OptiMOS™ P3 Power-Transistor

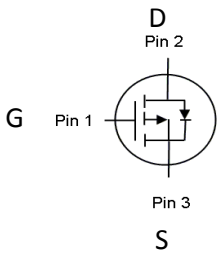
Features

- single P-Channel (Logic Level)
- Enhancement mode
- Qualified according JEDEC[1)] for target applications
- 175 °C operating temperature
- Pb-free; RoHS compliant
- applications: load switch, HS-switch
- Halogen-free according to IEC61249-2-21

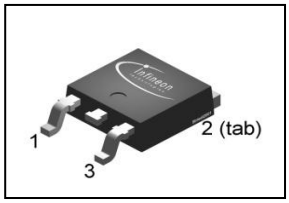
RoHS Halogen-Free

Product Summary

V_{DS}		-30	V
$R_{DS(on),max}$	V_{GS} = 10V	4.2	mΩ
	V_{GS} = 4.5V	6.8	
I_D		-70	A



PG-TO252-3



Type	Package	Marking	Lead free	Packing
IPD042P03L3 G	PG-TO252-3	042P03L	Yes	non dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_C=25 °C	-70	A
		T_C=100 °C	-70	
Pulsed drain current	$I_{D,pulse}$	T_C=25 °C[2)]	-280	
Avalanche energy, single pulse	E_{AS}	I_D=-70 A, R_{GS}=25 Ω	269	mJ
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_C=25 °C	150	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 175	°C
ESD class		JESD22-A114 HBM	class 2 (2 kV - < 4 kV)	
Soldering temperature			260	°C
IEC climatic category; DIN IEC 68-1			55/175/56	

[1)] J-STD20 and JESD22

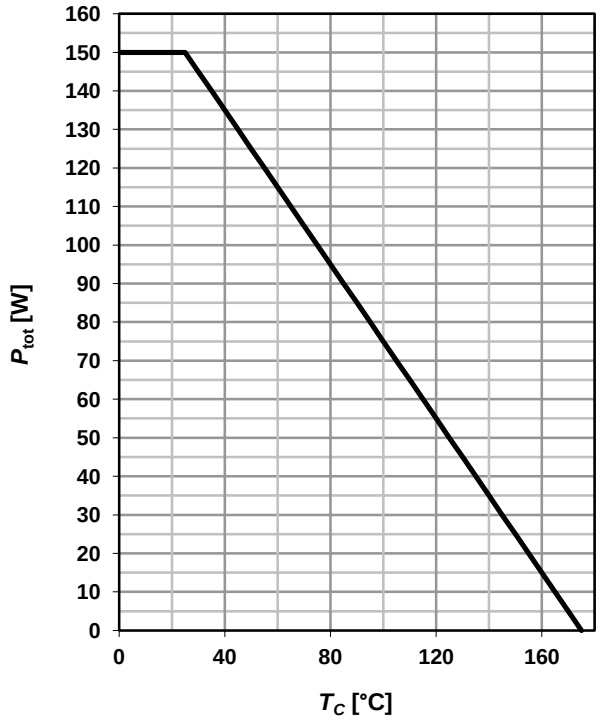
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}		-	-	1.0	K/W
Thermal resistance, junction - ambient	R_{thJA}	6 cm^2 cooling area[2)]	-	-	50	
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=-250µA	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-270 µA	-2.0	-1.5	-1.0	
Zero gate voltage drain current	I_{DSS}	V_{DS}=-30 V, V_{GS}=0 V, T_j=25 °C	-	-	-1	µA
		V_{DS}=-30 V, V_{GS}=0 V, T_j=175 °C	-	-	-300	
Gate-source leakage current	I_{GSS}	V_{GS}=-20 V, V_{DS}=0 V	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=-4.5 V, I_D=-70 A	-	4.6	6.8	mΩ
		V_{GS}=-10 V, I_D=-70 A	-	3.5	4.2	
Gate resistance	R_G		-	2.4	-	Ω
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=-70 A	65	130	-	S

