OptiMOS™ Buck converter series

Feature

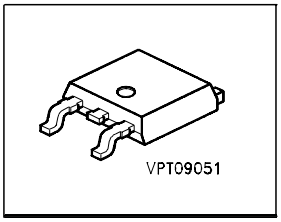
- N-Channel
- Logic Level
- Excellent Gate Charge x $R_{DS(on)}$ product (FOM)
- 175°C operating temperature
- d*v*/d*t* rated
- Ideal for fast switching buck converters
- Pb.free lead plating, RoHS compliant

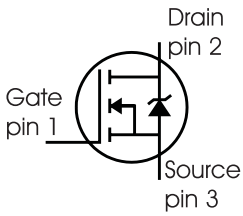
RoHS

Product Summary

V_{DS}	30	V
$R_{DS(on)}$	20	mΩ
I_D	30	A

PG-TO252-3





Type	Package	Marking
IPD20N03L G	PG-TO252-3	20N03L

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

Parameter	Symbol	Value	Unit
Continuous drain current T_C=25°C T_C=100°C	I_D	 30 25	A
Pulsed drain current T_C=25°C	$I_{D\ puls}$	120	
Avalanche energy, single pulse I_D=15A, V_{DD}=25V, R_{GS}=25Ω	E_{AS}	15	mJ
Reverse diode d*v*/d*t* I_S=30A, 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}	42	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	°C
IEC climatic category; DIN IEC 68-1		55/175/56	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	3.6	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 [1)]		-	-	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=25µA	$V_{GS(th)}$	1.2	1.6	2	
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		-	10	100	
Gate-source leakage current V_{GS}=20V, V_{DS}=0V	I_{GSS}	-	1	100	nA
Drain-source on-state resistance V_{GS}=4.5V, I_D=15A	$R_{DS(on)}$	-	23.0	31	mΩ
Drain-source on-state resistance V_{GS}=10V, I_D=15A	$R_{DS(on)}$	-	15.3	20	

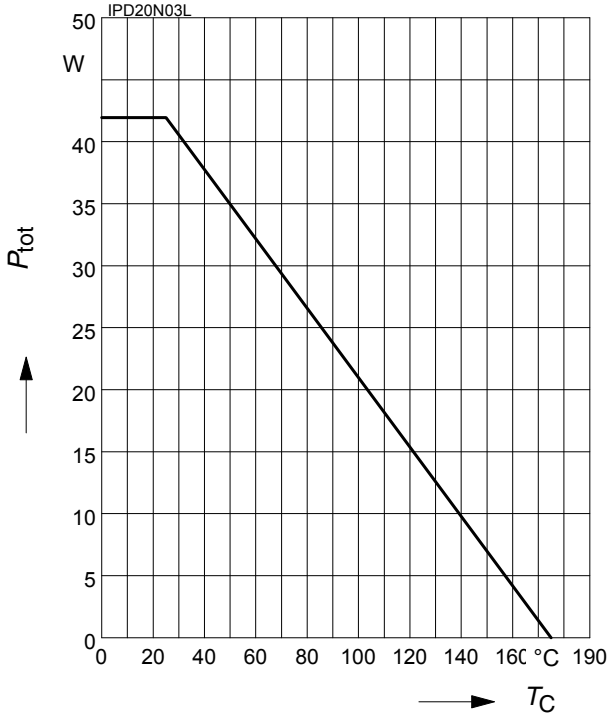
[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

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

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=25A	14	28	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	560	695	pF
Output capacitance	C_{oss}		-	230	280	
Reverse transfer capacitance	C_{rss}		-	62	93	
Gate resistance	R_G		-	1.3	-	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD}=15V, V_{GS}=10V, I_D=15A, R_G=12.7Ω	-	6.2	9.3	ns
Rise time	t_r		-	31	47	
Turn-off delay time	$t_{d(off)}$		-	23	34	
Fall time	t_f		-	18	27	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=15V, I_D=15A	-	2.5	3.1	nC
Gate to drain charge	Q_{gd}		-	6.4	9.6	
Gate charge total	Q_g	V_{DD}=15V, I_D=15A, V_{GS}=0 to 5V	-	15	19	
Output charge	Q_{oss}	V_{DS}=15V, I_D=15A, V_{GS}=0V	-	8	10	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=15V, I_D=15A	-	3.6	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	30	A
Inverse diode direct current, pulsed	I_{SM}		-	-	120	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=30A	-	1.1	1.4	V
Reverse recovery time	t_{rr}	V_R=15V, I_F=I_S, di_F/dt=100A/µs	-	26	32	ns
Reverse recovery charge	Q_{rr}		-	13	16	nC

