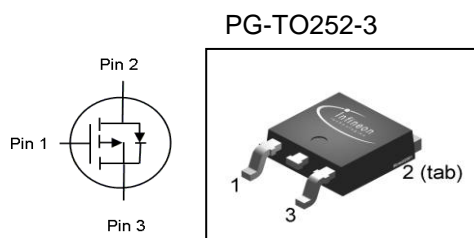


**OptiMOS™ P3 Power-Transistor**
**Features**

- single P-Channel in DPAK
- Qualified according JEDEC<sup>1)</sup> for target applications
- 175 °C operating temperature
- 100% Avalanche tested
- Pb-free; RoHS compliant, halogen free
- applications: power management
- Halogen-free according to IEC61249-2-21


**Product Summary**

$V_{DS}$	-30	V
$R_{DS(on),max}$	$V_{GS} = 10V$	6.8 mΩ
	$V_{GS} = 4.5V$	11.0
$I_D$	-70	A



Type	Package	Marking	Lead free	Packing
IPD068P03L3 G	PG-TO252-3	068P03L	Yes	non dry

**Maximum ratings**, at  $T_j=25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_C=25\text{ °C}$	-70	A
		$T_C=100\text{ °C}$	-70	
Pulsed drain current	$I_{D,pulse}$	$T_C=25\text{ °C}^{2)}$	-280	
Avalanche energy, single pulse	$E_{AS}$	$I_D=-70\text{ A}, R_{GS}=25\text{ }\Omega$	149	mJ
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	100	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 175	°C
ESD class		JESD22-A114 HBM	tbd	
Soldering temperature			260	°C
IEC climatic category; DIN IEC 68-1			55/175/56	

<sup>1)</sup> J-STD20 and JESD22

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - case	$R_{thJC}$		-	-	1.5	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	6 cm <sup>2</sup> cooling area <sup>2)</sup>	-	-	50	

**Electrical characteristics, at  $T_j=25\text{ °C}$ , unless otherwise specified**
**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\mu\text{A}$	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-150\mu\text{A}$	-1.0	-1.5	-2.0	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-0.1	-1	$\mu\text{A}$
		$V_{DS}=-30\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$	-	-10	-100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5\text{ V}, I_D=-45\text{ A}$	-	7.0	11.0	m $\Omega$
		$V_{GS}=-10\text{ V}, I_D=-70\text{ A}$	-	5.0	6.8	
Gate resistance	$R_G$		-	5.8	-	$\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-70\text{ A}$	50	100	-	S

<sup>2)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical in still air.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=-15\text{ V},$ $f=1\text{ MHz}$	-	5150	7720	pF
Output capacitance	$C_{oss}$		-	2090	3140	
Reverse transfer capacitance	$C_{rss}$		-	160	240	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15\text{ V}, V_{GS}=-10\text{ V}, I_D=-70\text{ A},$ $R_{G,ext}=6\ \Omega$	-	11	16.5	ns
Rise time	$t_r$		-	100	150	
Turn-off delay time	$t_{d(off)}$		-	84	126	
Fall time	$t_f$		-	31	47	

