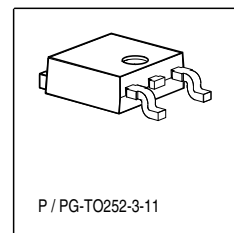**AEC** Qualified

RoHS

Features

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

Product Summary

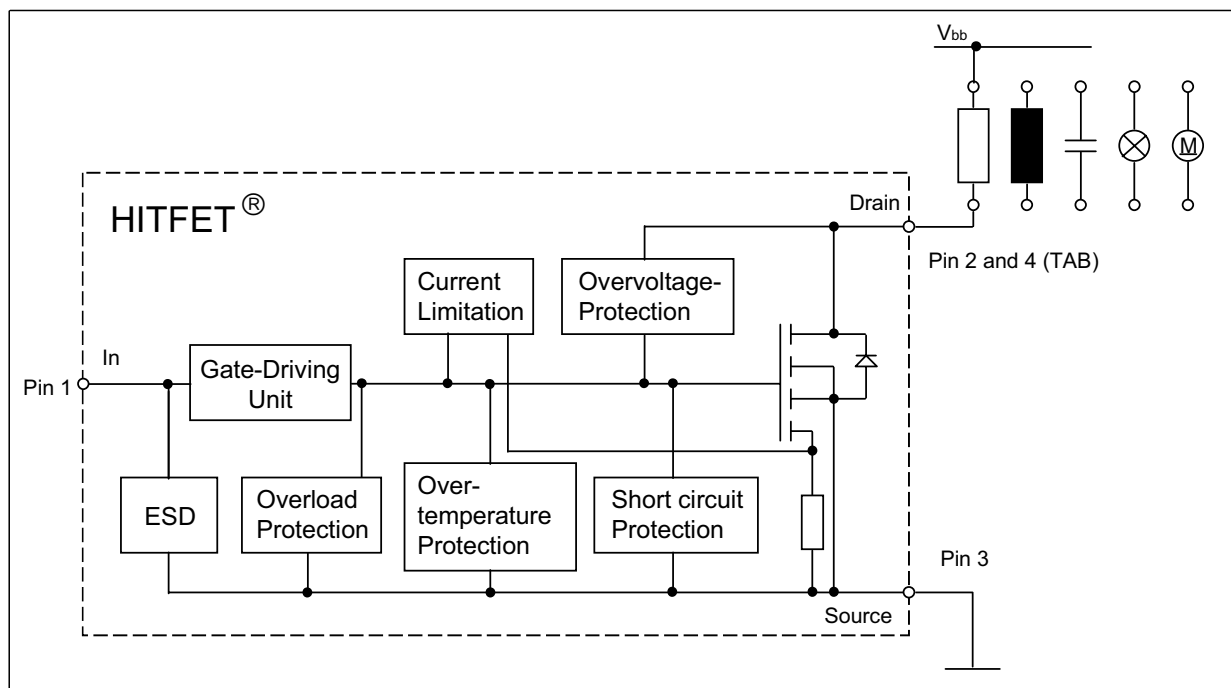| Drain source voltage	V_{DS}	42	V
On-state resistance	$R_{DS(on)}$	100	mΩ
Nominal load current	$I_{D(Nom)}$	2.4	A
Clamping energy	E_{AS}	2	J

P / PG-TO252-3-11

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.

Complete product spectrum and additional information http://www.infineon.com/hitfet

Maximum Ratings at T$_j$ = 25°C, unless otherwise specified

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	42	V
Supply voltage for full short circuit protection	$V_{bb(SC)}$	42	
Continuous input voltage[1]	V_{IN}	-0.2 [2] ... +10	
Continuous input current[2] -0.2V $\leq$ V_{IN} $\leq$ 10V V_{IN} < -0.2V or V_{IN} > 10V	I_{IN}	 self limited $\mid I_{IN} \mid \leq 2$	mA
Operating temperature	T_j	-40 ...+150	°C
Storage temperature	T_{stg}	-55 ... +150	
Power dissipation [5] T_C = 85 °C 6cm^2 cooling area , T_A = 85 °C	P_{tot}	 21 1.1	W
Unclamped single pulse inductive energy [2]	E_{AS}	2	J
Load dump protection $V_{LoadDump}$[2][3] = V_A + V_S V_{IN} = 0 and 10 V, t_d = 400 ms, R_I = 2 Ω, R_L = 6 Ω, V_A = 13.5 V	V_{LD}	58	V
Electro**s**tatic **d**ischarge voltage[2] (Human Body Model) according to Jedec norm EIA/JESD22-A114-B, Section 4	V_{ESD}	2	kV

Thermal resistance

junction - case:	R_{thJC}	3	K/W
SMD: junction - ambient @ min. footprint @ 6 cm^2 cooling area [4]	R_{thJA}	 115 55	

[1]For input voltages beyond these limits I$_{IN}$ has to be limited.