[2)] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=-15 V, f=1 MHz	-	9290	12400	pF
Output capacitance	C_{oss}		-	3570	4750	
Reverse transfer capacitance	C_{rss}		-	150	220	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-15 V, V_{GS}=-10 V, I_D=-70 A, $R_{G,ext}$=6 Ω	-	21	33	ns
Rise time	t_r		-	167	251	
Turn-off delay time	$t_{d(off)}$		-	89	134	
Fall time	t_f		-	22	33	
Gate Charge Characteristics[3)]						
Gate to source charge	Q_{gs}	V_{DD}=-15 V, I_D=-70 A, V_{GS}=0 to -10 V	-	31	41	nC
Gate charge at threshold	$Q_{g(th)}$		-	15	20	
Gate to drain charge	Q_{gd}		-	14	21	
Switching charge	Q_{sw}		-	30	42	
Gate charge total	Q_g		-	131	175	
Gate plateau voltage	$V_{plateau}$		-	3.3	-	V
Output charge	Q_{oss}	V_{DD}=-15 V, V_{GS}=0 V	-	84	111	nC
Reverse Diode						
Diode continous forward current	I_S	T_C=25 °C	-	-	70	A
Diode pulse current	$I_{S,pulse}$		-	-	280	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=-70 A, T_j=25 °C	-	-	-1.1	V
Reverse recovery time	t_{rr}	V_R=15 V, I_F=$\|I_S\|$, di_F/dt=100 A/µs	-	54	68	ns
Reverse recovery charge	Q_{rr}		-	61	76	nC