**Gate Charge Characteristics<sup>3)</sup>**

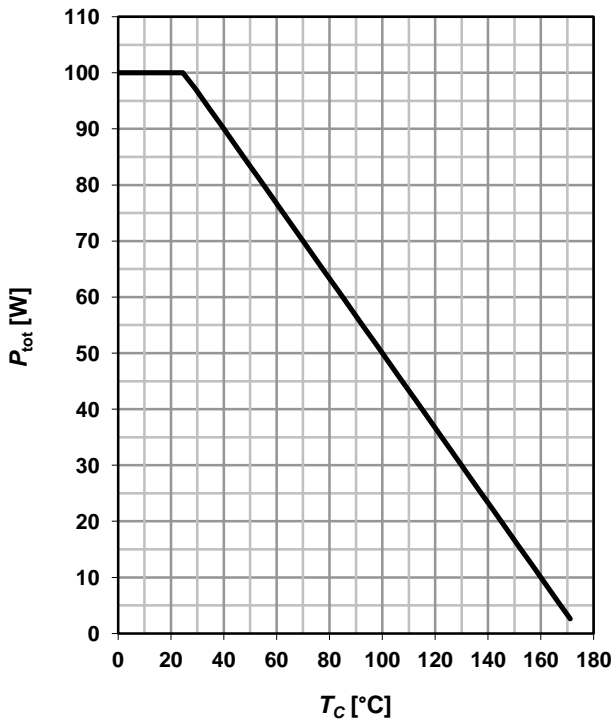
Gate to source charge	$Q_{gs}$	$V_{DD}=-15\text{ V}, I_D=-70\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	19	25	nC
Gate charge at threshold	$Q_{g(th)}$		-	8	11	
Gate to drain charge	$Q_{gd}$		-	8	13	
Switching charge	$Q_{sw}$		-	19	27	
Gate charge total	$Q_g$		-	68	91	
Gate plateau voltage	$V_{plateau}$		-	3.7	-	V
Output charge	$Q_{oss}$	$V_{DD}=-15\text{ V}, V_{GS}=0\text{ V}$	-	48	64	nC

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_C=25\text{ }^\circ\text{C}$	-	-	30	A
Diode pulse current	$I_{S,pulse}$		-	-	280	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=-70\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-	-1.2	V
Reverse recovery time	$t_{rr}$	$V_R=15\text{ V}, I_F=-70\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	46	69	ns
Reverse recovery charge	$Q_{rr}$		-	44	-	