[2]not subject to production test, specified by design

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

[4] 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.

[5]not subject to production test, calculated by R$_{thJA}$ and R$_{ds(on)}$

Electrical Characteristics

Parameter	Symbol	Values			Unit
at T_j = 25°C, unless otherwise specified		min.	typ.	max.	
Characteristics					
Drain source clamp voltage T_j = - 40 ...+ 150, I_D = 10 mA	$V_{DS(AZ)}$	42	-	55	V
Off-state drain current T_j = -40...+85 °C, V_{DS} = 32 V , V_{IN} = 0 V	I_{DSS}	-	1.5	8	µA
T_j = 150 °C		-	4	12	
Input threshold voltage I_D = 0.6 mA, T_j = 25 °C	$V_{IN(th)}$	1.3	1.7	2.2	V
I_D = 0.6 mA, T_j = 150 °C		0.8	-	-	
On state input current	$I_{IN(on)}$	-	10	30	µA
On-state resistance V_{IN} = 5 V, I_D = 2.2 A, T_j = 25 °C	$R_{DS(on)}$	-	90	120	mΩ
V_{IN} = 5 V, I_D = 2.2 A, T_j = 150 °C		-	160	240	
On-state resistance V_{IN} = 10 V, I_D = 2.2 A, T_j = 25 °C	$R_{DS(on)}$	-	70	100	
V_{IN} = 10 V, I_D = 2.2 A, T_j = 150 °C		-	130	200	
Nominal load current [5] T_j < 150°C, V_{IN} = 10 V, T_A = 85 °C, SMD [1]	$I_{D(Nom)}$	2.4	3.2	-	A
Nominal load current [5] V_{IN} = 10 V, V_{DS} = 0.5 V, T_C = 85 °C, T_j < 150°C	$I_{D(ISO)}$	3.5	5	-	
Current limit (active if V_{DS}>2.5 V)[2] V_{IN} = 10 V, V_{DS} = 12 V, t_m = 200 µs	$I_{D(lim)}$	10	15	20	

[1]@ 6 cm² cooling area

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

[5]not subject to production test, calculated by R_{thJA} and $R_{ds(on)}$

Electrical Characteristics

Parameter	Symbol	Values			Unit
at T_j = 25°C, unless otherwise specified		min.	typ.	max.	

Dynamic Characteristics

Parameter	Symbol	Values			Unit
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}	-	40	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}	-	70	100	
Slew rate on 70 to 50% V_{bb}: R_L = 4.7 Ω, V_{IN} = 0 to 10 V, V_{bb} = 12 V	$-dV_{DS}/dt_{on}$	-	0.4	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}	-	0.6	1.5	

Protection Functions[1]

Parameter	Symbol	Values			Unit
Thermal overload trip temperature	T_{jt}	150	175	-	°C
Thermal hysteresis [2]	ΔT_{jt}	-	10	-	K
Input current protection mode T_j = 150 °C	$I_{IN(Prot)}$	-	100	300	µA
Unclamped single pulse inductive energy [2] I_D = 2.2 A, T_j = 25 °C, V_{bb} = 12 V	E_{AS}	2	-	-	J