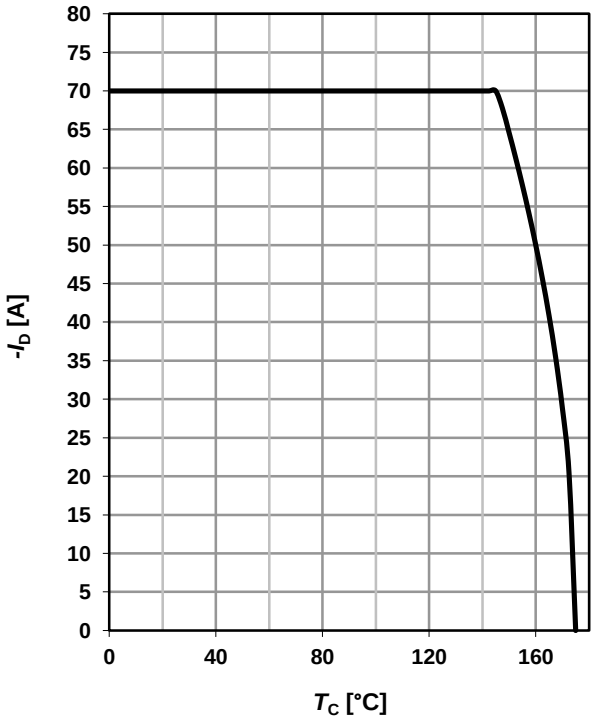
1 Power dissipation

$P_{tot}=f(T_C)$; $t_p \leq 10$ s



2 Drain current

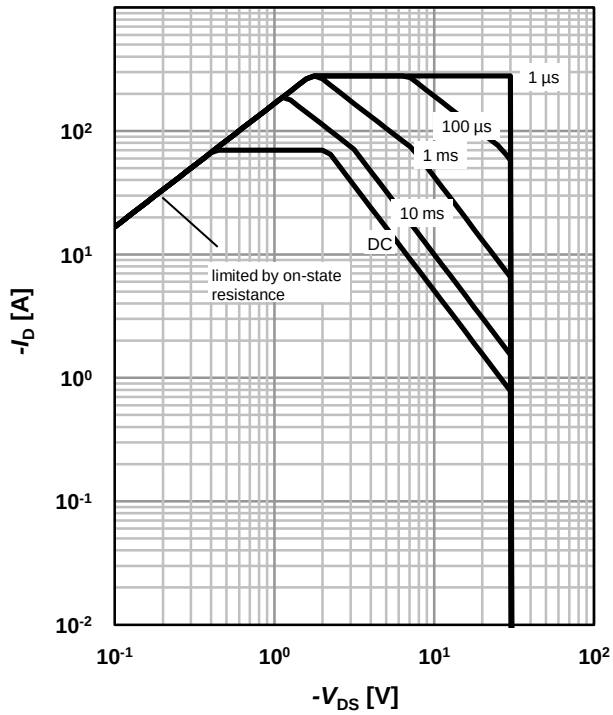
$I_D=f(T_C)$; $|V_{GS}| \geq 10$ V; $t_p \leq 10$ s



3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C[1)]; $D=0$

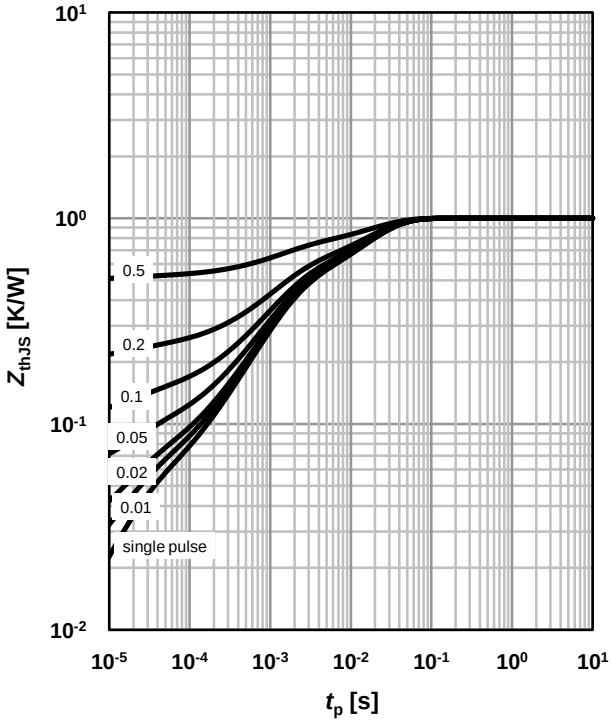
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJS}=f(t_p)$

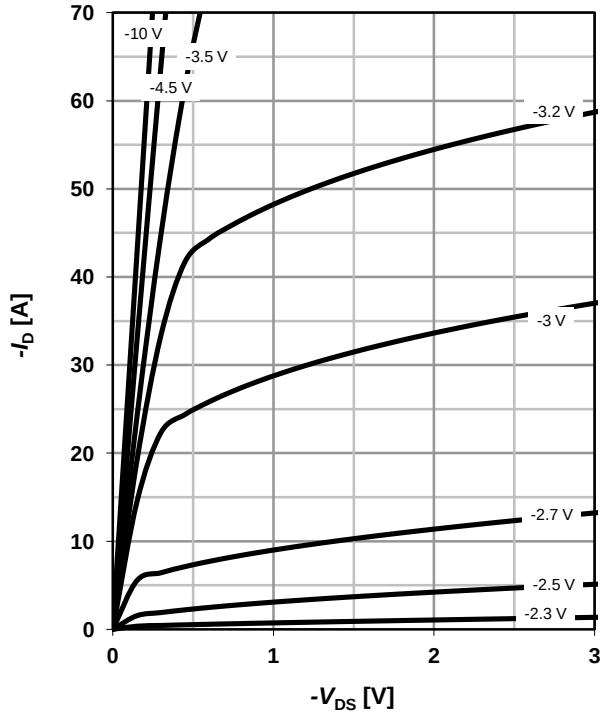
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

