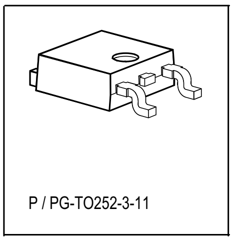
Features

- Logic Level Input
- Input Protection (ESD)
- Thermal shutdown
- Green product (RoHS compliant)
- Overload protection
- Short circuit protection
- Overvoltage protection
- Current limitation
- Analog driving possible

Product Summary

Drain source voltage	V_{DS}	42	V
On-state resistance	$R_{DS(on)}$	50	mΩ
Nominal load current	$I_{D(Nom)}$	3.5	A
Clamping energy	E_{AS}	3	J

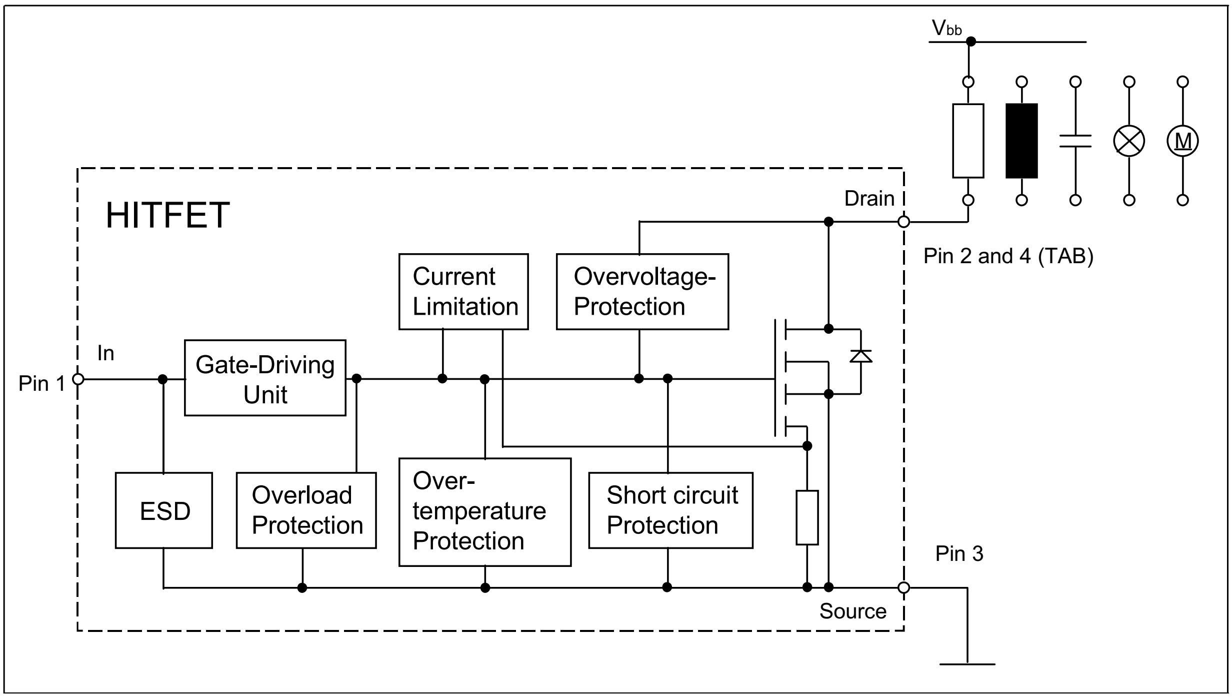


Application

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

General Description

N channel vertical power FET in Smart SIPMOS® technology. Fully protected by embedded protection functions.