1 Power dissipation

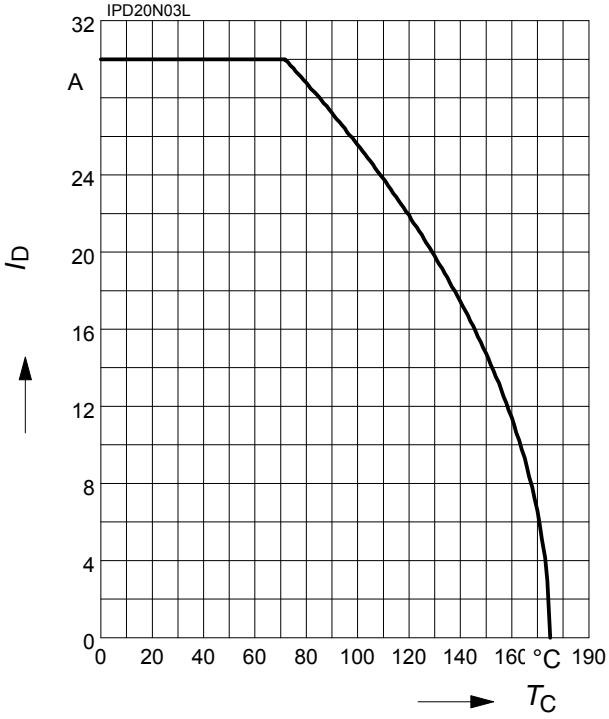
$P_{tot} = f(T_C)$



2 Drain current

$I_D = f(T_C)$

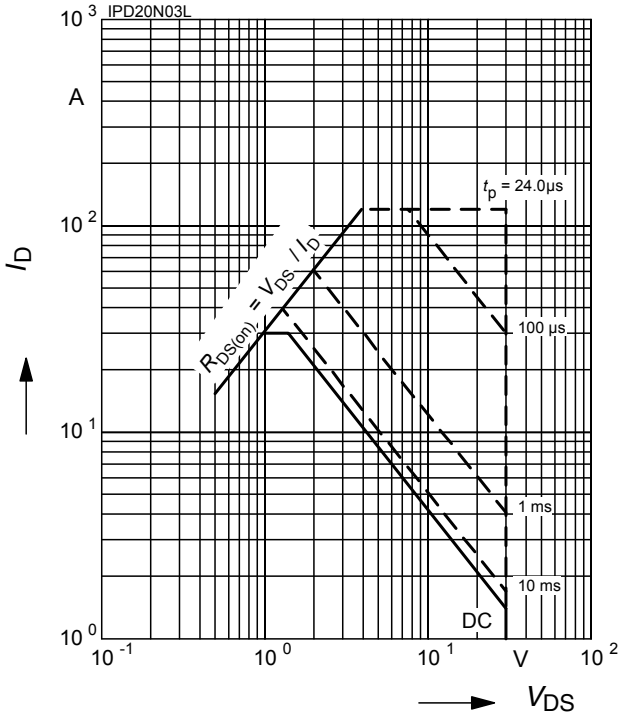
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