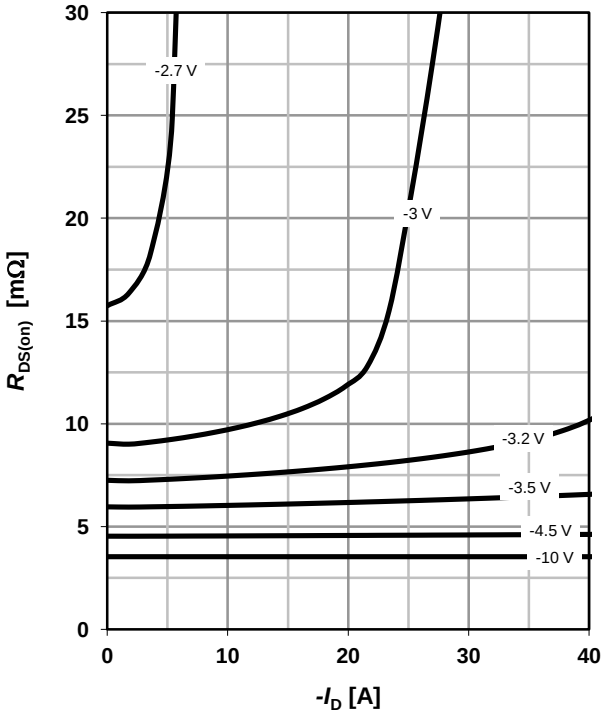
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}$=f(I_D); T_j=25 °C

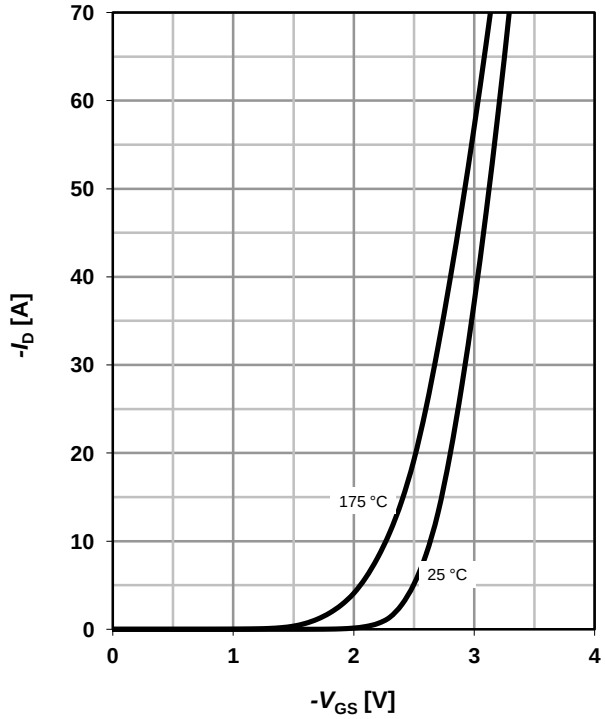
parameter: V_{GS}



7 Typ. transfer characteristics

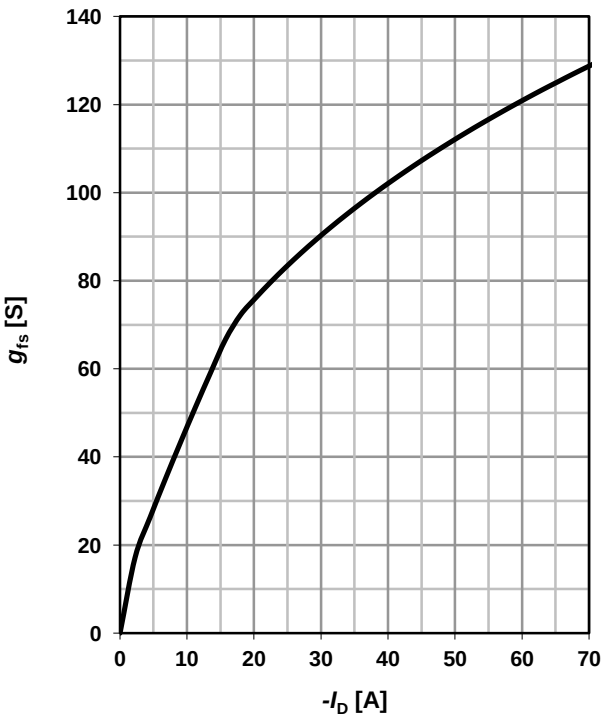
I_D=f(V_{GS}); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