Maximum Ratings at T_j = 25 °C, unless otherwise specified [1)]

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	42	V
Drain source voltage for short circuit protection T_j = -40 ... +150 °C	$V_{DS(SC)}$	30	
Continuous input current -0.2V ≤ V_{IN} ≤ 10V V_{IN} < -0.2V or V_{IN} > 10V	I_{IN}	 no limit $\| I_{IN} \| \leq 2$	mA
Operating temperature	T_j	-40 ... +150	°C
Storage temperature	T_{stg}	-55 ... +150	
Power dissipation [4)] T_C = 85 °C 6cm² cooling area , T_A = 85 °C	P_{tot}	 43 1.1	W
Unclamped single pulse inductive energy [1)]	E_{AS}	3	J
Load dump protection $V_{LoadDump}$[2)] = V_A + V_S V_{IN} = 0 and 10 V, t_d = 400 ms, R_I = 2 Ω, R_L = 4.5 Ω, V_A = 13.5 V	V_{LD}	65	V
Electro**s**tatic **d**ischarge voltage (Human Body Model) according to ANSI/ESDA/JEDEC JS-001 (1.5 kΩ, 100 pF)	V_{ESD}	2	kV

Thermal resistance

junction - case:	R_{thJC}	1.5	K/W
SMD: junction - ambient @ min. footprint @ 6 cm² cooling area [3)]	R_{thJA}	 115 55	

[1] Not subject to production test, specified by design.

[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 6cm² (one layer, 70µm thick) copper area for drain connection. PCB mounted vertical without blown air.

[4] Not subject to production test, calculated by R_{thJA}/R_{thJC} and maximum allowed junction temperature

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	$V_{DS(AZ)}$	42	-	55	V
Off-state drain current T_j = -40 ... +150 °C V_{DS} = 32 V, V_{IN} = 0 V	I_{DSS}	-	1.5	10	µA
Input threshold voltage I_D = 1.4 mA, T_j = 25 °C I_D = 1.4 mA, T_j = 150 °C	$V_{IN(th)}$	 1.3 0.8	 1.7 -	 2.2 -	V
On state input current	$I_{IN(on)}$	-	10	30	µA
On-state resistance V_{IN} = 5 V, I_D = 3 A, T_j = 25 °C V_{IN} = 5 V, I_D = 3 A, T_j = 150 °C	$R_{DS(on)}$	 - -	 45 75	 60 100	mΩ
On-state resistance V_{IN} = 10 V, I_D = 3 A, T_j = 25 °C V_{IN} = 10 V, I_D = 3 A, T_j = 150 °C	$R_{DS(on)}$	 - -	 35 65	 50 90	
Nominal load current [1)] T_j < 150 °C, V_{IN} = 10 V, T_A = 85 °C, SMD [2)]	$I_{D(Nom)}$	 3.5	 -	 -	A
Nominal load current [1)] V_{IN} = 10 V, V_{DS} = 0.5 V, T_C = 85 °C, T_j < 150 °C	$I_{D(ISO)}$	7.1	-	-	
Current limit (active if V_{DS} > 2.5 V) [3)] V_{IN} = 10 V, V_{DS} = 12 V, t_m = 200 µs	$I_{D(lim)}$	18	24	30	

1 Not subject to production test, calculated by R_{thJA} /R_{thJC} and $R_{DS(on)}$
2 @ 6 cm^2 cooling area
3 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.

Electrical Characteristics

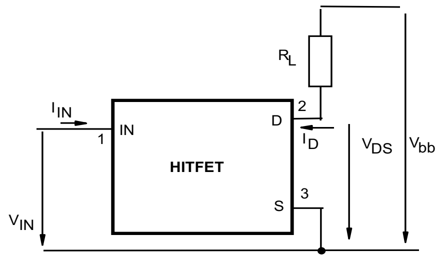
Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Turn-on time V_{IN} to 90% I_D: R_L = 4.7 Ω, V_{IN} = 0 to 10 V, V_{bb} = 12 V	t_{on}	-	60	100	µs
Turn-off time V_{IN} to 10% I_D: R_L = 4.7 Ω, V_{IN} = 10 to 0 V, V_{bb} = 12 V	t_{off}	-	60	100	
Slew rate on 70 to 50% V_{bb}: R_L = 4.7 Ω, V_{IN} = 0 to 10 V, V_{bb} = 12 V	$-dV_{DS}/dt_{on}$	-	0.3	1.5	V/µs
Slew rate off 50 to 70% V_{bb}: R_L = 4.7 Ω, V_{IN} = 10 to 0 V, V_{bb} = 12 V	dV_{DS}/dt_{off}	-	0.7	1.5	
Protection Functions[1]					
Thermal overload trip temperature	T_{jt}	150	175	-	°C
Input current protection mode	$I_{IN(Prot)}$	80	160	300	µA
Input current protection mode T_j = 150 °C	$I_{IN(Prot)}$	-	130	300	
Unclamped single pulse inductive energy [2] I_D = 3 A, T_j = 25 °C, V_{bb} = 12 V	E_{AS}	3	-	-	J
Inverse Diode					
Inverse diode forward voltage I_F = 15 A, t_m = 250 µs, V_{IN} = 0 V, t_P = 300 µs	V_{SD}	-	1.0	-	V

