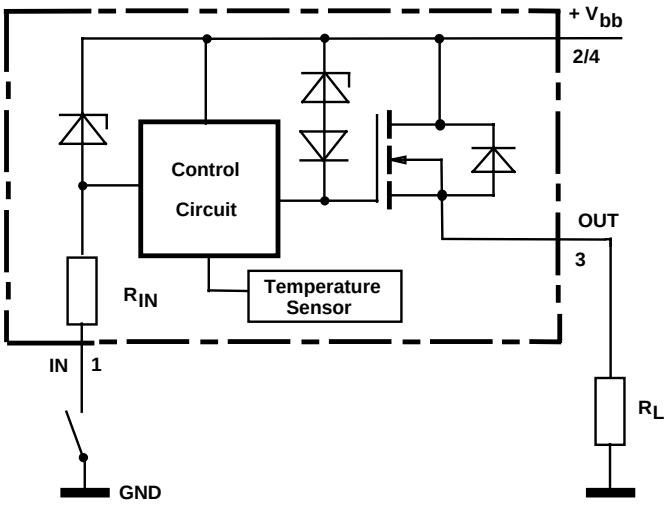
Type	Ordering code
BSP 350	Q67000-S227

Pins:

1	2	3	4
IN	V_{bb}	OUT	V_{bb}

Maximum Ratings

Parameter		Symbol	Values	Unit
Supply voltage		V_{bb}	50	V
Load current	self-limited	I_L	$I_{L(SC)}$	A
Maximum current through input pin (DC) see internal circuit diagram		I_{IN}	±15	mA
Inductive load switch-off energy dissipation		E_{AS}	5	mJ
Operating temperature range		T_j	-40 ...+150	°C
Storage temperature range		T_{stg}	-55 ...+150	
Max. power dissipation (DC)[2)]	T_A = 25 °C	P_{tot}	1.7	W
Thermal resistance	chip - soldering point:	R_{thJS}	17	K/W
	chip - ambient:[2)]	R_{thJA}	72	



[1)] For 12 V applications only. Reverse load current only limited by connected load.
[2)] BSP 350 on epoxy pcb 40 mm x 40 mm x 1.5 mm with 6 cm^2 copper area for V_{bb} connection

Electrical Characteristics

Parameter and Conditions at T_j = 25 °C, V_{bb} = 13.5V unless otherwise specified	Symbol	Values			Unit
		min	typ	max	
Load Switching Capabilities and Characteristics					
On-state resistance (pin 2 to 3)					
I_L = 0.07 A, pin 1 = GND T_j = 25°C	R_{ON}	--	4	5	Ω
T_j = 150°C		--	8	10	
V_{bb} = 6 V, T_j = 25°C		--	5	10	
Nominal load current (pin 2 to 3)	$I_{L(ISO)}$	0.07	--	--	A
ISO Standard: $V_{ON} = V_{bb} - V_{OUT}$ = 0.5 V					
T_S = 85 °C					
Turn-on time to 90% V_{OUT}	t_{on}	--	60	100	µs
Turn-off time to 10% V_{OUT}	t_{off}	--	70	140	
R_L = 270 Ω					
Slew rate on	dV/dt_{on}	--	4	6	V/µs
10 to 30% V_{OUT}, R_L = 270 Ω					
Slew rate off	$-dV/dt_{off}$	--	2	6	
70 to 40% V_{OUT}, R_L = 270 Ω					
Input					
OFF state input current T_j = - 40...+150°C	$I_{IN(off)}$	--	--	0.05	mA
R_L = 270 Ω, $V_{OUT} \leq$ 0,1V					
ON state input current, (pin 1 grounded)[3]	$I_{IN(on)}$	--	0.3	1	mA
T_j = - 40...+150°C					
Operating Parameters					
Operating voltage (pin 1 grounded)[4]	$V_{bb(on)}$	4.9	--	45	V
T_j = - 40...+150°C					
Leakage current (pin 2 to 3, pin 1 open) T_j = 25°C	$I_{bb(off)}$	--	1	10	µA
T_j =150°C		--	1.2	10	

[3] Driver circuit must be capable to drive currents >1mA.

