OptiMOS® Power-Transistor

Feature

- N-Channel
- Enhancement mode
- Excellent Gate Charge x $R_{DS(on)}$ product (FOM)
- Superior thermal resistance
- 175°C operating temperature
- Avalanche rated
- d*v*/d*t* rated

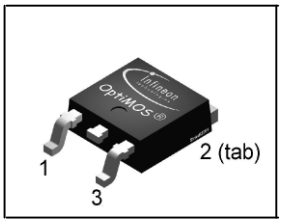
° Pb-free lead plating; RoHS compliant

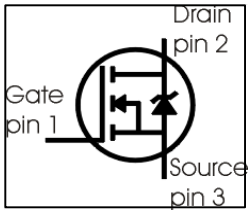
RoHS

Product Summary

V_{DS}	30	V
$R_{DS(on)}$	7.3	mΩ
I_D	50	A

PG-TO252-3





Type	Package	Marking
SPD50N03S2-07 G	PG-TO252-3	PN0307

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

Parameter	Symbol	Value	Unit
Continuous drain current[1)] T_C=25°C	I_D	 50 50	A
Pulsed drain current T_C=25°C	$I_{D\ puls}$	200	
Avalanche energy, single pulse I_D=50 A , V_{DD}=25V, R_{GS}=25Ω	E_{AS}	250	mJ
Repetitive avalanche energy, limited by T_{jmax}[2)]	E_{AR}	13	
Reverse diode d*v*/d*t* I_S=50A, V_{DS}=24V, d*i*/d*t*=200A/µs, T_{jmax}=175°C	d*v*/d*t*	6	kV/µs
Gate source voltage	V_{GS}	±20	V
Power dissipation T_C=25°C	P_{tot}	136	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	°C
IEC climatic category; DIN IEC 68-1		55/175/56	

Downloaded from Arrow.com.

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	0.7	1.1	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	100	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	75	
@ 6 cm^2 cooling area [3]		-	-	50	

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage V_{GS}=0V, I_D=1mA	$V_{(BR)DSS}$	30	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=85µA	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=30V, V_{GS}=0V, T_j=25°C		-	0.01	1	
V_{DS}=30V, V_{GS}=0V, T_j=125°C		-	1	100	
Gate-source leakage current V_{GS}=20V, V_{DS}=0V	I_{GSS}	-	1	100	nA
Drain-source on-state resistance V_{GS}=10V, I_D=50A	$R_{DS(on)}$	-	5.7	7.3	mΩ

[1]Current limited by bondwire ; with an R_{thJC} = 1.1K/W the chip is able to carry I_D= 106A at 25°C, for detailed information see app.-note ANPS071E available at *www.infineon.com/optimos*

[2]Defined by design. Not subject to production test.

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

Downloaded from Arrow.com.

Electrical Characteristics

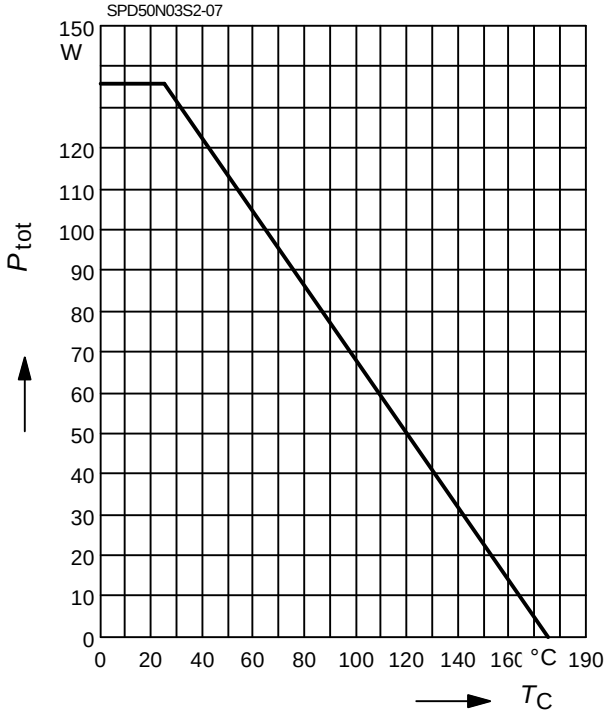
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D=50A	30	60	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	1630	2170	pF
Output capacitance	C_{oss}		-	750	1000	
Reverse transfer capacitance	C_{rss}		-	150	230	
Turn-on delay time	$t_{d(on)}$	V_{DD}=15V, V_{GS}=10V, I_D=50A, R_G=6.8Ω	-	14	21	ns
Rise time	t_r		-	36	54	
Turn-off delay time	$t_{d(off)}$		-	27	40	
Fall time	t_f		-	25	38	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=24V, I_D=50A	-	7.9	10.5	nC
Gate to drain charge	Q_{gd}		-	14.1	21.1	
Gate charge total	Q_g	V_{DD}=24V, I_D=50A, V_{GS}=0 to 10V	-	35	46.5	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=24V, I_D=50A	-	5.2	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	50	A
Inv. diode direct current, pulsed	I_{SM}		-	-	200	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=50A	-	0.9	1.3	V
Reverse recovery time	t_{rr}	V_R=15V, I_F=I_S, di_F/dt=100A/µs	-	41	51	ns
Reverse recovery charge	Q_{rr}		-	46	58	nC