[1] 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.

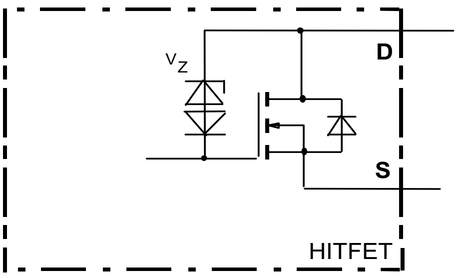
[2] Not tested, specified by design.

Block diagram

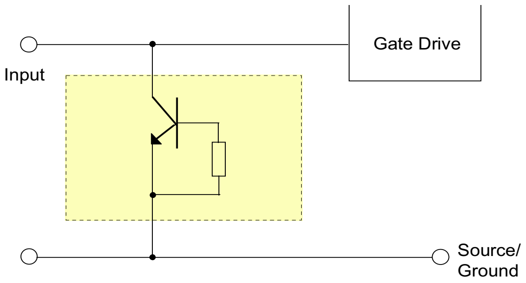
Terms



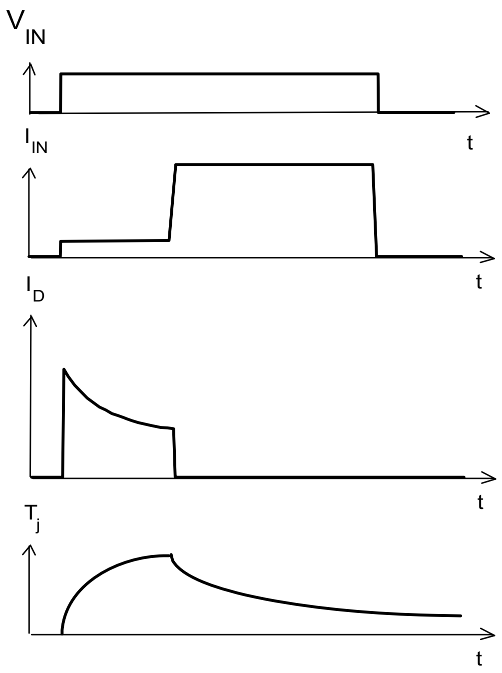
Inductive and overvoltage output clamp



Input circuit (ESD protection)