Inverse Diode

Parameter	Symbol	Values			Unit
Inverse diode forward voltage I_F = 10.9 A, t_m = 250 µs, V_{IN} = 0 V, t_P = 300 µs	V_{SD}	-	1.0	1.5	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.
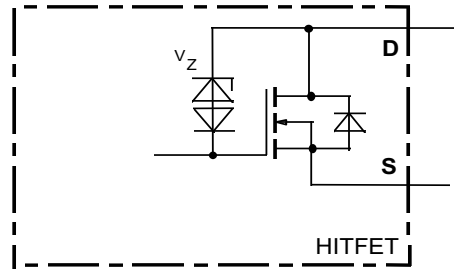
[2]not subject to production test, specified by design
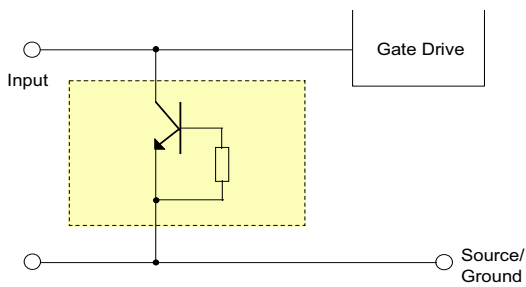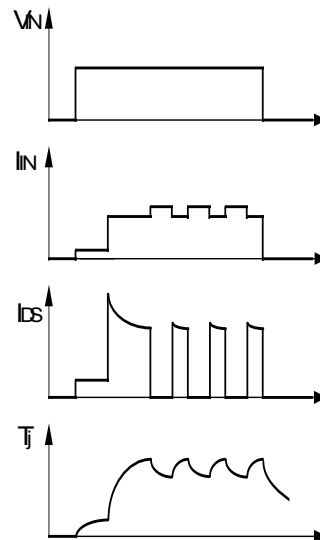
Block diagram

Terms

Inductive and overvoltage output clamp
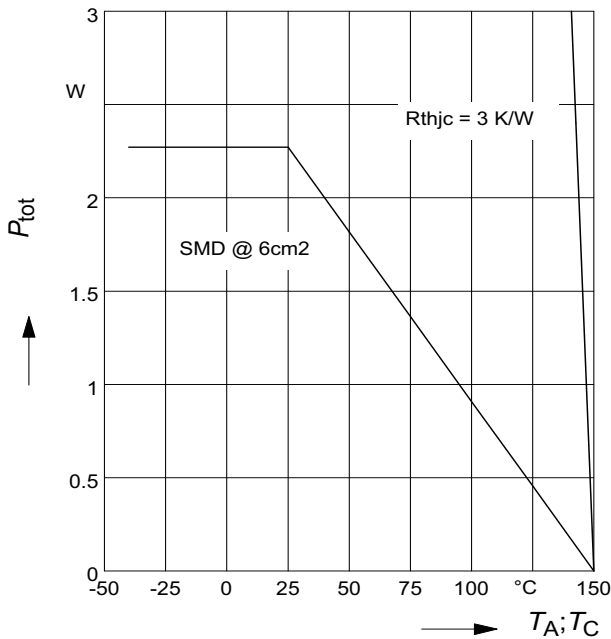
Input circuit (ESD protection)