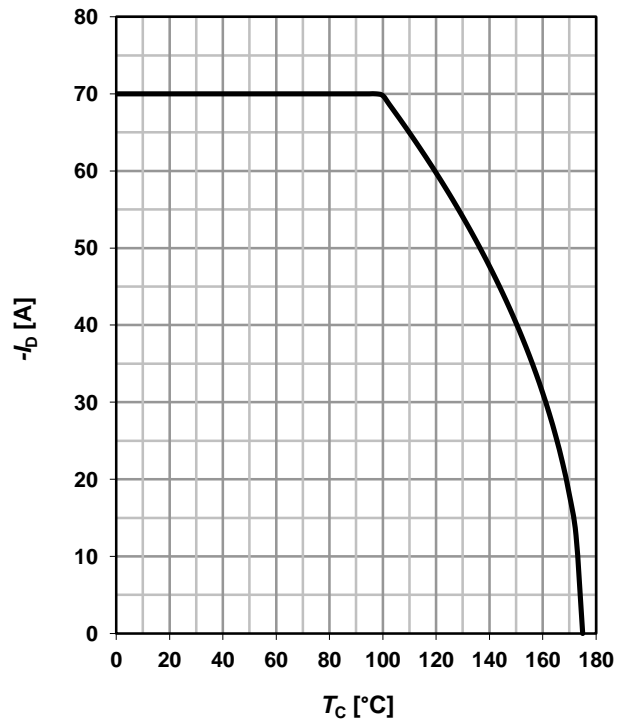
**1 Power dissipation**

$P_{tot}=f(T_C)$



**2 Drain current**

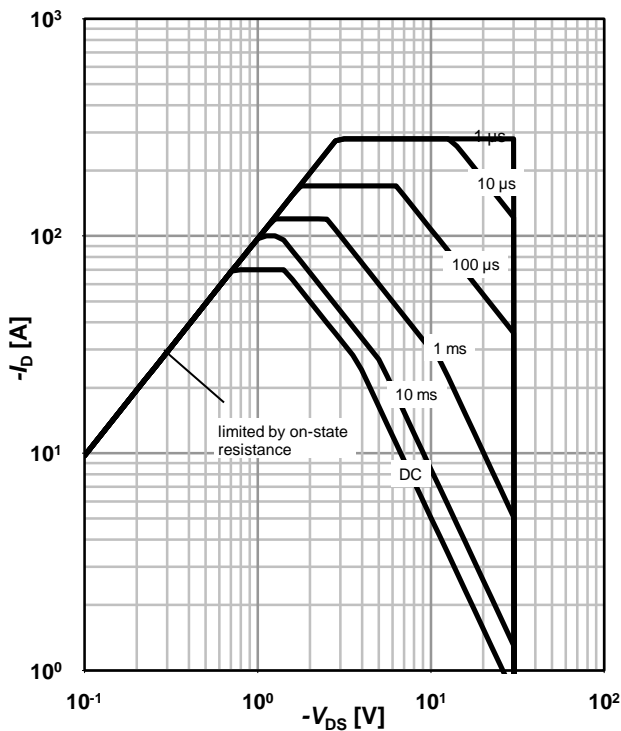
$I_D=f(T_C); |V_{GS}|\geq 10\text{ V}$



**3 Safe operating area**

$I_D=f(V_{DS}); T_C=25\text{ }^\circ\text{C}^1; D=0$

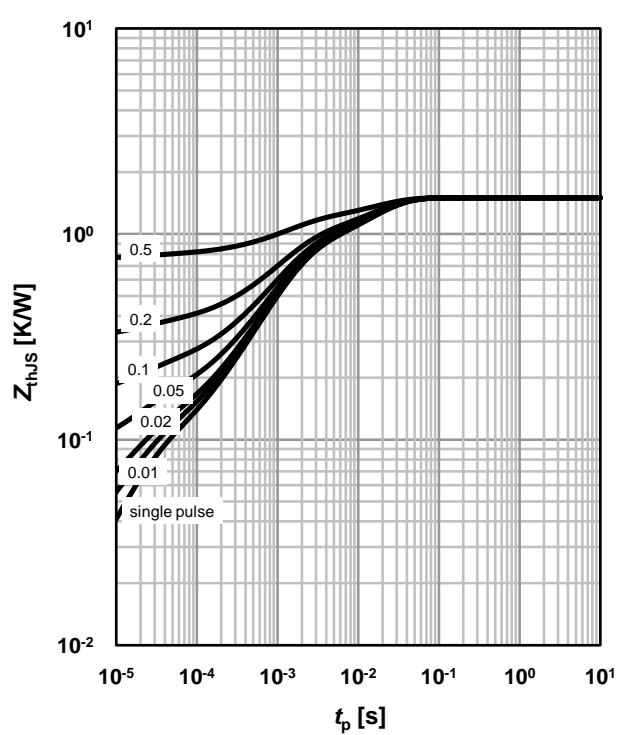
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJS}=f(t_p)$

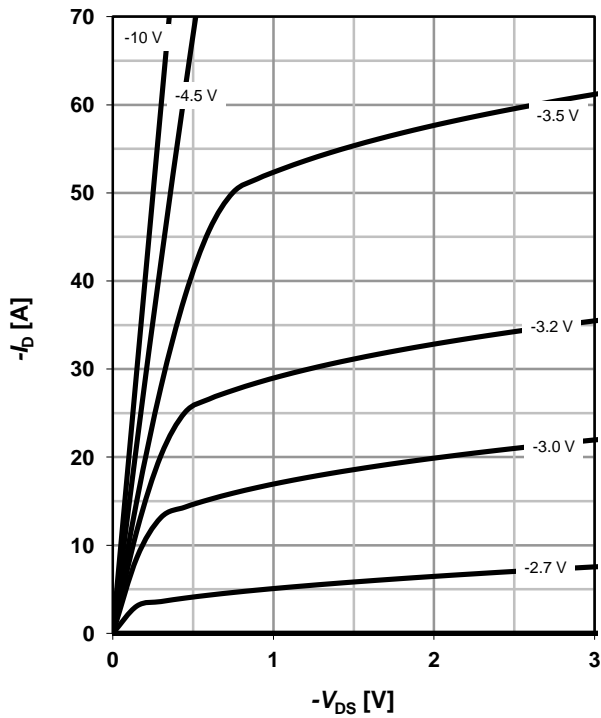
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}$