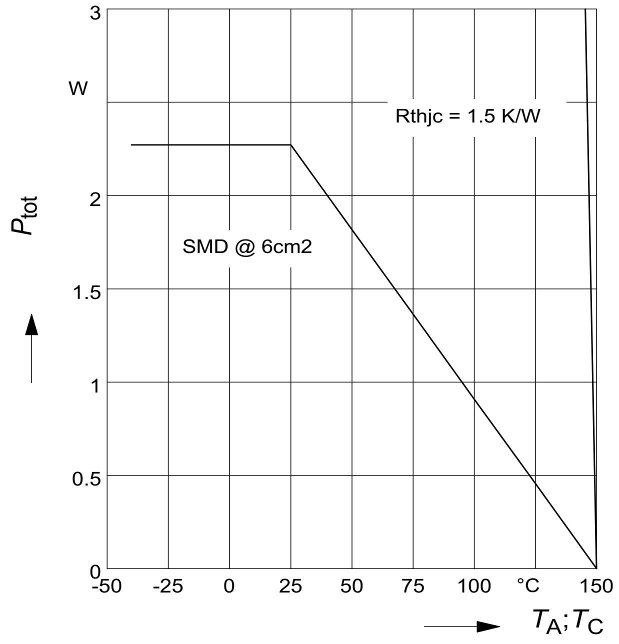
Short circuit behaviour



1 Maximum allowable power dissipation

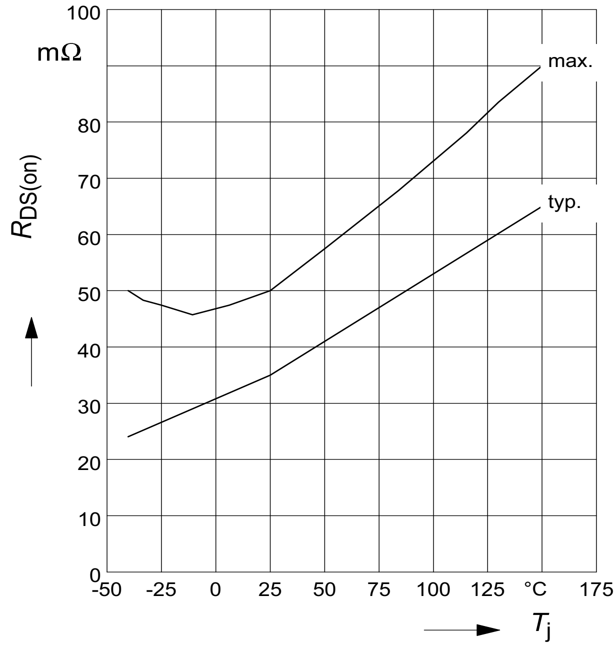
P_{tot} = f(T_C) resp.