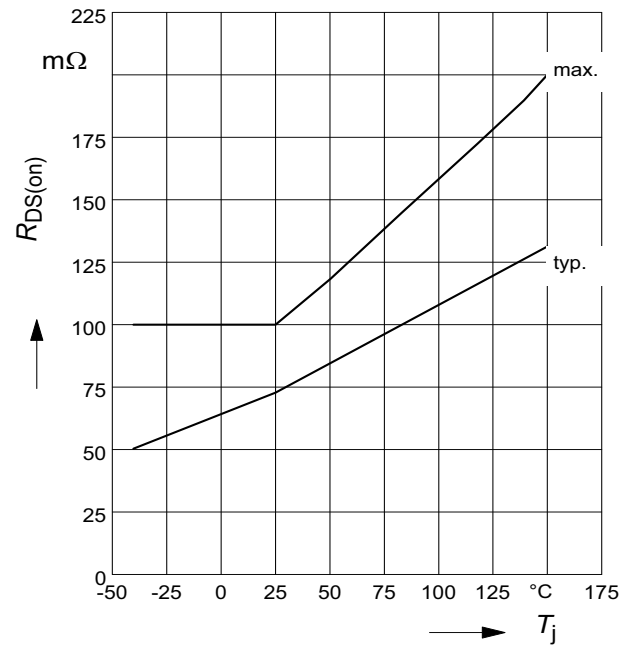### Short circuit behaviour

1 Maximum allowable power dissipation

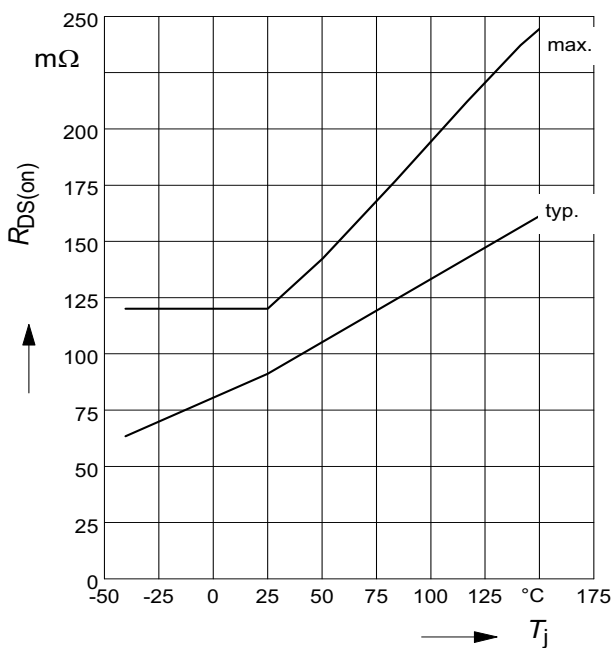$P_{tot} = f(T_C)$ resp.

