AEC Qualified

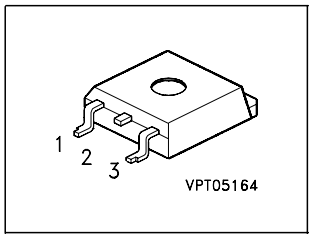
RoHS

Features

- Logic Level Input
- Input Protection (ESD)
- Thermal shutdown with latch
- Short circuit and Overload protection
- Overvoltage protection
- Current limitation
- Status feedback with external input resistor
- Analog driving possible
- AEC qualified
- Green product (RoHS compliant)

Product Summary

Drain source voltage	V_{DS}	60	V
On-state resistance	$R_{DS(on)}$	50	mΩ
Current limit	$I_{D(lim)}$	21	A
Nominal load current	$I_{D(ISO)}$	7	A
Clamping energy	E_{AS}	2000	mJ

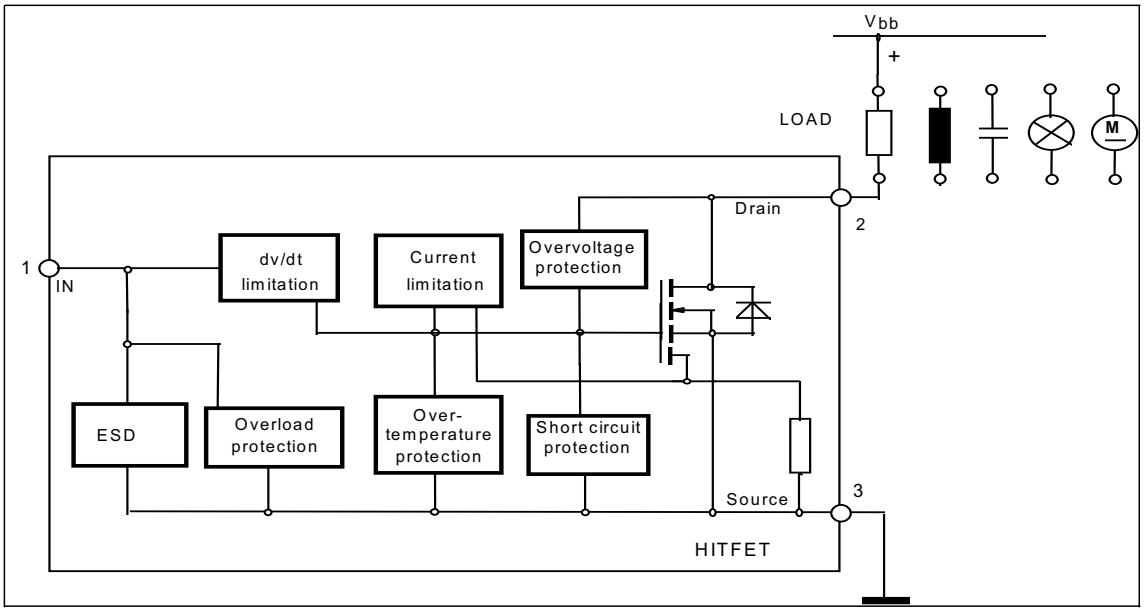


Application

- All kinds of resistive, inductive and capacitive loads in switching or linear applications
- µC compatible power switch for 12 V and 24 V DC applications
- Replaces electromechanical relays and discrete circuits

General Description

N channel vertical power FET in Smart SIPMOS® chip on chip technology. Providing embedded protection functions.



Maximum Ratings at Tj = 25 °C unless otherwise specified

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	60	V
Drain source voltage for short circuit protection	$V_{DS(SC)}$	32	
Continuous input current [1] $-0.2V \le V_{IN} \le 10V$ $V_{IN} < -0.2V$ or $V_{IN} > 10V$	I_{IN}	 no limit $\lvert I_{IN} \rvert \le 2$	mA
Operating temperature	T_j	- 40 ... +150	°C
Storage temperature	T_{stg}	- 55 ... +150	
Power dissipation T_C = 25 °C	P_{tot}	90	W
Unclamped single pulse inductive energy $I_{D(ISO)}$ = 7 A	E_{AS}	2000	mJ
Electrostatic discharge voltage (Human Body Model) according to MIL STD 883D, method 3015.7 and EOS/ESD assn. standard S5.1 - 1993	V_{ESD}	3000	V
Load dump protection $V_{LoadDump}$[2] = V_A + V_S V_{IN}=low or high; V_A=13.5 V t_d = 400 ms, R_I = 2 Ω, I_D=0,5*7A t_d = 400 ms, R_I = 2 Ω, I_D= 7A	V_{LD}	 90 74	

Thermal resistance

junction - case:	R_{thJC}	1.4	K/W
junction - ambient:	R_{thJA}	75	
SMD version, device on PCB: [3]	R_{thJA}	45	

[1] In case of thermal shutdown a minimum sensor holding current of 500 µA has to be guaranteed (see also page 3).