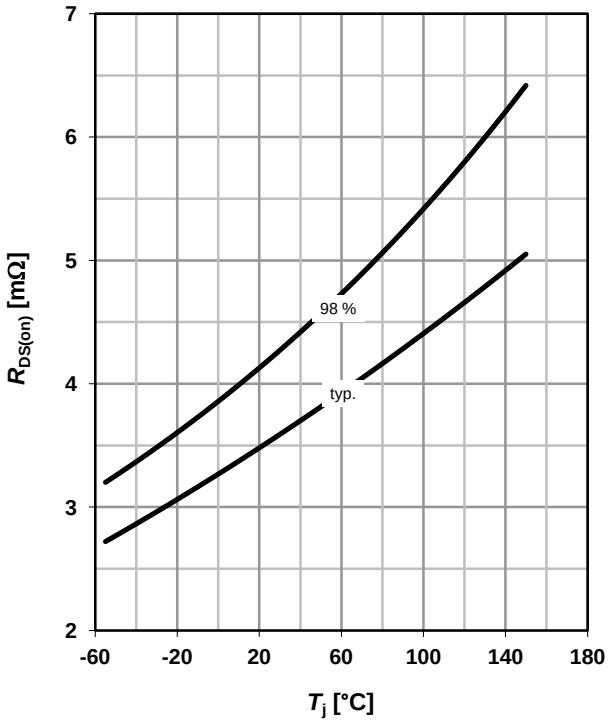
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



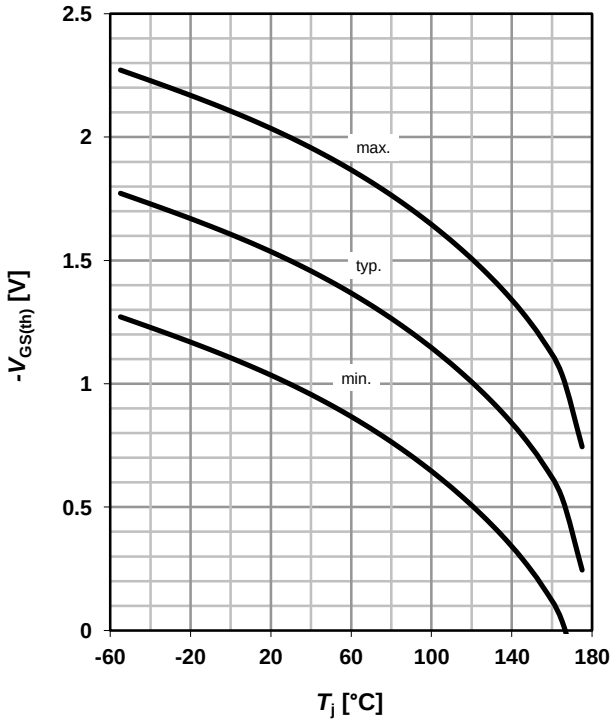
9 Drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=-30 A; V_{GS}=-10 V