P_{tot} = f(T_A) @ R_{thJA}=55 K/W



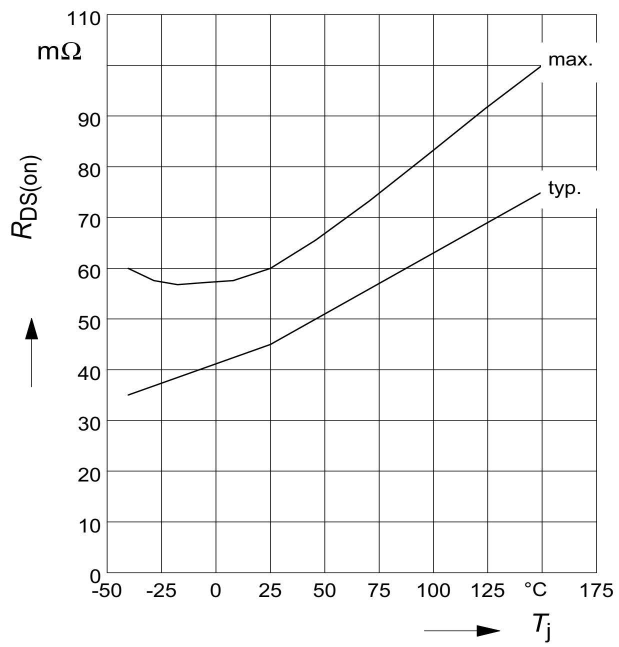
2 On-state resistance

R_{ON}=f(T_j); I_D=3A; V_{IN}=10V



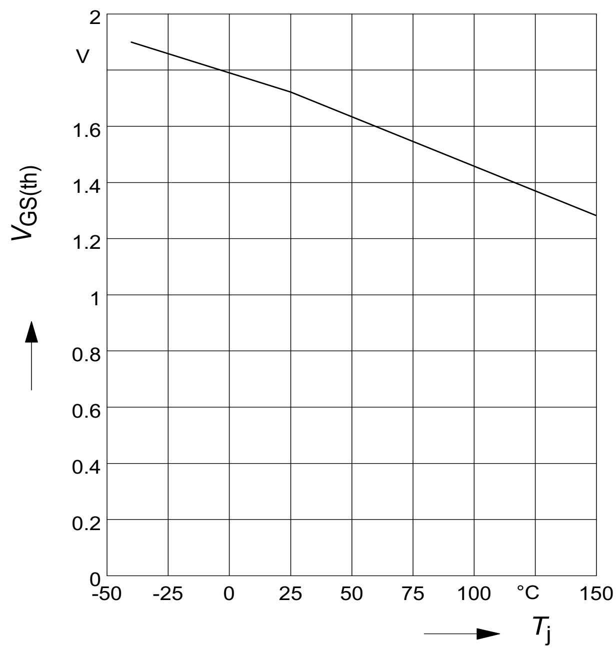
3 On-state resistance

R_{ON}=f(T_j); I_D=3A; V_{IN}=5V



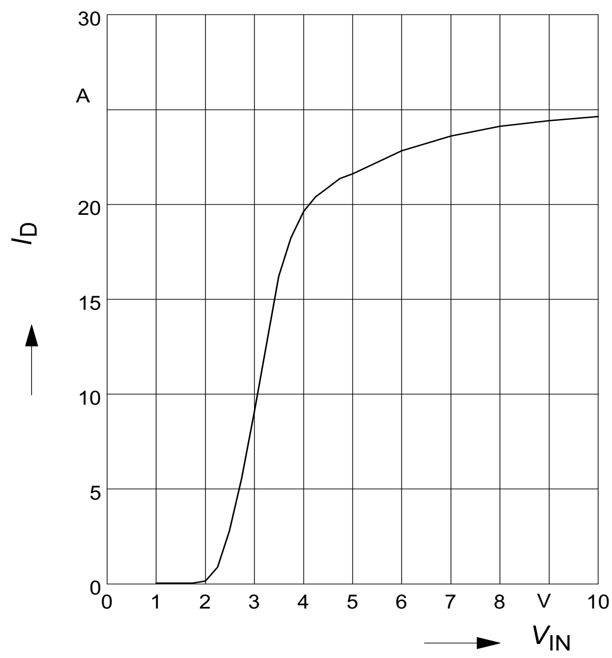
4 Typ. input threshold voltage

$V_{IN(th)}$ = f(T_j); I_D = 0.7 mA; V_{DS} = 12V



5 Typ. transfer characteristics

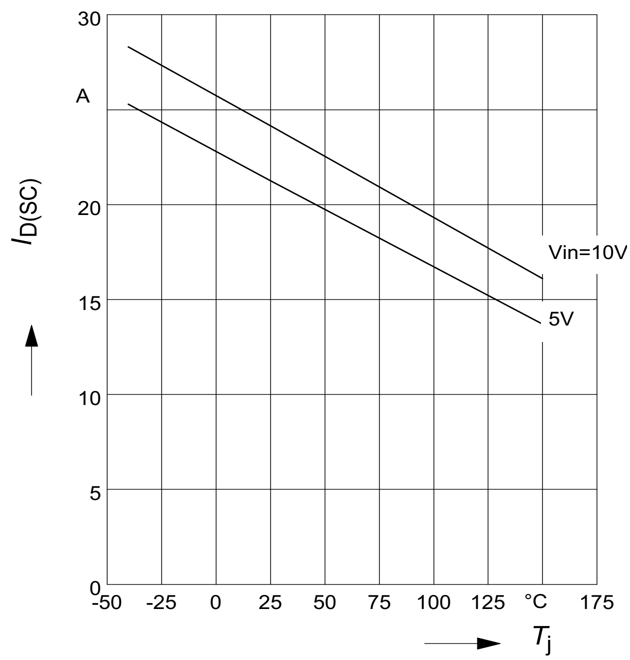
I_D=f(V_{IN}); V_{DS}=12V; T_{Jstart}=25 °C