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

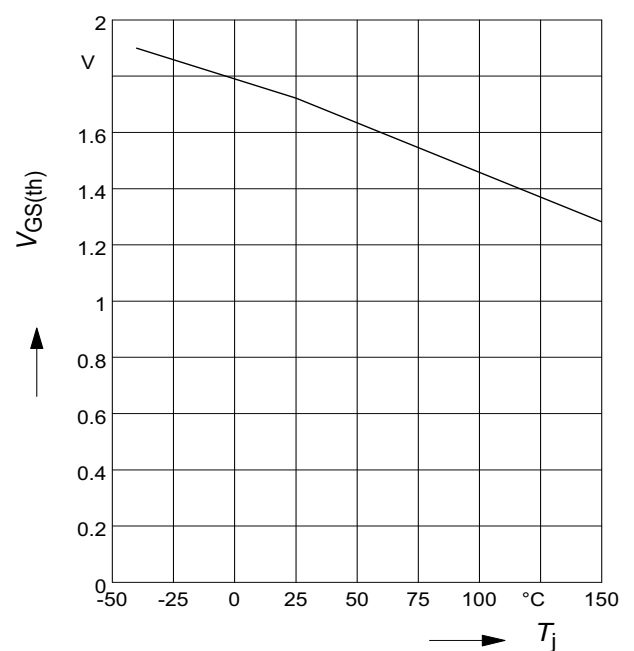## 2 On-state resistance

$R_{ON} = f(T_j)$; I_D=2.2A; V_{IN}=10V

3 On-state resistance
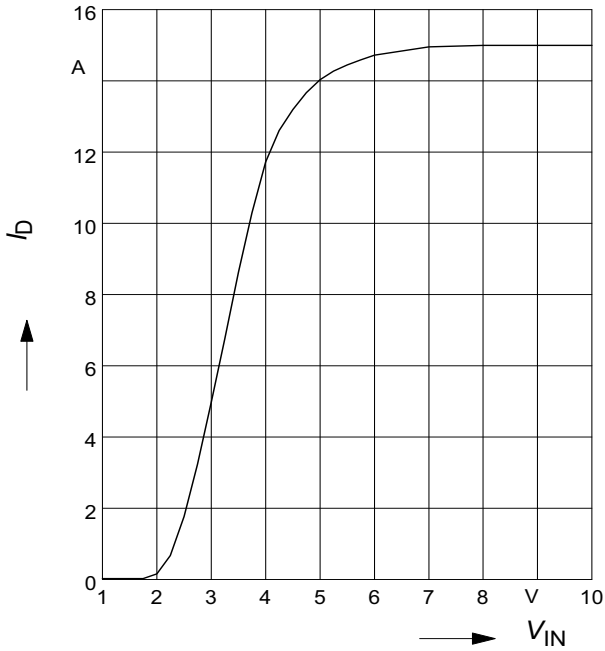
$R_{ON} = f(T_j)$; I_D=2.2A; V_{IN}=5V

4 Typ. input threshold voltage

$V_{IN(th)} = f(T_j)$; I_D = 0.3 mA; V_{DS} = 12V
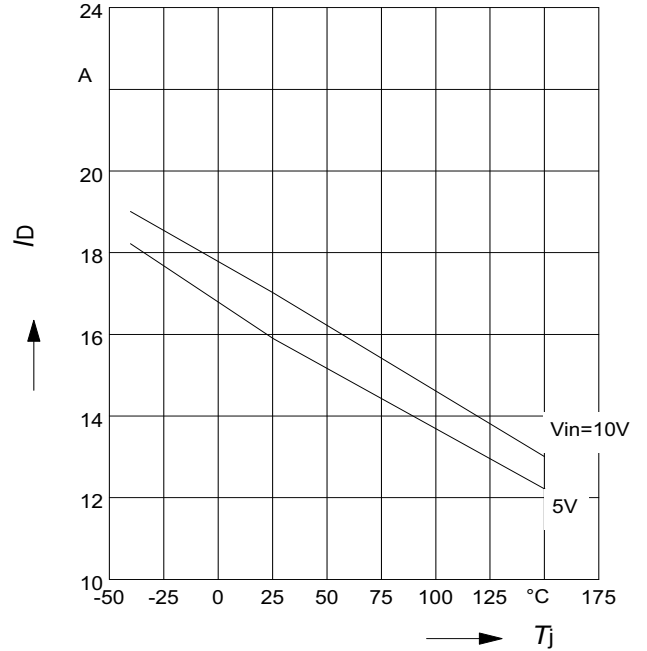
5 Typ. transfer characteristics

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

6 Typ. short circuit current
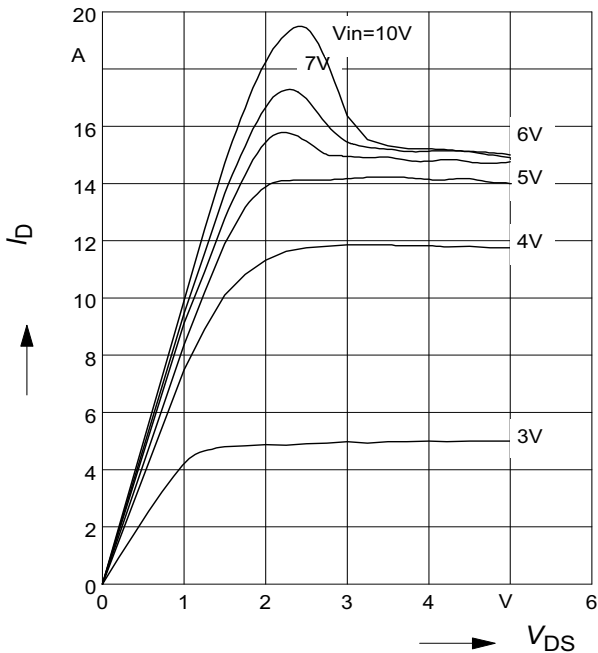
$I_{D(lim)}$ = f(Tj); V_{DS}=12V
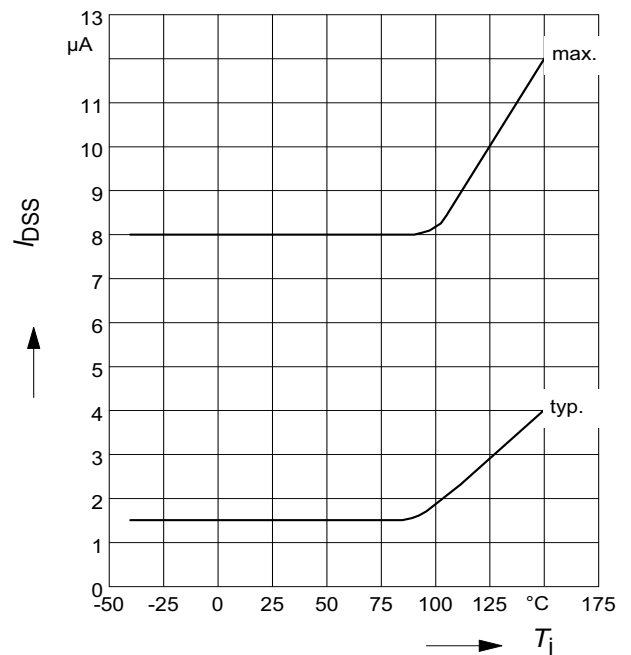Parameter: V_{IN}