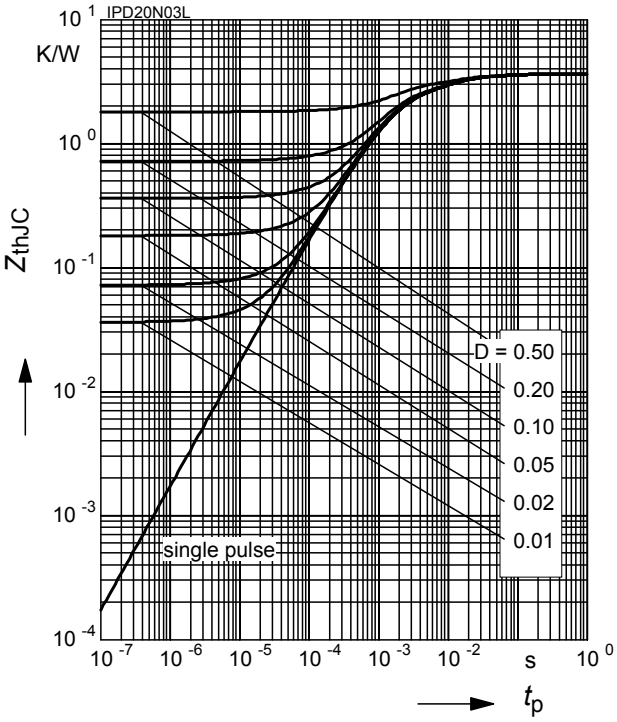
parameter : $D = 0$, $T_C = 25$ °C



4 Transient thermal impedance

$Z_{thJC} = f(t_p)$

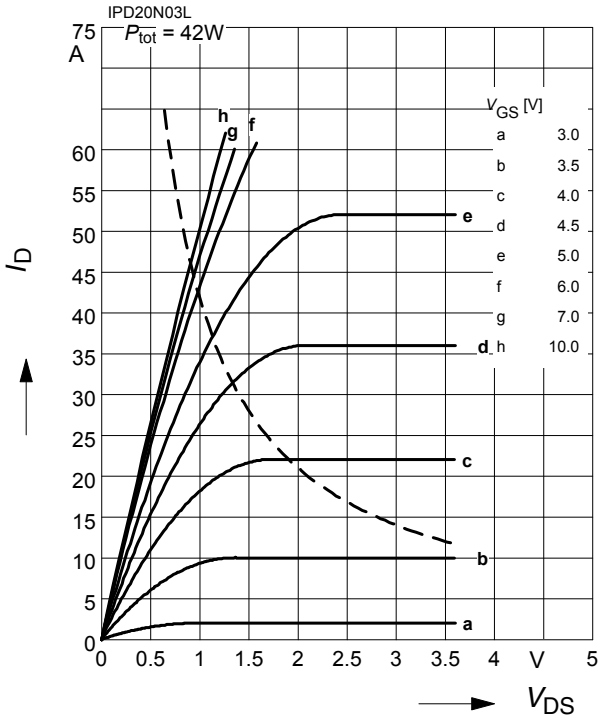
parameter : $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

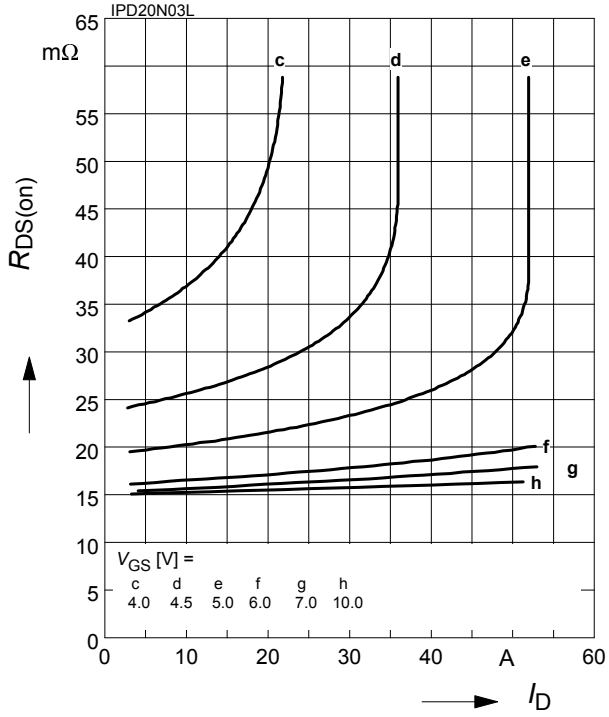
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