6 Typ. short circuit current

$I_{D(lim)}$ = f(Tj); V_{DS}=12V

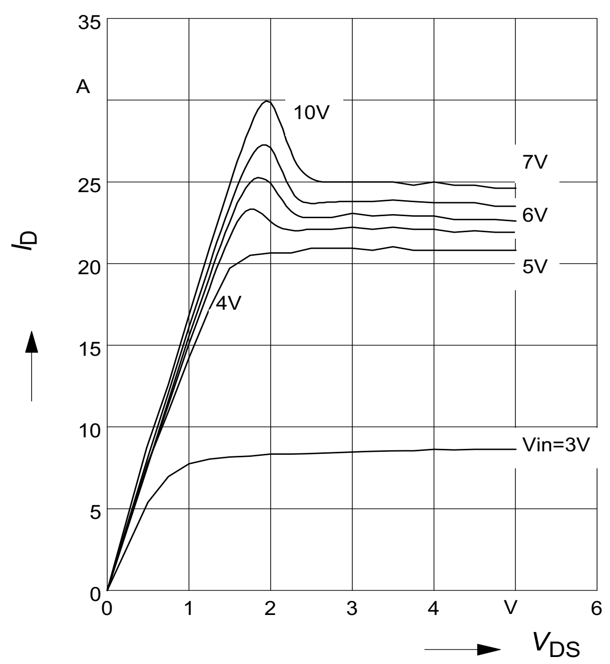
Parameter: V_{IN}



7 Typ. output characteristics

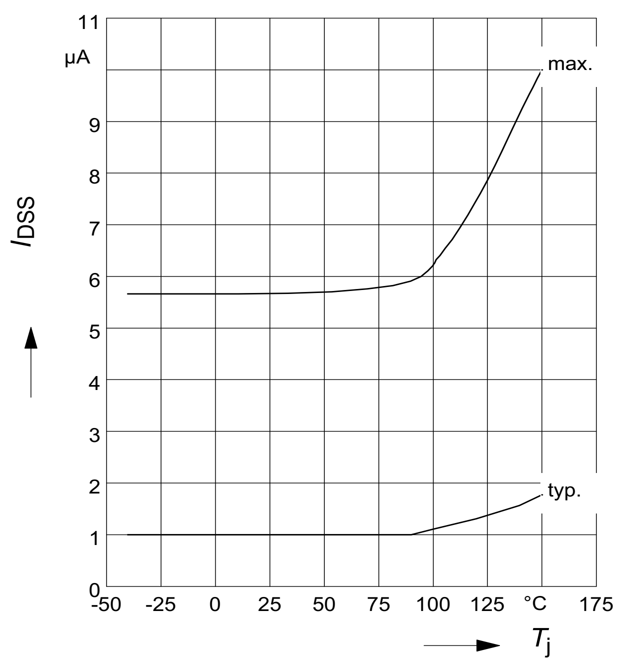
I_D=f(V_{DS}); T_{Jstart}=25 °C

Parameter: V_{IN}



8 Typ. off-state drain current

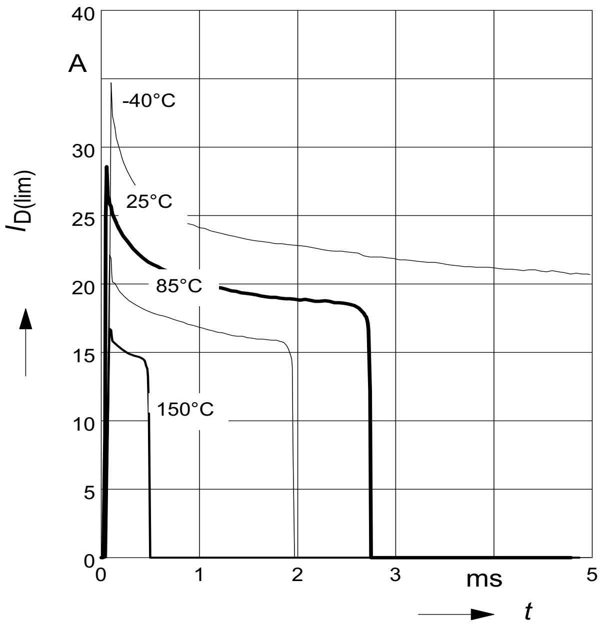
I_{DSS} = f(T_j)