Downloaded from Arrow.com.

1 Power dissipation

$P_{tot} = f(T_C)$

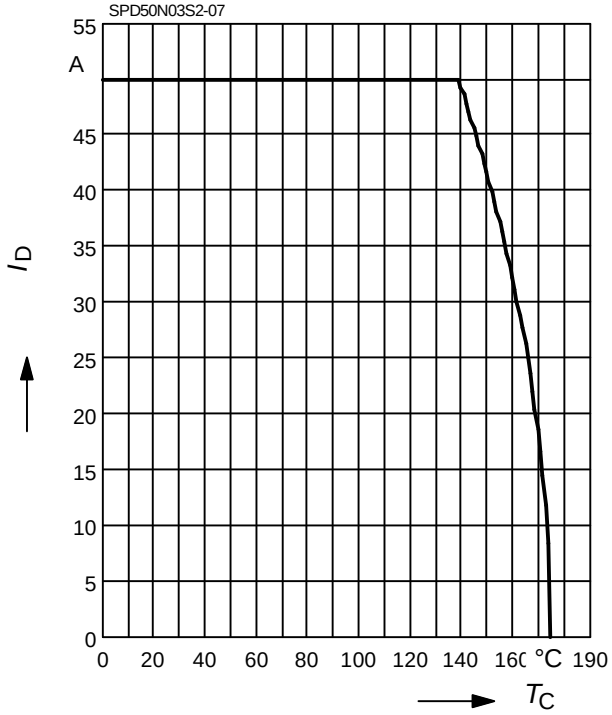
parameter: $V_{GS} \geq 6$ V



2 Drain current

$I_D = f(T_C)$

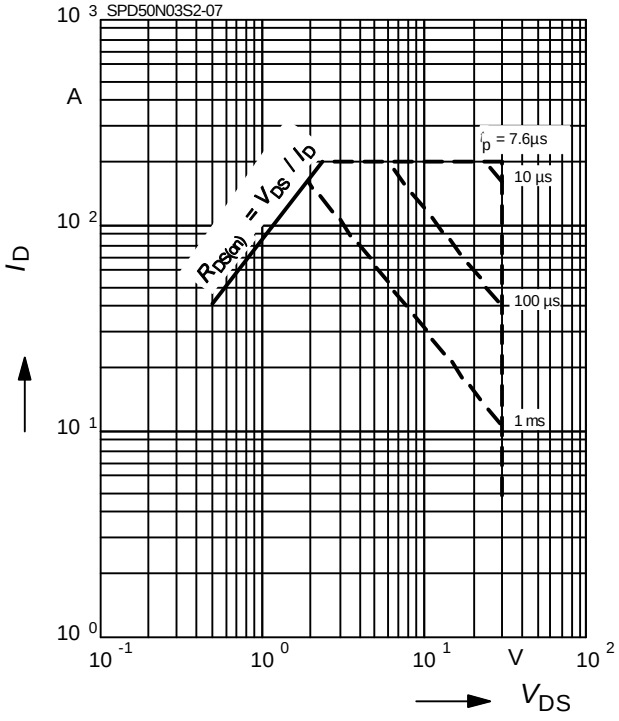
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