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

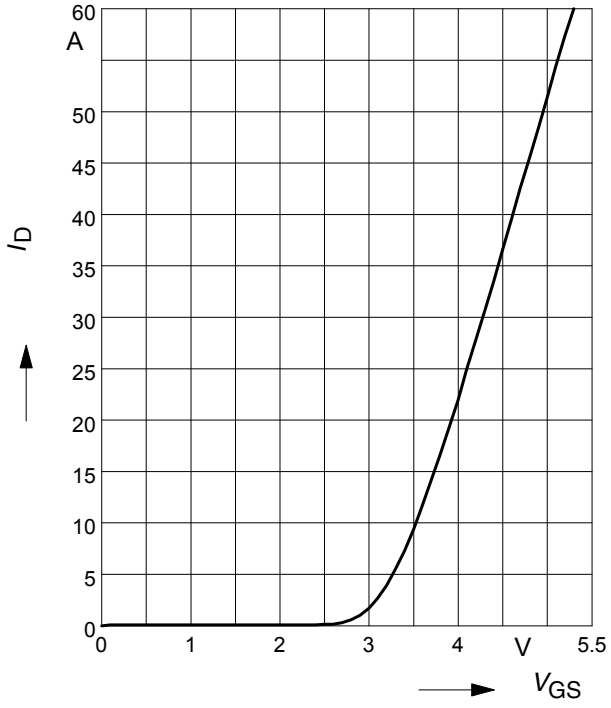
parameter: V_{GS}



7 Typ. transfer characteristics

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

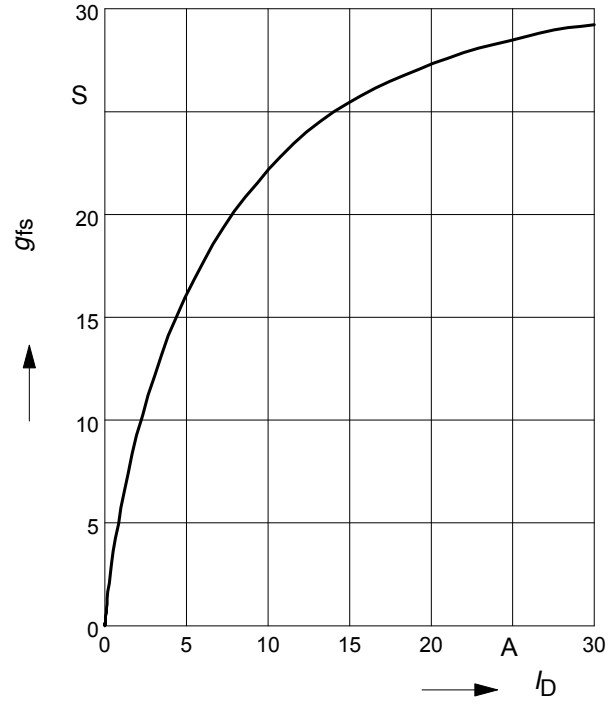
parameter: t_p = 80 µs



8 Typ. forward transconductance

g_{fs} = f(I_D); T_j=25°C

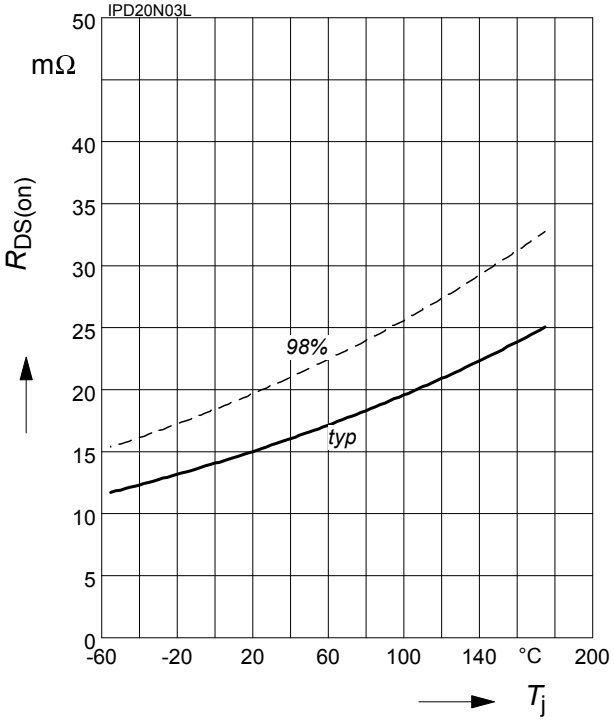
parameter: g_{fs}



9 Drain-source on-state resistance