[2] $V_{Loaddump}$ is setup without the DUT connected to the generator per ISO 7637-1 and DIN 40839

[3] Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6cm^2 (one layer, 70µm thick) copper area for Drain connection. PCB mounted vertical without blown air.

Electrical Characteristics

Parameter at T_j=25°C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Drain source clamp voltage T_j = - 40 ...+ 150°C, I_D = 10 mA	$V_{DS(AZ)}$	60	-	73	V
Off state drain current V_{DS} = 32 V, T_j = -40...+150 °C, V_{IN} = 0 V	I_{DSS}	-	-	10	µA
Input threshold voltage I_D = 1,4 mA	$V_{IN(th)}$	1.3	1.7	2.2	V
Input current - normal operation, I_D<$I_{D(lim)}$: V_{IN} = 10 V	$I_{IN(1)}$	-	30	55	µA
Input current - current limitation mode, I_D=$I_{D(lim)}$: V_{IN} = 10 V	$I_{IN(2)}$	60	150	350	
Input current - after thermal shutdown, I_D=0 A: V_{IN} = 10 V	$I_{IN(3)}$	1000	2500	4000	
Input holding current after thermal shutdown [1)] T_j = 25 °C T_j = 150 °C	$I_{IN(H)}$	 500 300	 - -	 - -	
On-state resistance V_{IN} = 5 V, I_D = 7 A, T_j = 25 °C V_{IN} = 5 V, I_D = 7 A, T_j = 150 °C	$R_{DS(on)}$	 - -	 50 90	 60 120	mΩ
On-state resistance V_{IN} = 10 V, I_D = 7 A, T_j = 25 °C V_{IN} = 10 V, I_D = 7 A, T_j = 150 °C	$R_{DS(on)}$	 - -	 40 75	 50 100	
Nominal load current (ISO 10483) V_{IN} = 10 V, V_{DS} = 0.5 V, T_C = 85 °C	$I_{D(ISO)}$	7	-	-	A

[1] If the input current is limited by external components, low drain currents can flow and heat the device. Auto restart behaviour can occur.

Electrical Characteristics

Parameter at T_j=25°C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Initial peak short circuit current limit V_{IN} = 10 V, V_{DS} = 12 V	$I_{D(SCp)}$	-	65	-	A
Current limit [1] V_{IN} = 10 V, V_{DS} = 12 V, t_m = 350 µs, T_j = -40...+150 °C	$I_{D(lim)}$	21	28	40	
Dynamic Characteristics					
Turn-on time V_{IN} to 90% I_D: R_L = 2,2 Ω, V_{IN} = 0 to 10 V, V_{bb} = 12 V	t_{on}	--	40	100	µs
Turn-off time V_{IN} to 10% I_D: R_L = 2,2 Ω, V_{IN} = 10 to 0 V, V_{bb} = 12 V	t_{off}	--	70	170	
Slew rate on 70 to 50% V_{bb}: R_L = 2,2 Ω, V_{IN} = 0 to 10 V, V_{bb} = 12 V	$-dV_{DS}/dt_{on}$	--	1	3	V/µs
Slew rate off 50 to 70% V_{bb}: R_L = 2,2 Ω, V_{IN} = 10 to 0 V, V_{bb} = 12 V	dV_{DS}/dt_{off}	--	1	3	
Protection Functions [2]					
Thermal overload trip temperature	T_{jt}	150	165	-	°C
Unclamped single pulse inductive energy I_D = 7 A, T_j = 25 °C, V_{bb} = 32 V I_D = 7 A, T_j = 150 °C, V_{bb} = 32 V	E_{AS}	 2000 450	 - -	 - -	mJ
Inverse Diode					
Inverse diode forward voltage I_F = 5*7A, t_m = 300 µS, V_{IN} = 0 V	V_{SD}	-	1.08	-	V

[1] Device switched on into existing short circuit (see diagram Determination of $I_{D(lim)}$). If the device is in on condition and a short circuit occurs, these values might be exceeded for max. 50 µs.

[2] Integrated protection functions are designed to prevent IC destruction under fault conditions described in the data sheet. Fault conditions are considered as "outside" normal operating range. Protection functions are not designed for continuous repetitive operation.