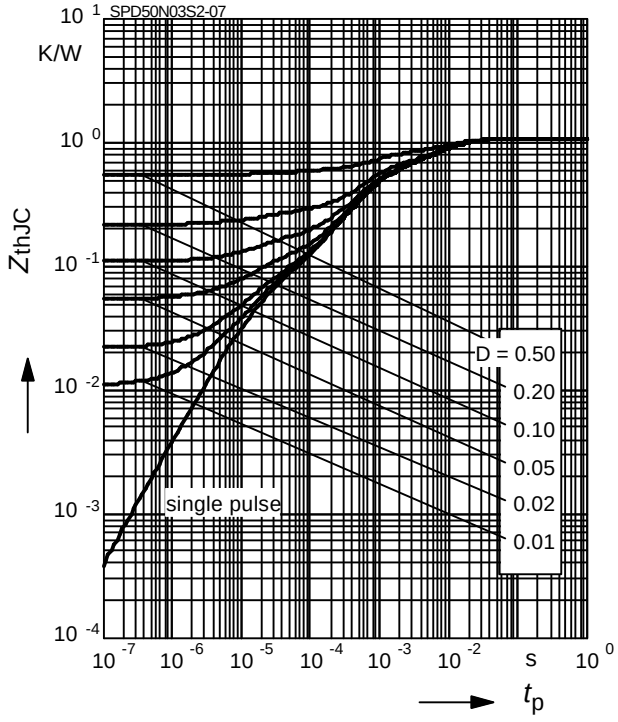
parameter : $D = 0$, $T_C = 25$ °C



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

parameter : $D = t_p/T$

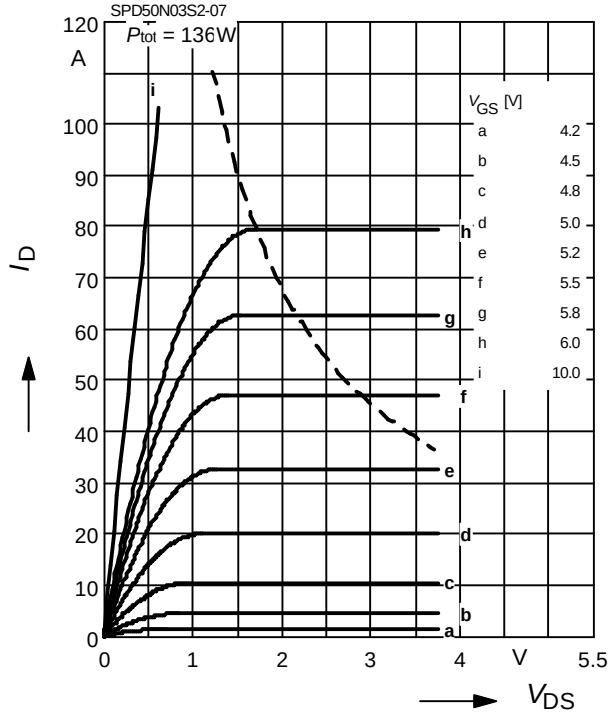


Downloaded from Arrow.com.

5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

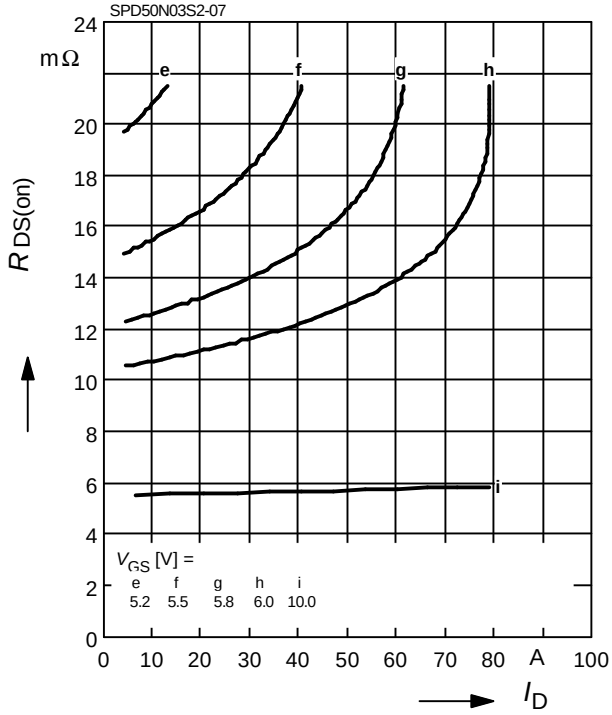
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