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

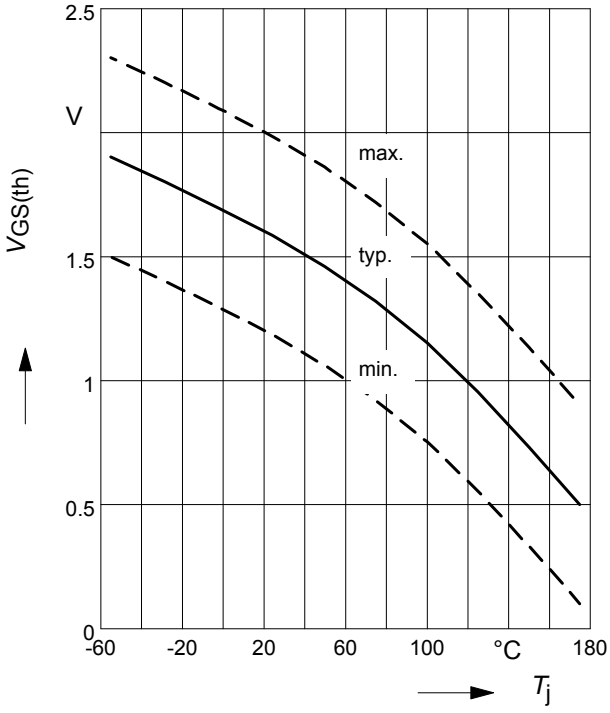
parameter : I_D = 15 A, V_{GS} = 10 V



10 Gate threshold voltage

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

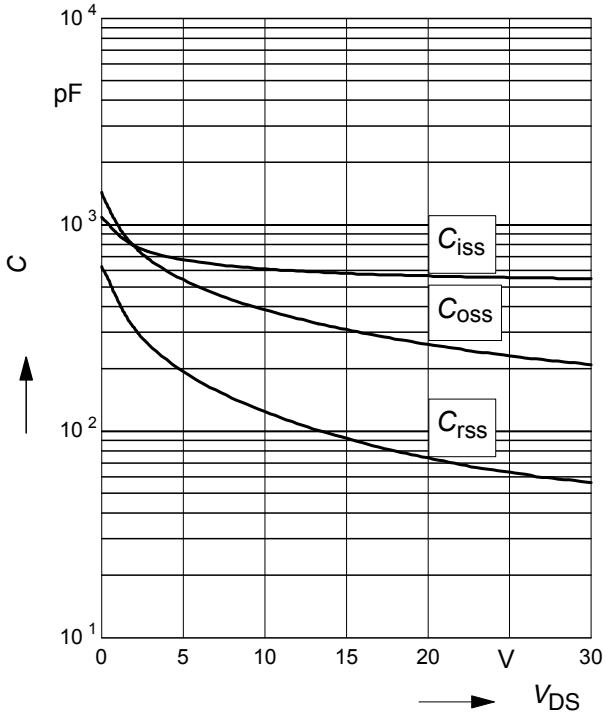
parameter: $V_{GS} = V_{DS}$, I_D = 25 µA



11 Typ. capacitances

$C = f(V_{DS})$

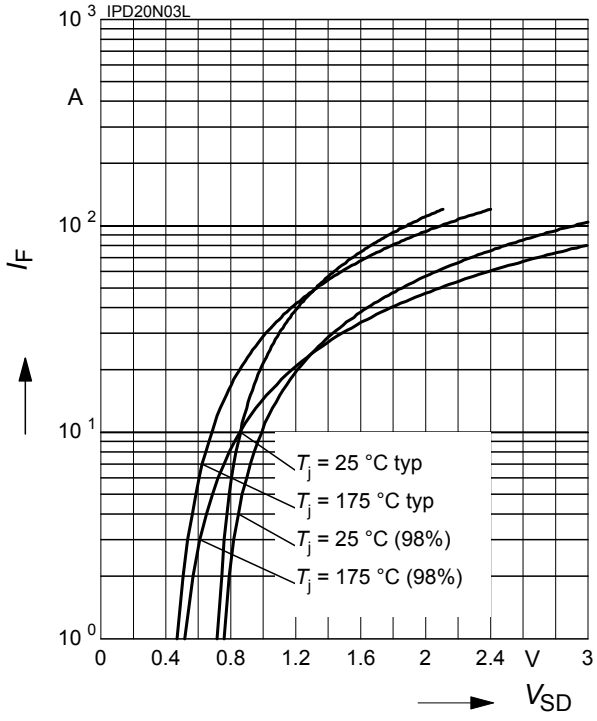
parameter: V_{GS}=0V, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