7 Typ. output characteristics

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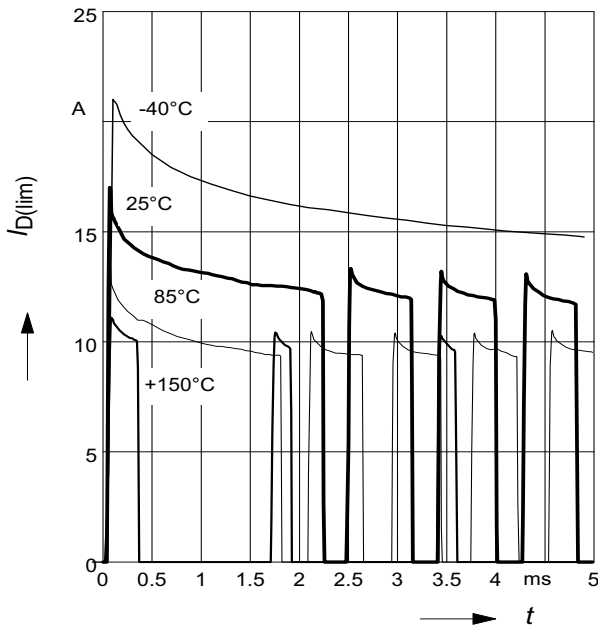Parameter: V_{IN}

8 Off-state drain current

I_{DSS} = f(T_j)

9 Typ. overload current

$I_{D(lim)}$ = f(t), V_{bb}=12 V, no heatsink
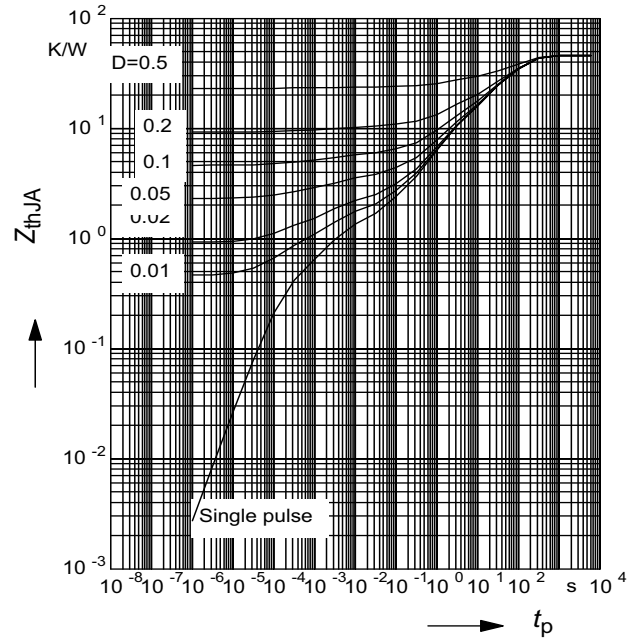Parameter: T_{jstart}

10 Typ. transient thermal impedance
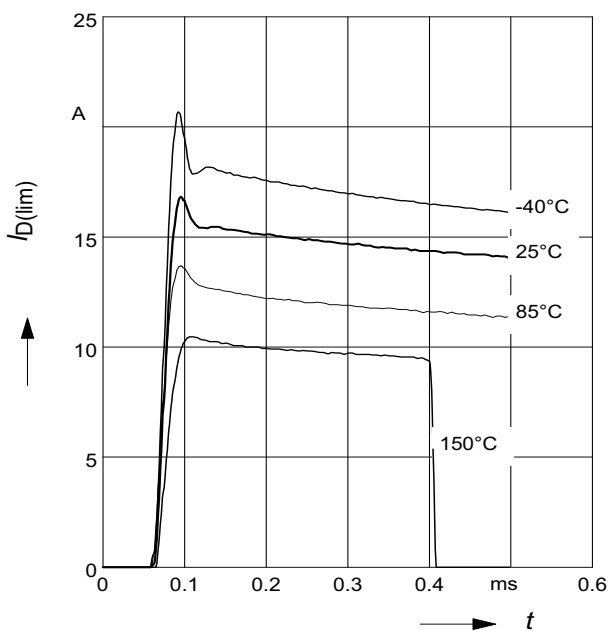
Z_{thJA}=f(t_p) @ 6 cm^2 cooling area
Parameter: $D=t_p/T$