[4] Below V_{bb}=4.5 V typ. without chargepump, $V_{out} \approx V_{bb}$ - 2 V

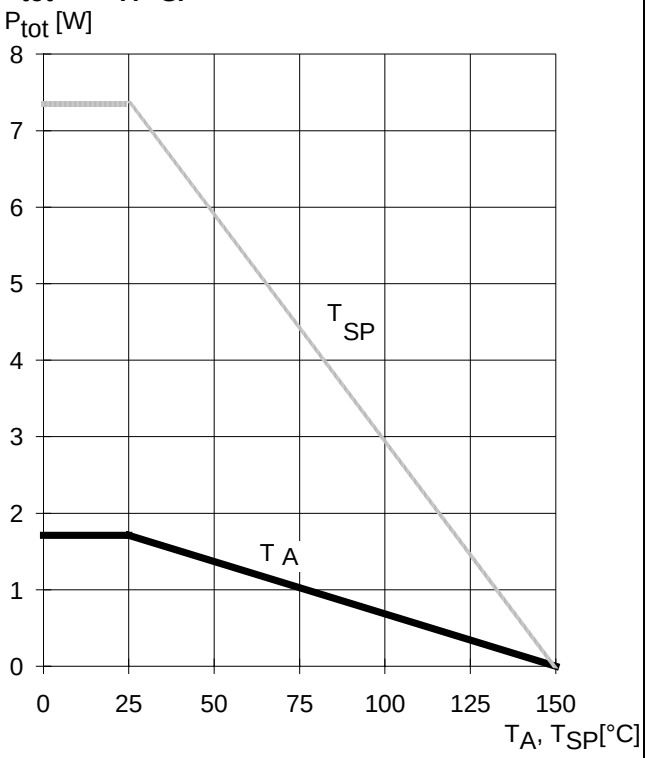
Parameter and Conditions at T_j = 25 °C, V_{bb} = 13.5V unless otherwise specified	Symbol	Values			Unit
		min	typ	max	
Protection Functions					
Current limit (pin 2 to 3)[5] T_j = 25°C T_j = -40...+150°	$I_{L(SC)}$	0.2 0.1	0.5 --	1 1.2	A
Thermal overload trip temperature	T_{jt}	150	--	--	°C
Thermal hysteresis	ΔT_{jt}	--	20	--	K
Overvoltage protection T_j =-40...+150°C	$V_{bbin(AZ)}$	50	56	--	V
Output clamp (ind. load switch off) at $V_{OUT} = V_{bb} - V_{ON(CL)}$	$V_{ON(CL)}$	--	56	--	V
Inductive load switch-off energy dissipation[6]	E_{AS}	--	--	5	mJ
Reverse battery resistor (pin 1 to 2)	R_{IN}	--	1	--	kΩ
Reverse Diode					
Continious reverse drain current T_j = 25°C	I_S	--	--	0.2	A
Pulsed reverse drain current T_j = 25°C	I_{SM}	--	--	0.8	A
Diode forward on voltage I_F = 0.2 A, I_{IN} = ≤ 0.05 mA	V_{SD}	--	0.9	1.2	V

[5] load current limits onset at $I_L * R_{on}$ approx. 1V
short circuit protection: combination of current limit and thermal overload switch off

[6] while demagnetizing load inductance, dissipated energy is $E_{AS} = \int (V_{ON(CL)} * i_L(t)\ dt$,
approx. $E_{AS} = {}^1/_2 * L * I_L^2 * \left(\frac{V_{ON(CL)}}{V_{ON(CL)} - V_{bb}} \right)$