9 Typ. overload current

$\boldsymbol{I_{D(lim)}}$ **= f(*t*)**, V_{bb}=12 V, no heatsink

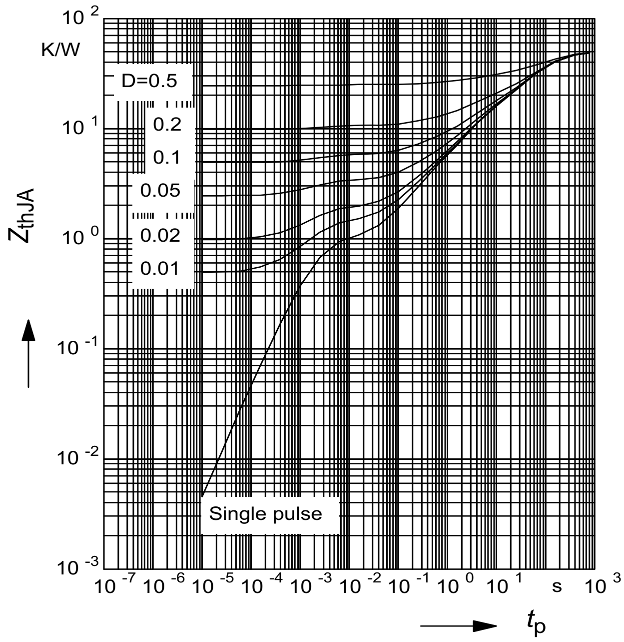
Parameter: T_{jstart}



10 Typ. transient thermal impedance

$\boldsymbol{Z_{thJA}}$**=f(**$\boldsymbol{t_p}$**) @ 6 cm² cooling area**

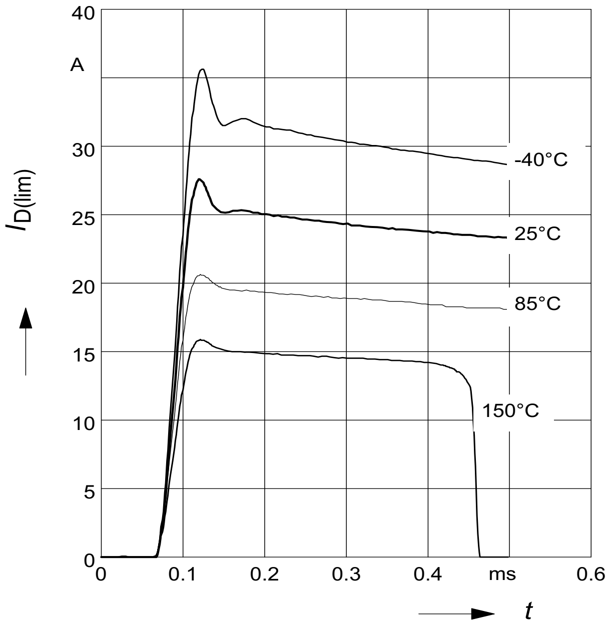
Parameter: $D=t_p/T$



11 Determination of $I_{D(lim)}$

$\boldsymbol{I_{D(lim)}}$ **= f(*t*);** $\boldsymbol{t_m}$ **= 200µs**

Parameter: T_{Jstart}



1 Package Outlines

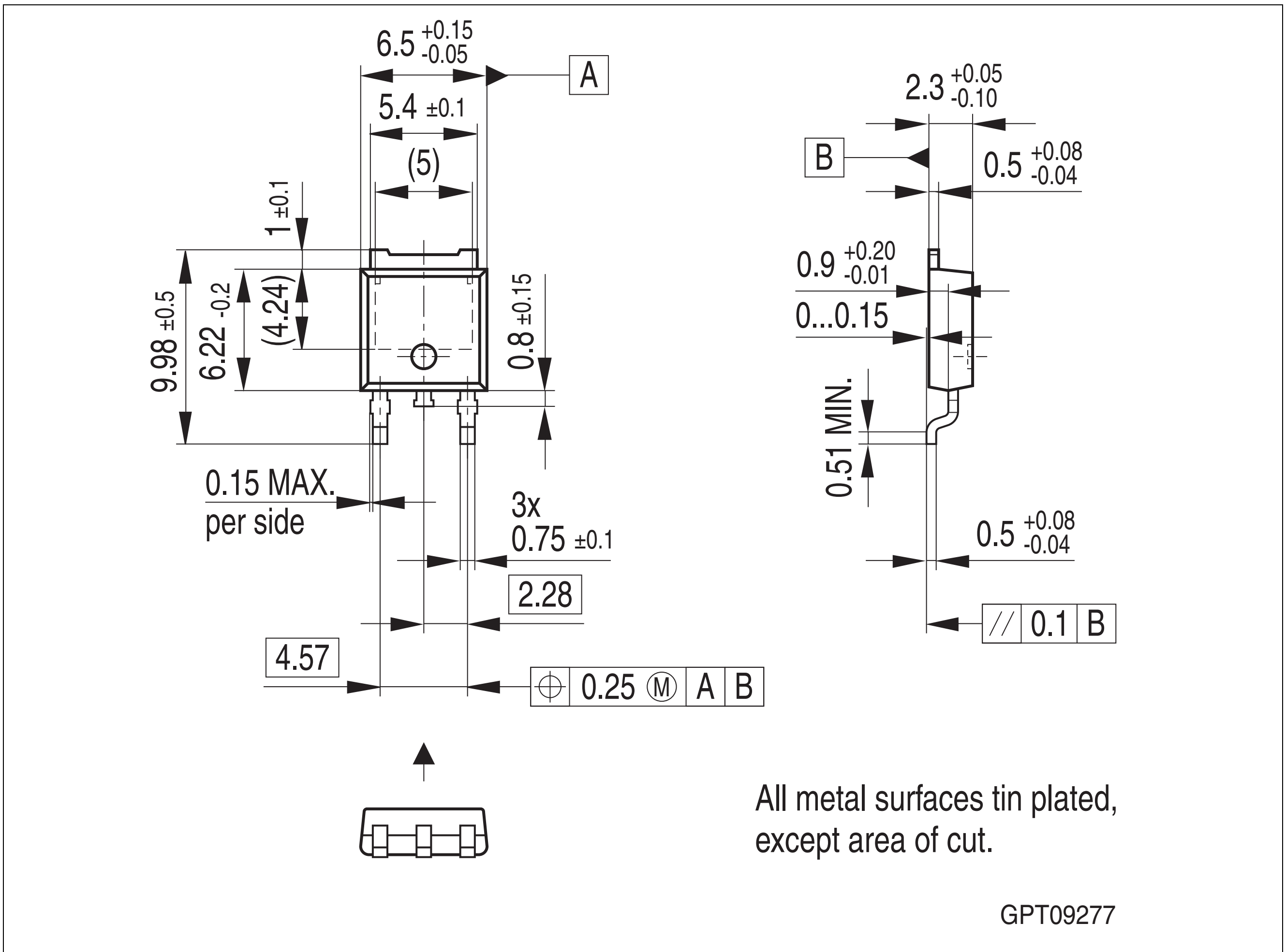


Figure 1 **PG-TO252-3-11** (Plastic Dual Small Outline Package) (RoHS-Compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

Please specify the package needed (e.g. green package) when placing an order

You can find all of our packages, sorts of packing and others in our Infineon Internet Page “Products”: **http://www.infineon.com/products**.

Dimensions in mm

2 Revision History

Version	Date	Changes
Rev. 1.4	2012-03-07	page 2: - added footnote “Not subject to production test, specified by design” for chapter/table Maximum Ratings - added footnote “Not subject to prod. test, calculated ...” for parameter P_{tot} - updated ESD HBM standard in chapter “Maximum Ratings” page 3: - updated test condition I_D for parameter input threshold voltage $V_{IN(th)}$ - added footnote “Not subject to production test, calculated...” to the parameter Nominal load current $I_{D(nom)}$, $I_{D(ISO)}$
Rev. 1.3	2006-12-22	released automotive green and robust version (BTS) Package parameter (humidity and climatic) removed in Maximum ratings
Rev. 1.2	2006-12-11	AEC icon added RoHS icon added Green product (RoHS-compliant) added to the feature list Package information updated to green Green explanation added
Rev. 1.1	2006-08-08	released non automotive green version (ITS)
Rev. 1.0	2004-03-05	released production version

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