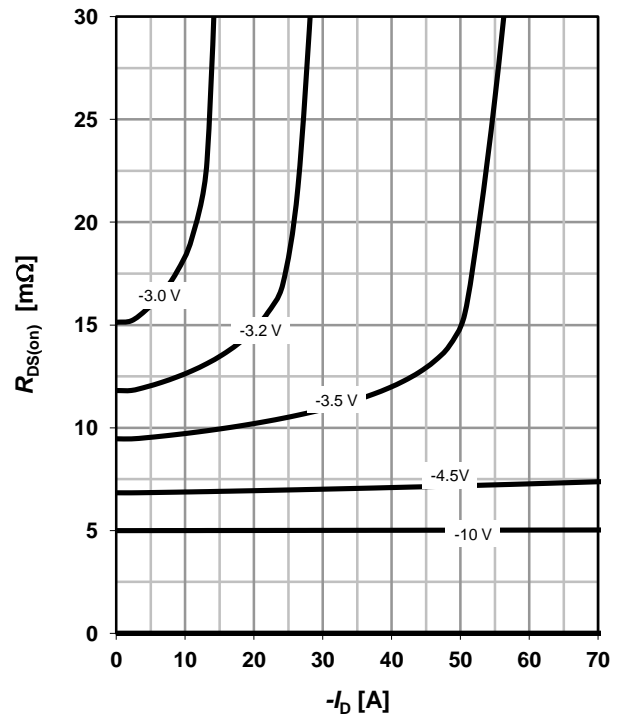
parameter:  $V_{GS}$



**6 Typ. drain-source on resistance**

$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

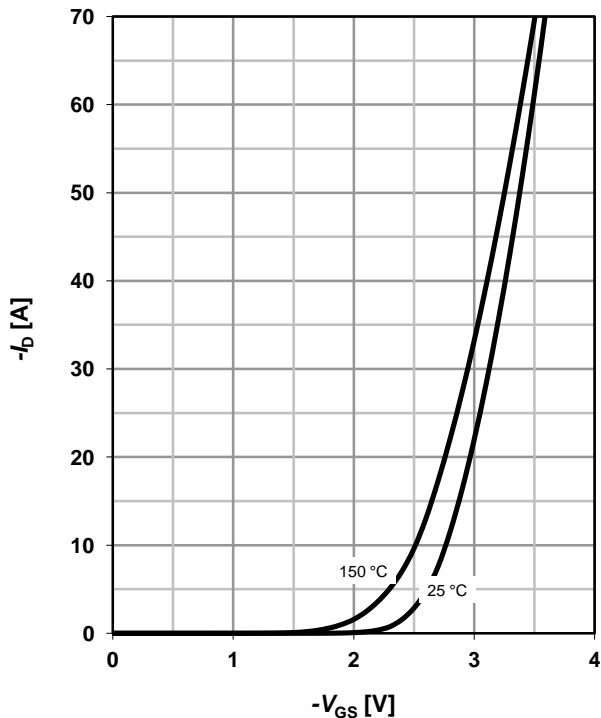
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

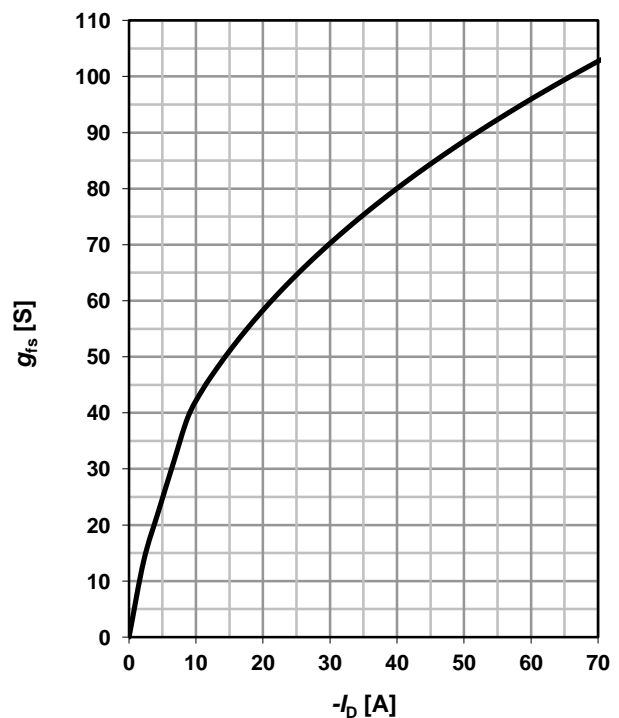
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