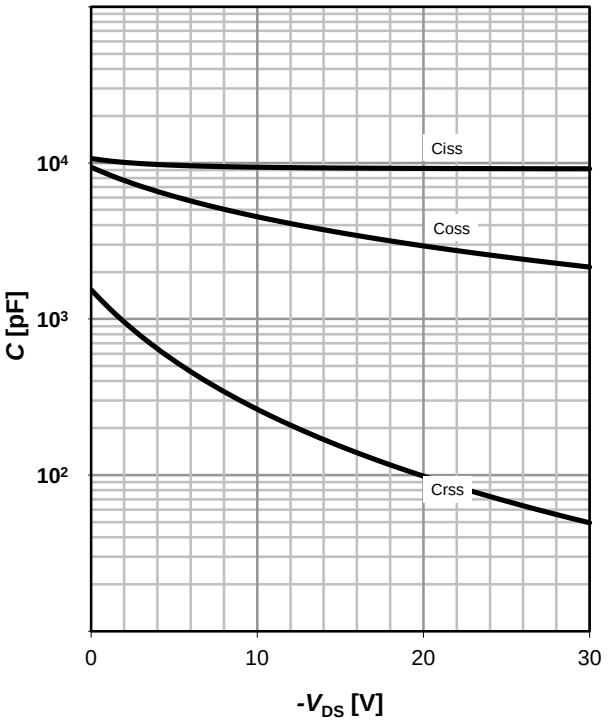
10 Typ. gate threshold voltage

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=-270 µA



11 Typ. capacitances

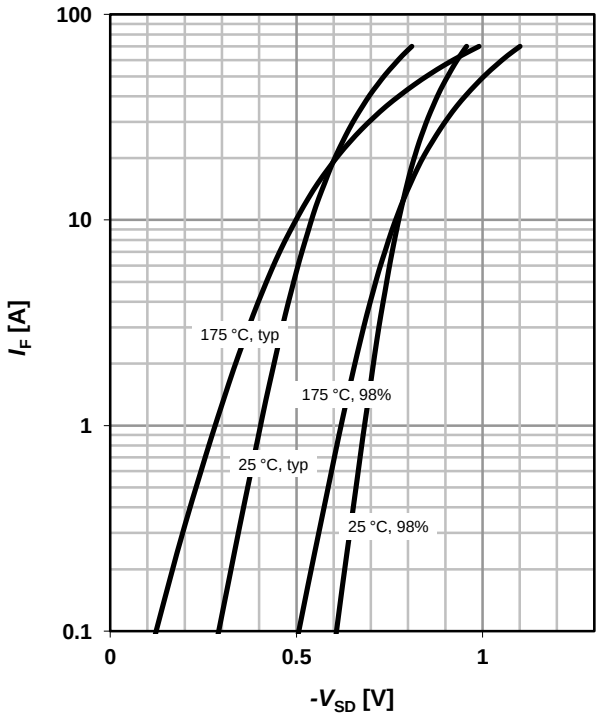
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

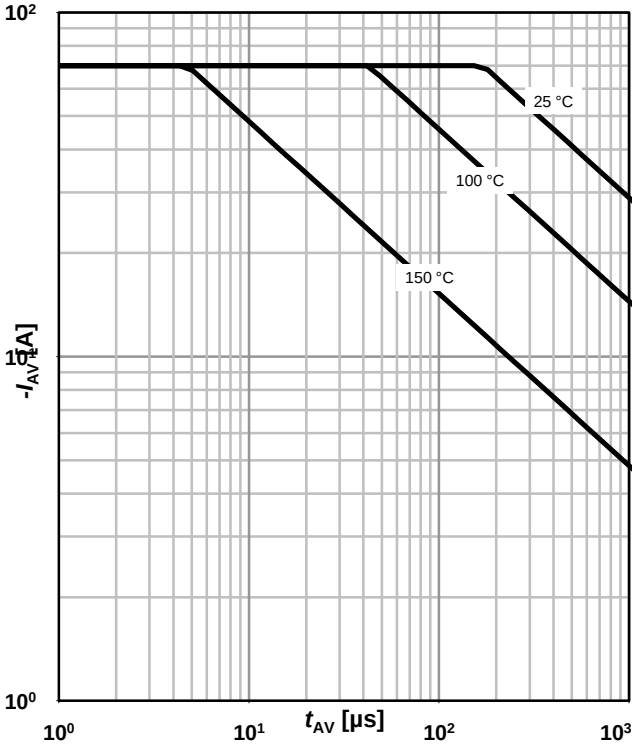
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