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

$I_{D(lim)}$ = f(t); t_m = 200µs
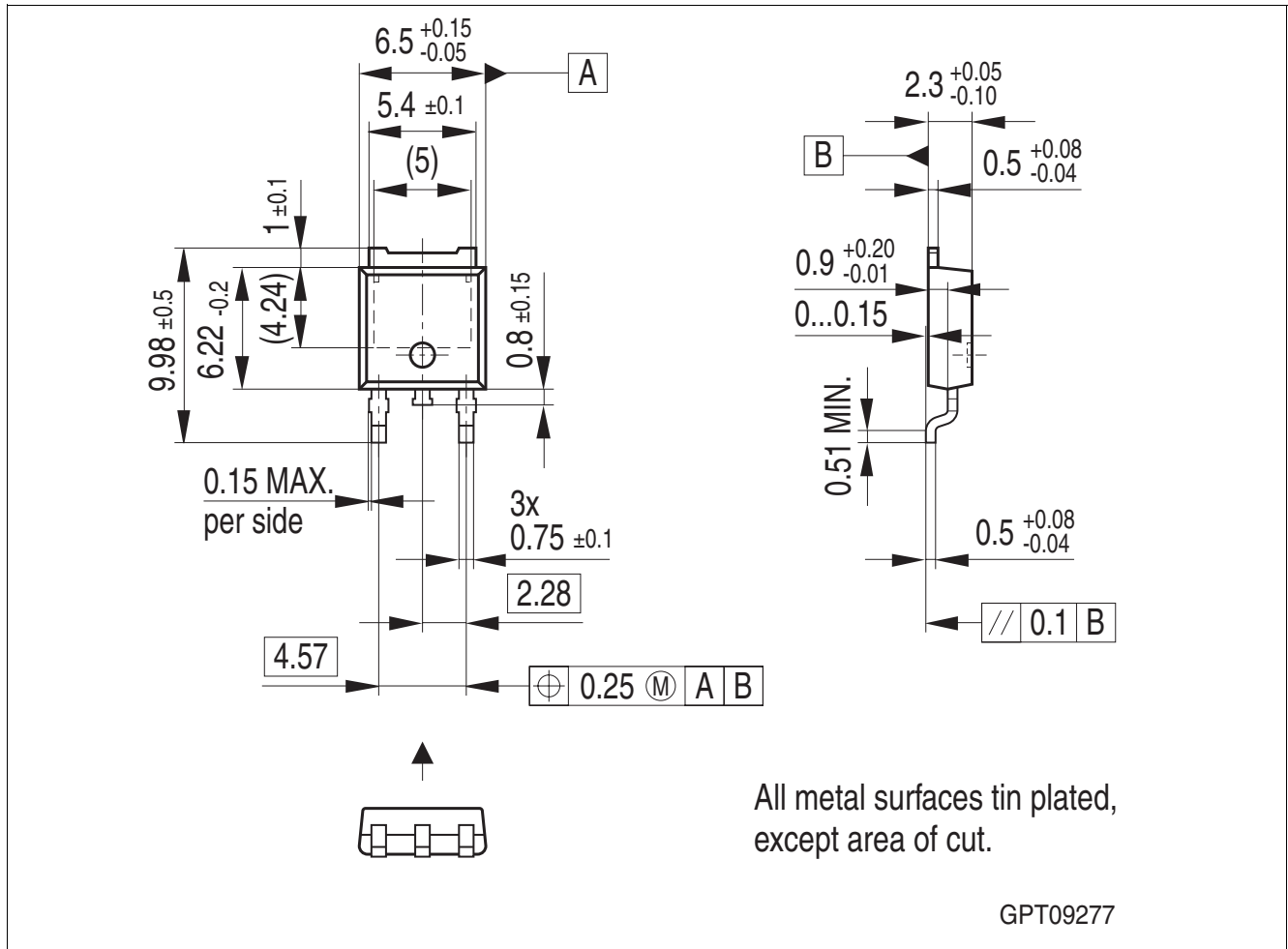Parameter: T_{Jstart}

1 Package Outlines

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

Green Product (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. 1.3	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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