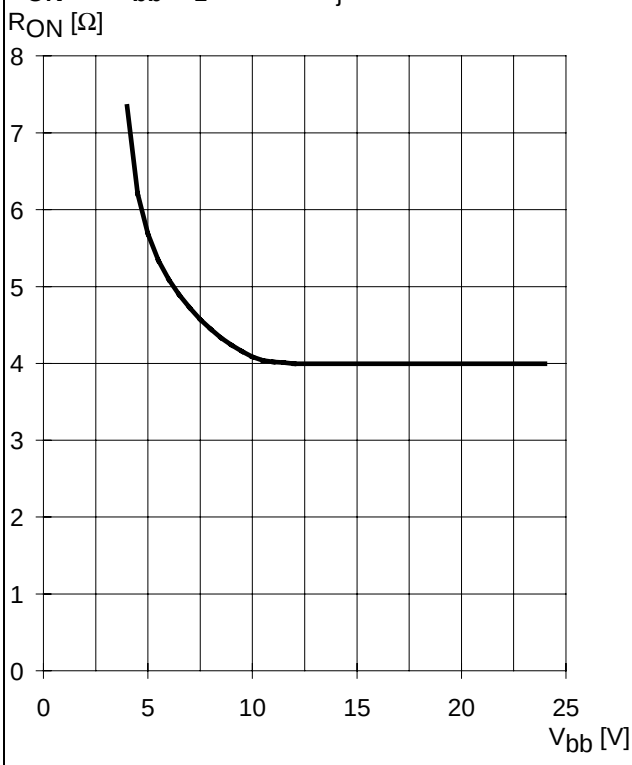
Max allowable power dissipation

$P_{tot} = f(T_A, T_{SP})$



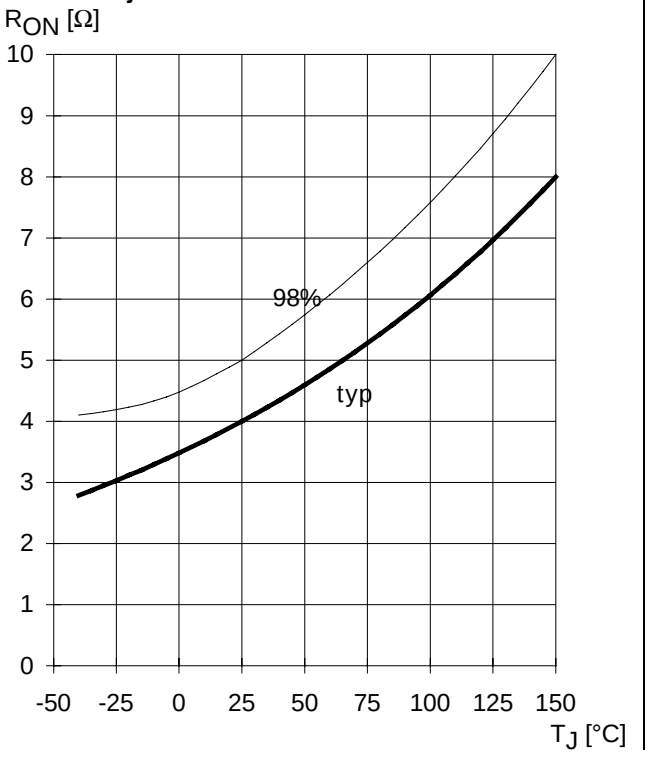
Typ. on state resistance (Vbb- pin to OUT pin)

$R_{ON} = f(V_{bb})$; I_L = 70 mA; T_j = 25°C



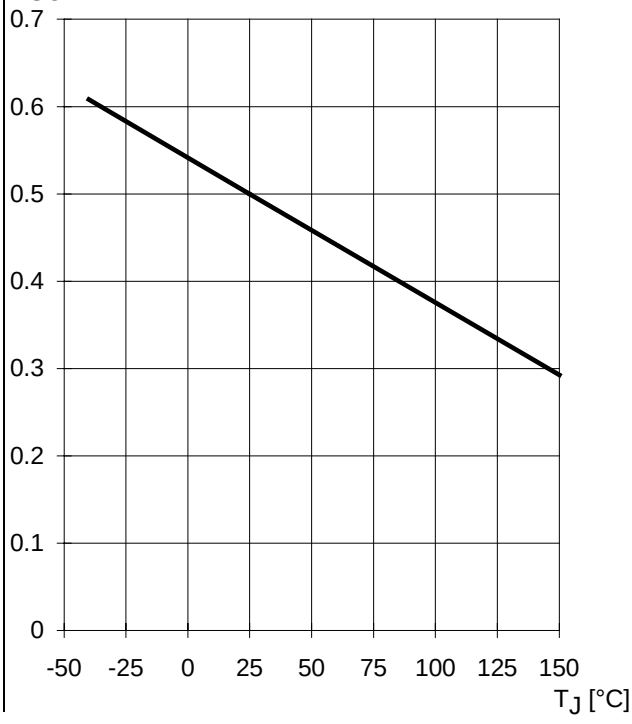
On state resistance (Vbb- pin to OUT pin)