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

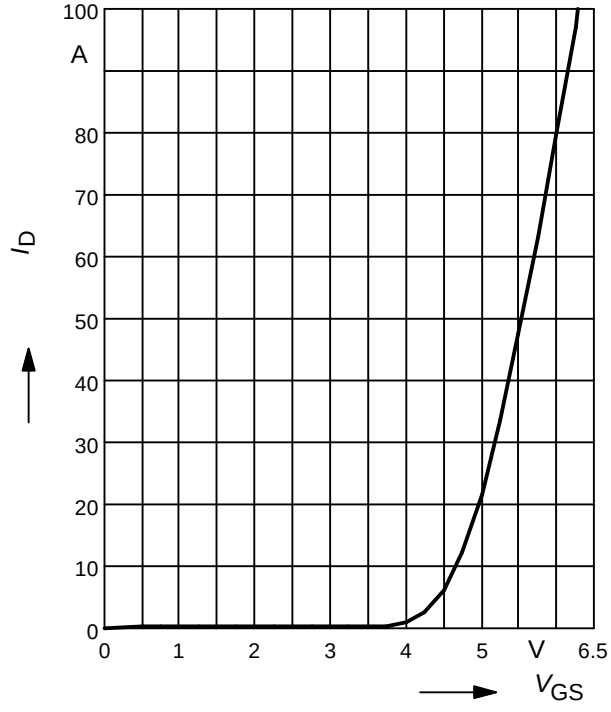
parameter: V_{GS}



7 Typ. transfer characteristics

$I_D = f(V_{GS})$; $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

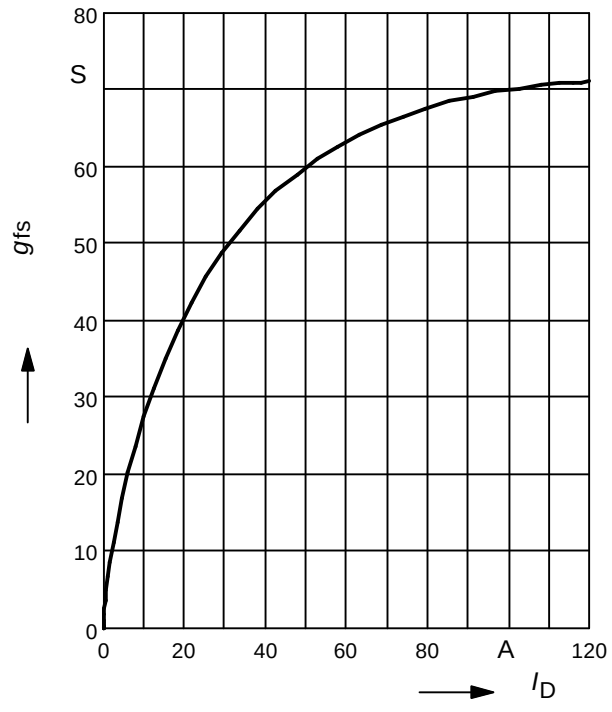
parameter: t_p = 80 µs



8 Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j=25°C

parameter: g_{fs}

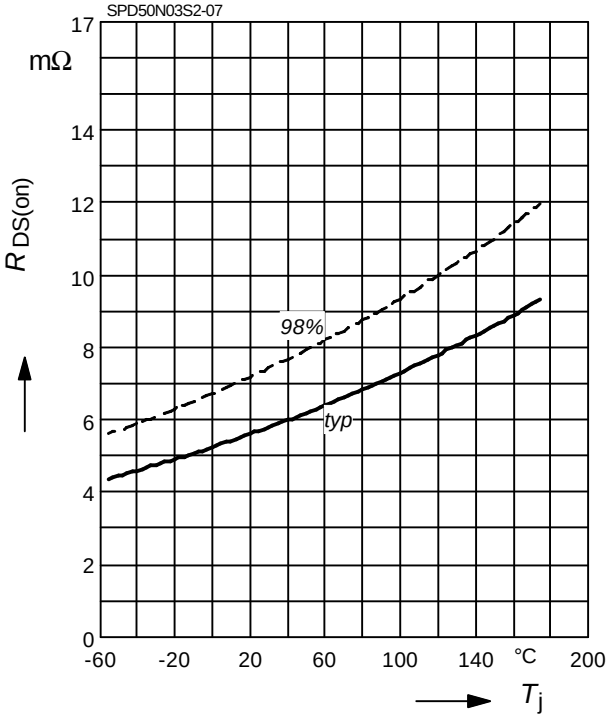


Downloaded from Arrow.com.