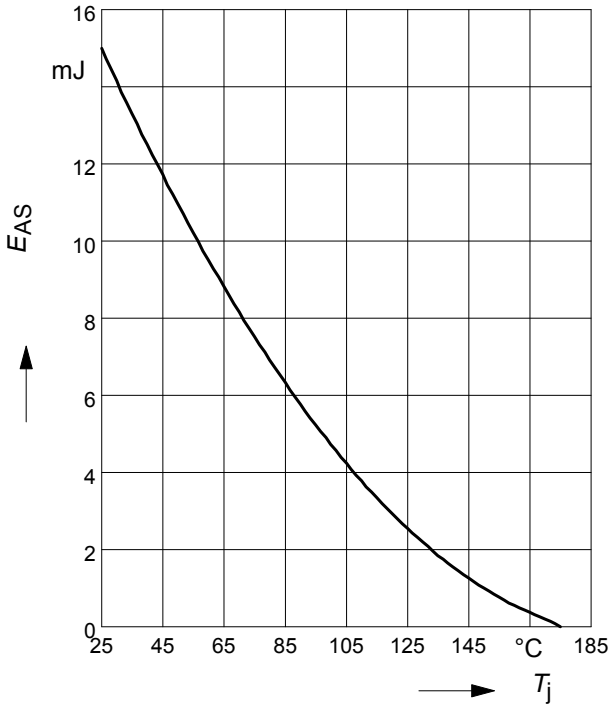
parameter: T_j , tp = 80 µs



13 Typ. avalanche energy

$E_{AS} = f(T_j)$

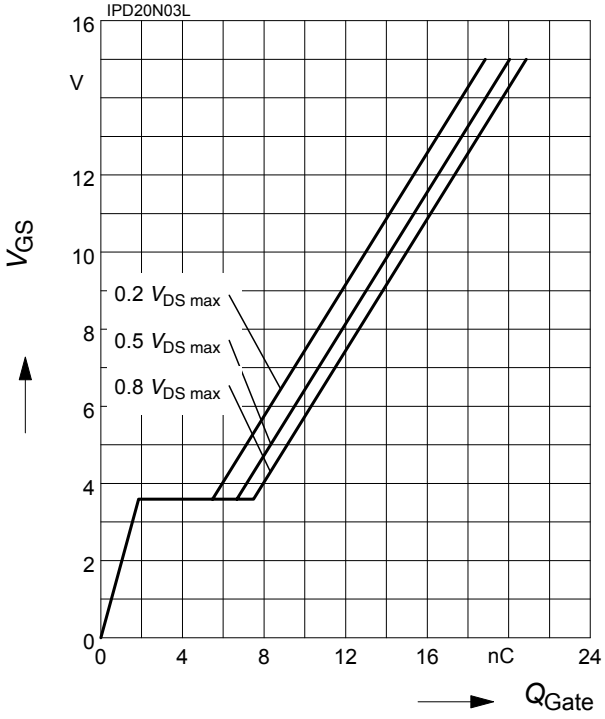
par.: I_D = 15 A, V_{DD} = 25 V, R_{GS} = 25 Ω