$R_{ON} = f(T_j)$; V_{bb} = 13.5 V; I_L = 70 mA



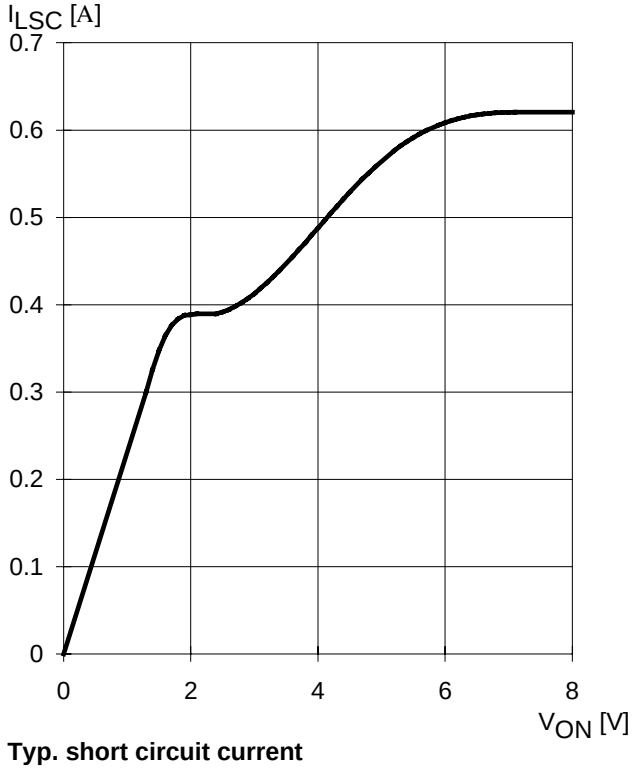
Typ. short circuit current

$I_{L(SC)} = f(T_j)$; V_{bb} = 13.5V



Typ. short circuit current

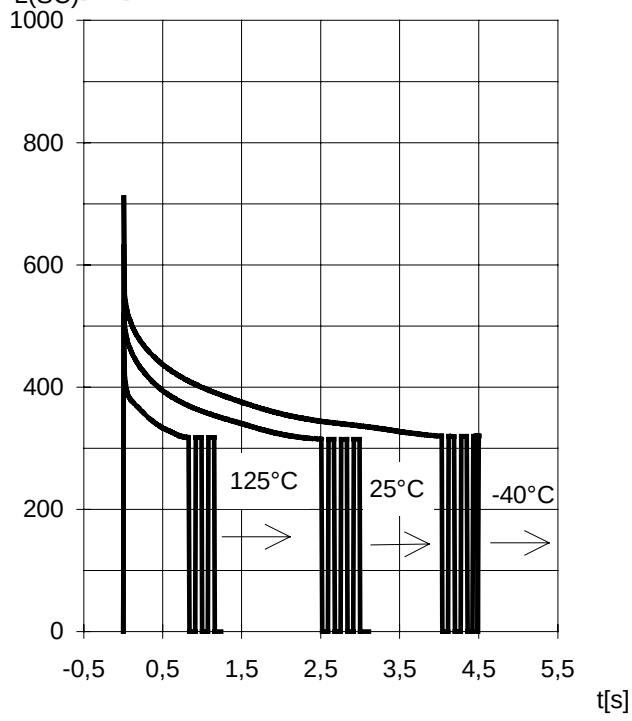
$I_{L(SC)} = f(V_{ON})$; V_{bb} = 13.5V; T_j = 25°C