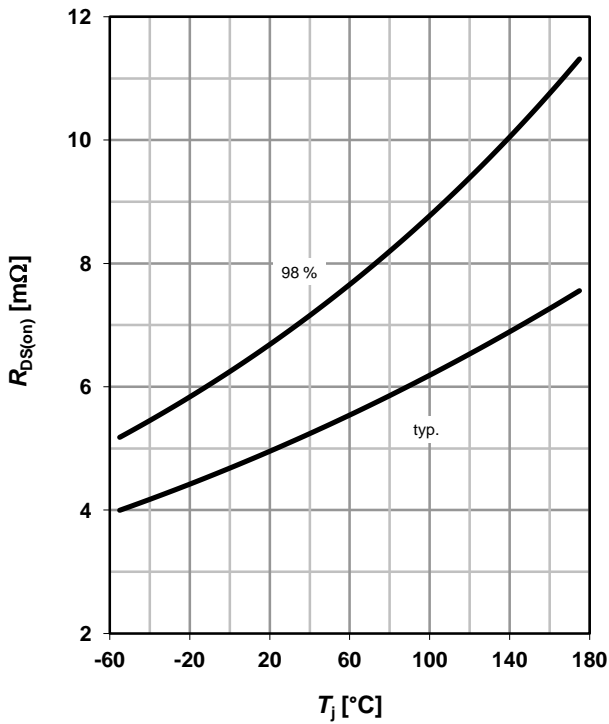
**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25\text{ }^\circ\text{C}$