14 Typ. gate charge

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

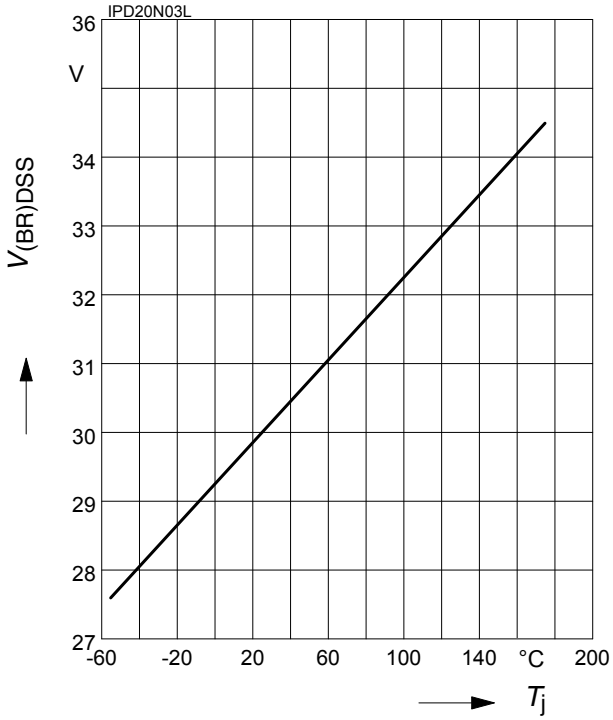
parameter: I_D = 30 A pulsed



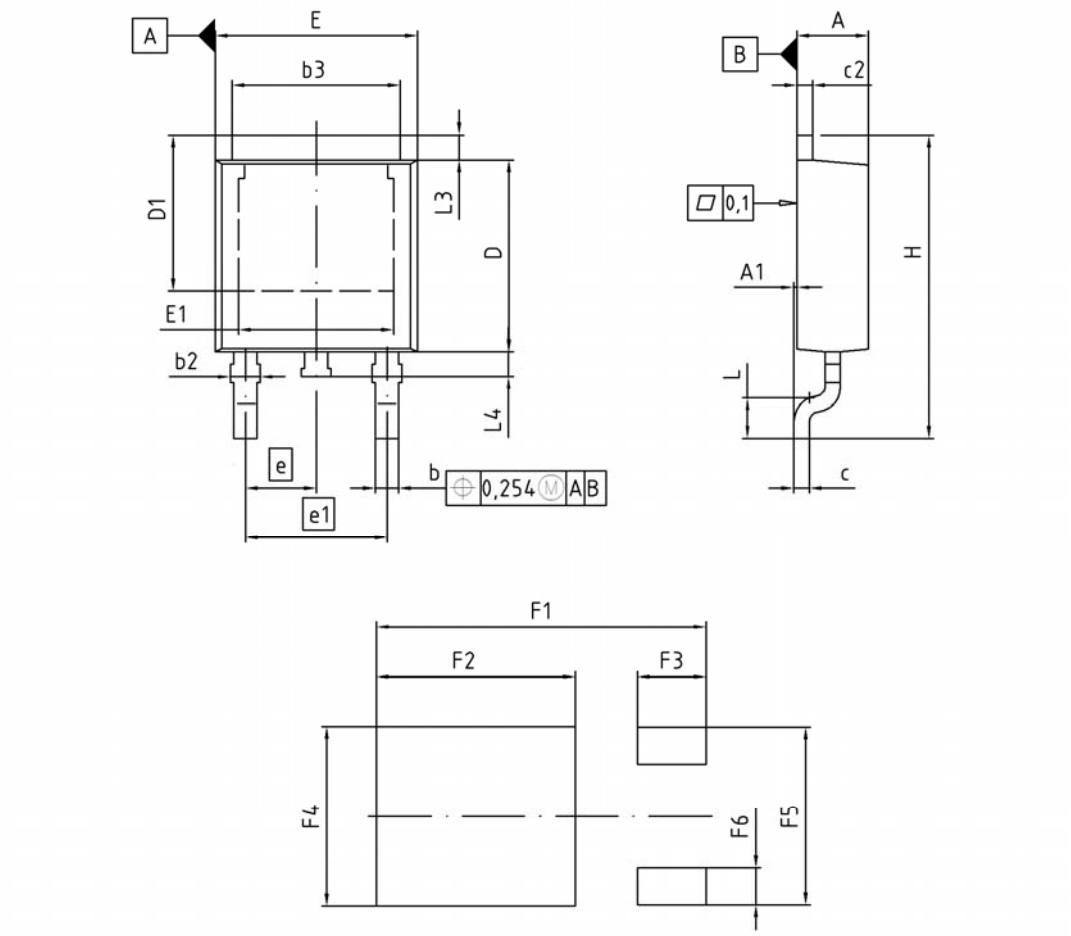
15 Drain-source breakdown voltage

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

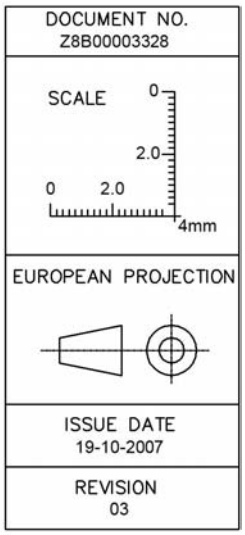
parameter: I_D=10 mA



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



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