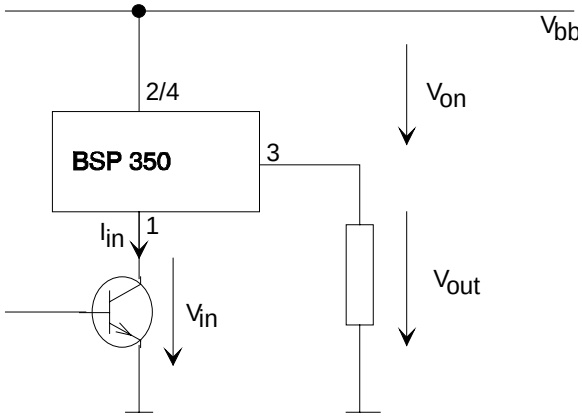
Typ. short circuit current

$I_{L(SC)} = f(t)$; V_{bb} = 13.5V

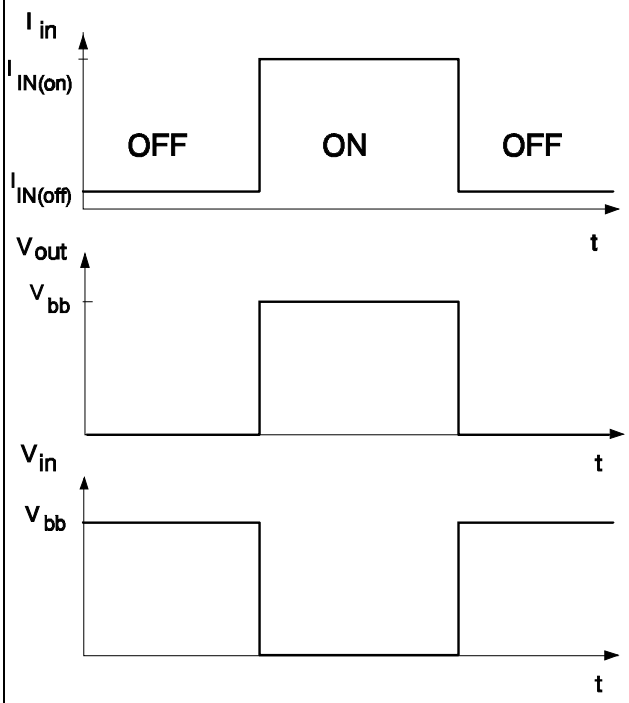
no heatsink; Parameter: T_{jStart}



Test circuit

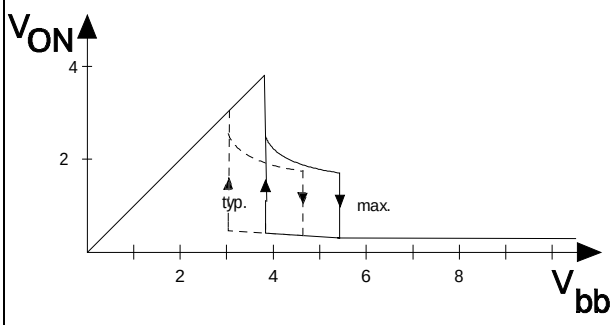


Turn on conditions



Chargepump threshold

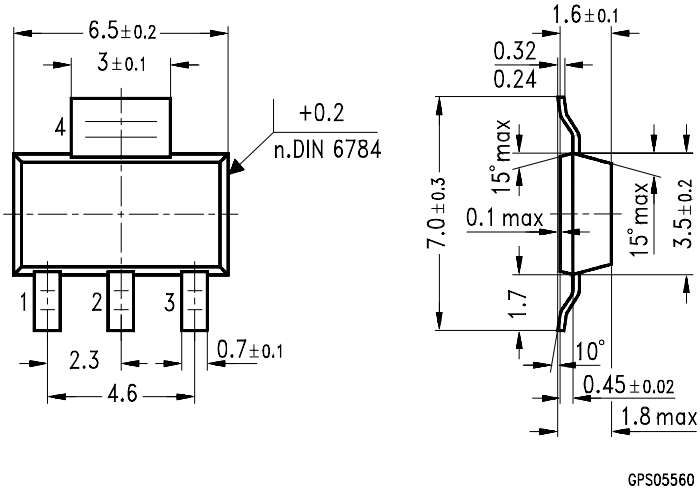
$V_{ON} = f(V_{bb})$



Package:

all dimensions in mm.

SOT 223/3:



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