9 Drain-source on-state resistance

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

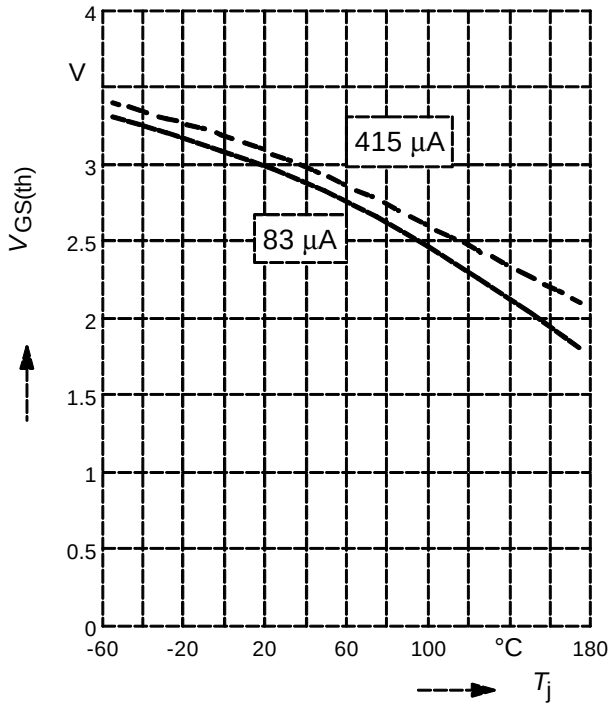
parameter : I_D = 50 A, V_{GS} = 10 V



10 Typ. gate threshold voltage

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

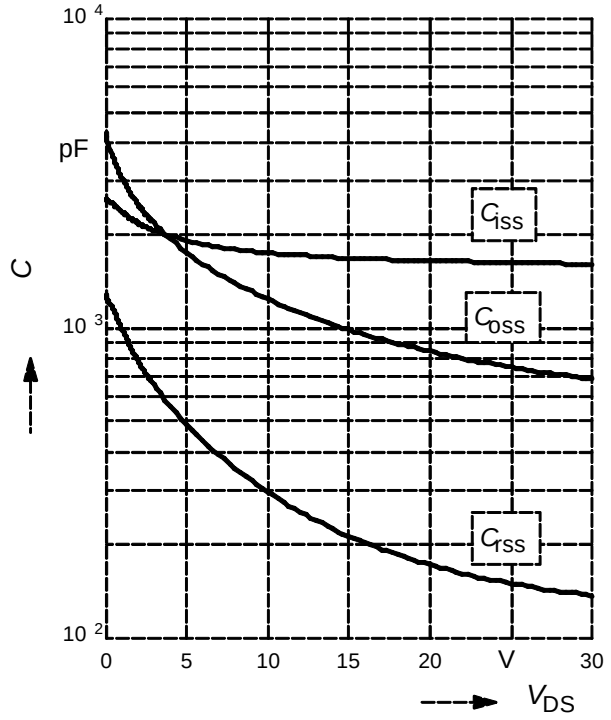
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

$C = f(V_{DS})$

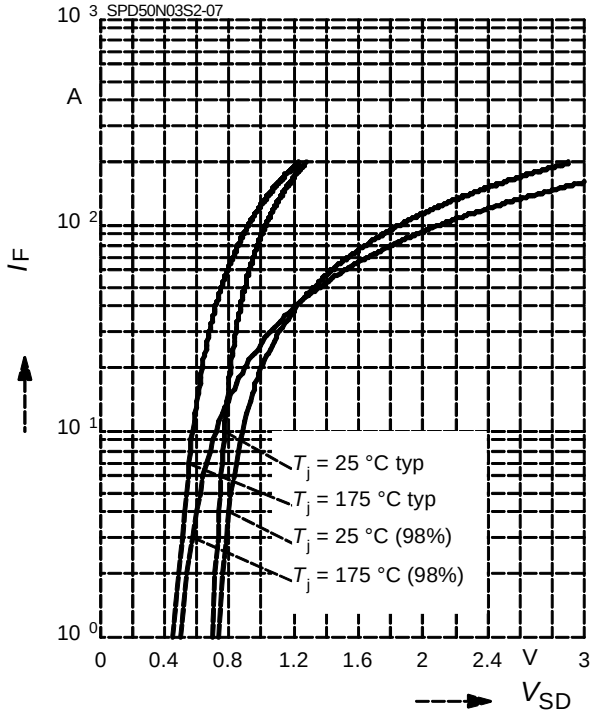
parameter: V_{GS}=0V, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