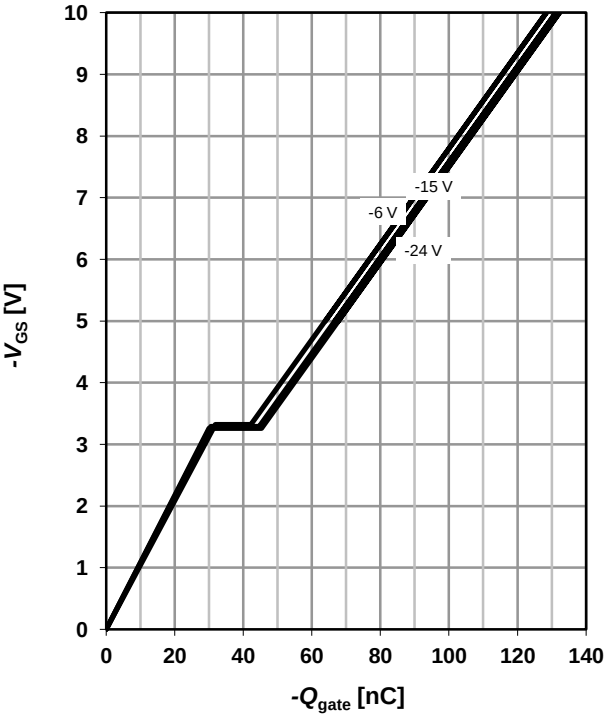
parameter: $T_{j(start)}$



14 Typ. gate charge

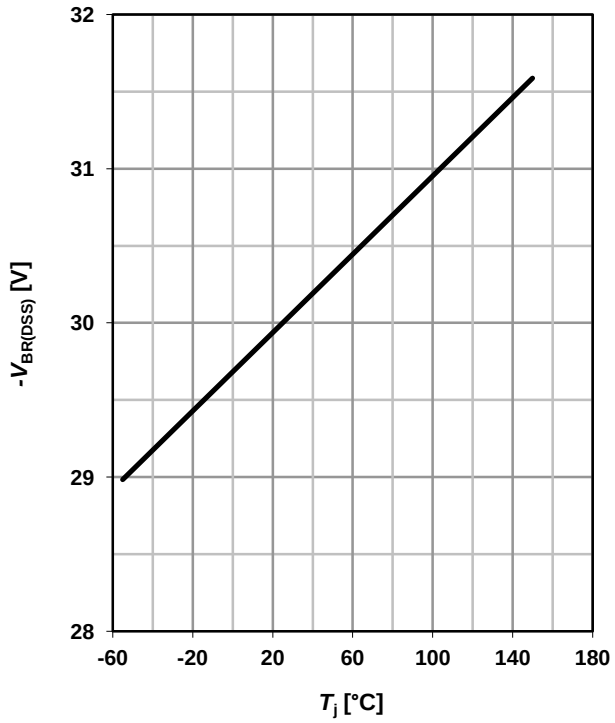
V_{GS}=f(Q_{gate}); I_D=-70 A pulsed

parameter: V_{DD}

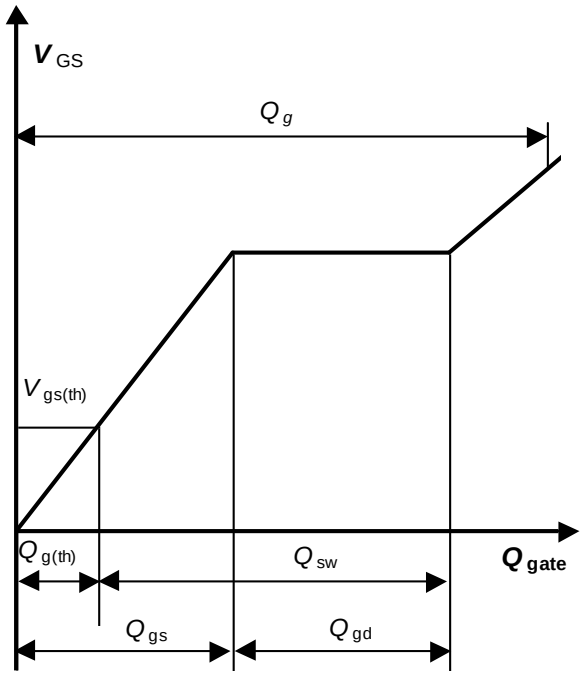