parameter: T_j , tp = 80 µs

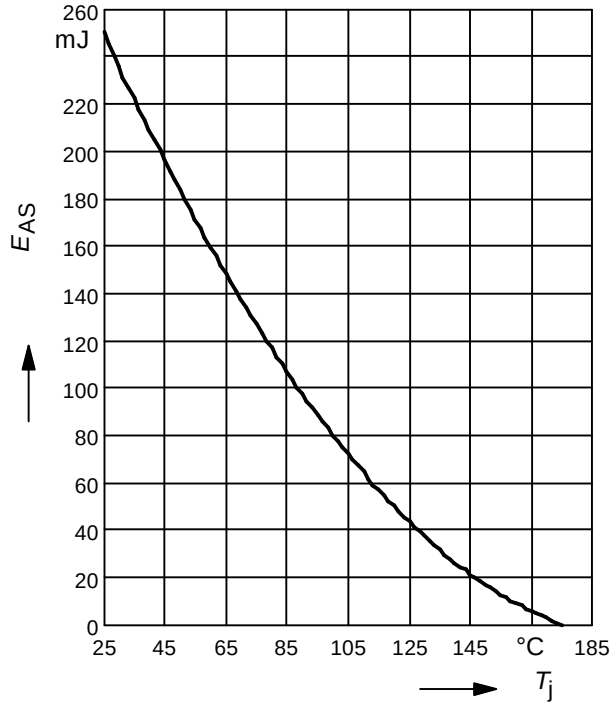


Downloaded from Arrow.com.

13 Typ. avalanche energy

$E_{AS} = f(T_j)$

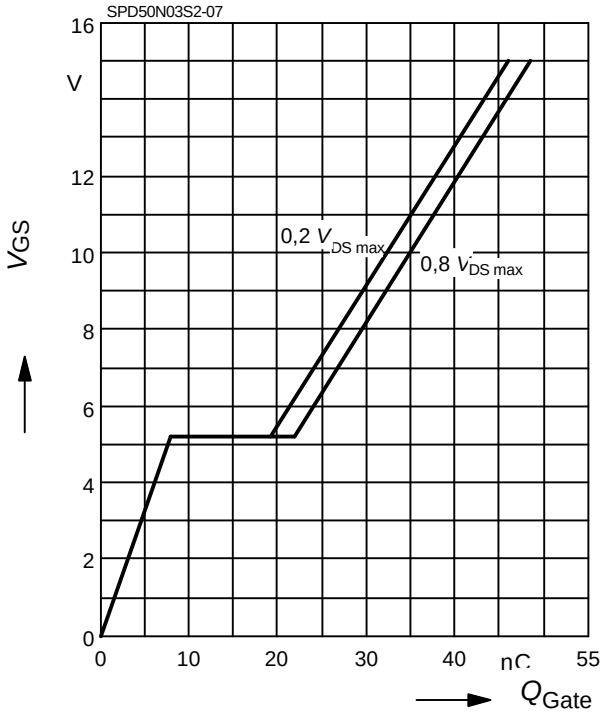
par.: $I_D = 50$ A , $V_{DD} = 25$ V, $R_{GS} = 25\ \Omega$