15 Drain-source breakdown voltage

$V_{BR(DSS)}$=f(T_j); I_D=-250 µA

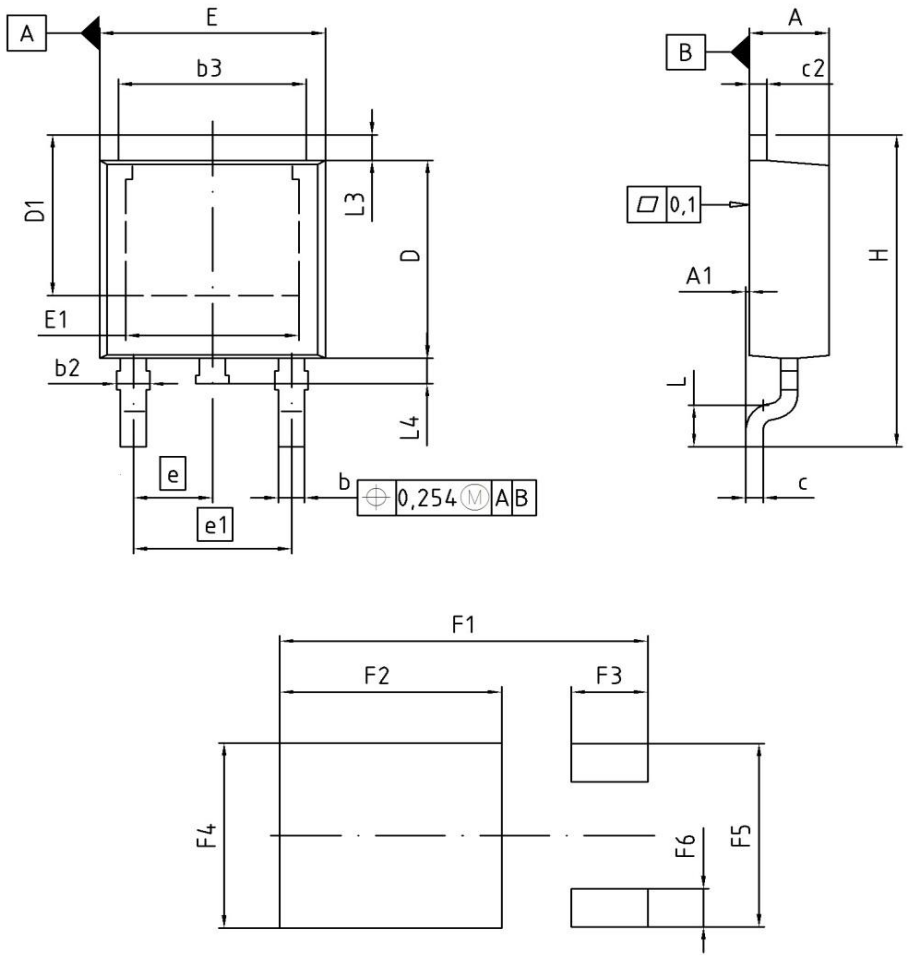


16 Gate charge waveforms



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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