14 Typ. gate charge

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

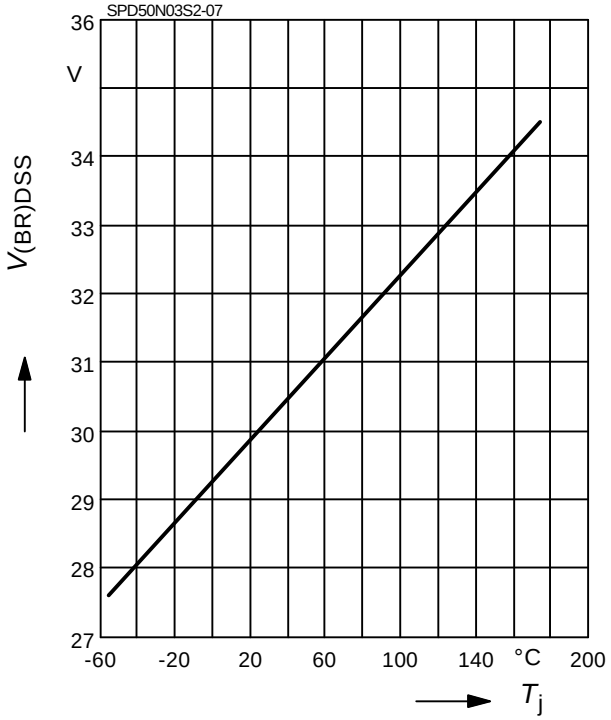
parameter: $I_D = 50$ A pulsed



15 Drain-source breakdown voltage

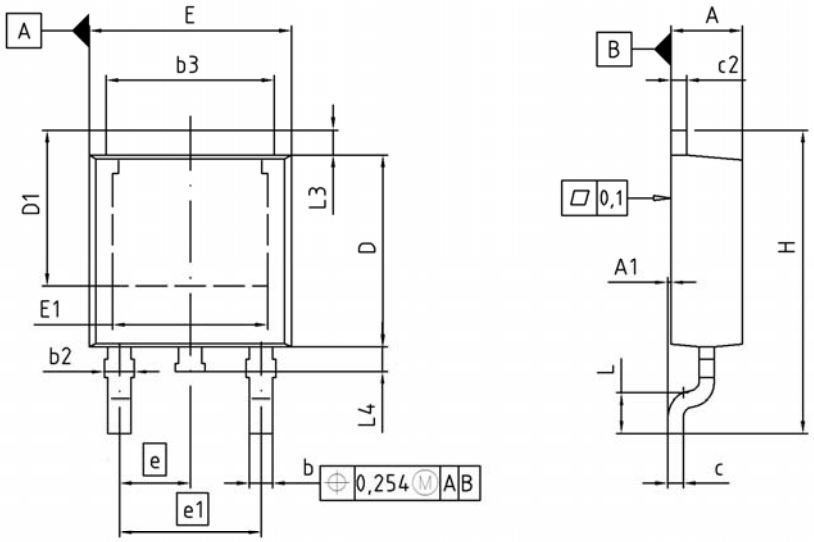
$V_{(BR)DSS} = f(T_j)$

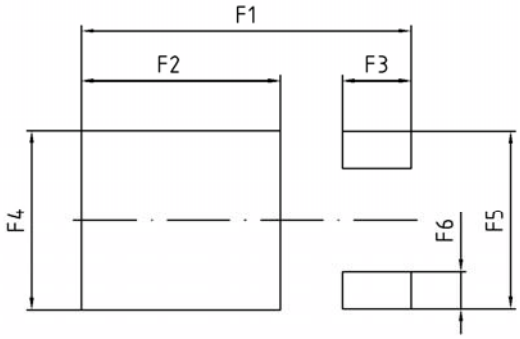
parameter: I_D=10 mA



Downloaded from Arrow.com.

Package outline: PG-TO252-3





DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.16	2.41	0.085	0.095
A1	0.00	0.15	0.000	0.006
b	0.64	0.89	0.025	0.035
b2	0.65	1.15	0.026	0.045
b3	5.00	5.50	0.197	0.217
c	0.46	0.60	0.018	0.024
c2	0.46	0.98	0.018	0.039
D	5.97	6.22	0.235	0.245
D1	5.02	5.84	0.198	0.230
E	6.40	6.73	0.252	0.265
E1	4.70	5.21	0.185	0.205
e	2.29		0.090	
e1	4.57		0.180	
N	3		3	
H	9.40	10.48	0.370	0.413
L	1.18	1.70	0.046	0.067
L3	0.90	1.25	0.035	0.049
L4	0.51	1.00	0.020	0.039
F1	10.50	10.70	0.413	0.421
F2	6.30	6.50	0.248	0.256
F3	2.10	2.30	0.083	0.091
F4	5.70	5.90	0.224	0.232
F5	5.66	5.86	0.223	0.231
F6	1.10	1.30	0.043	0.051

DOCUMENT NO.
Z8B00003328

SCALE
0
2.0
0 2.0
4mm

EUROPEAN PROJECTION

ISSUE DATE
19-10-2007

REVISION
03

Downloaded from Arrow.com.

Published by
Infineon Technologies AG
81726 Munich, Germany
© 2008 Infineon Technologies AG
All Rights Reserved.

Legal Disclaimer
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information
For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings
Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office. The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support, automotive, aviation and aerospace device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Downloaded from Arrow.com.