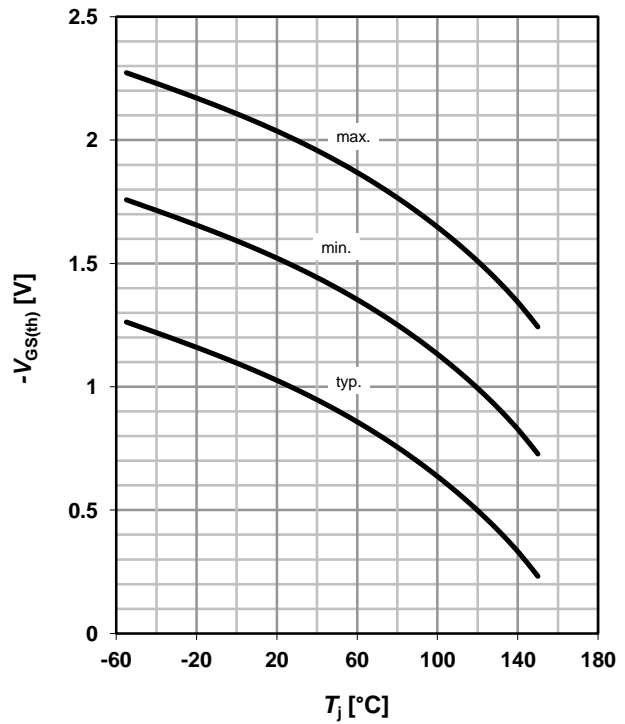
**9 Drain-source on-state resistance**

$R_{DS(on)}=f(T_j); I_D=-70\text{ A}; V_{GS}=-10\text{ V}$



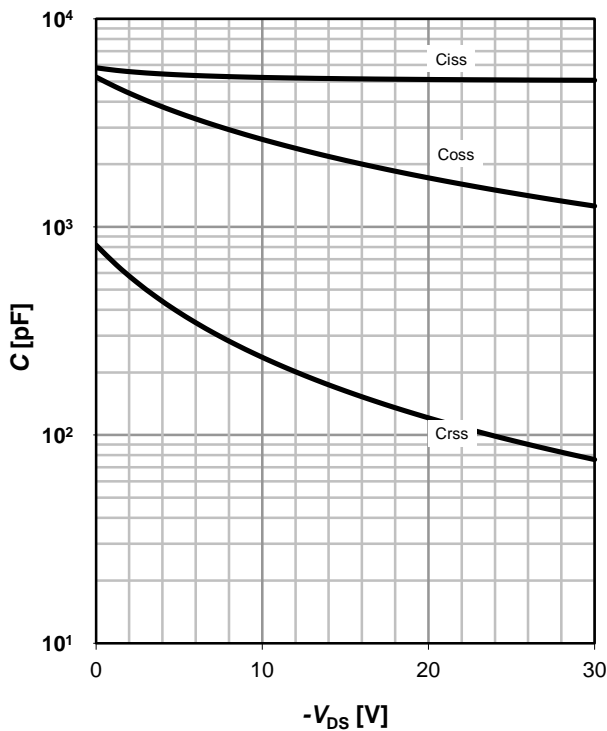
**10 Typ. gate threshold voltage**

$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=-150\ \mu\text{A}$



**11 Typ. capacitances**

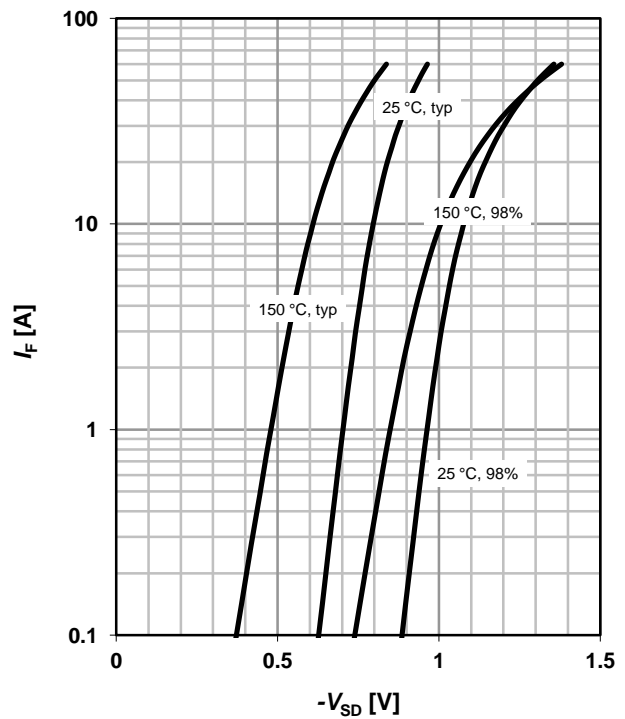
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

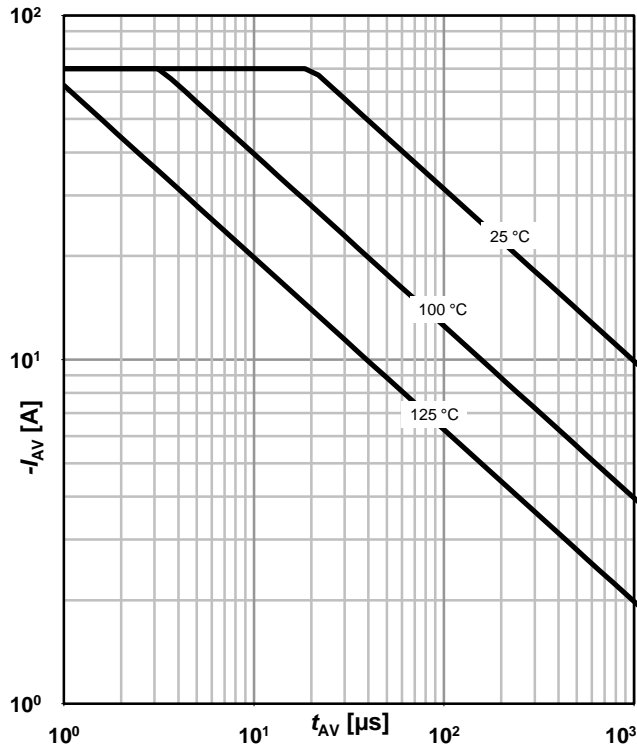
parameter:  $T_j$



**13 Avalanche characteristics**

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

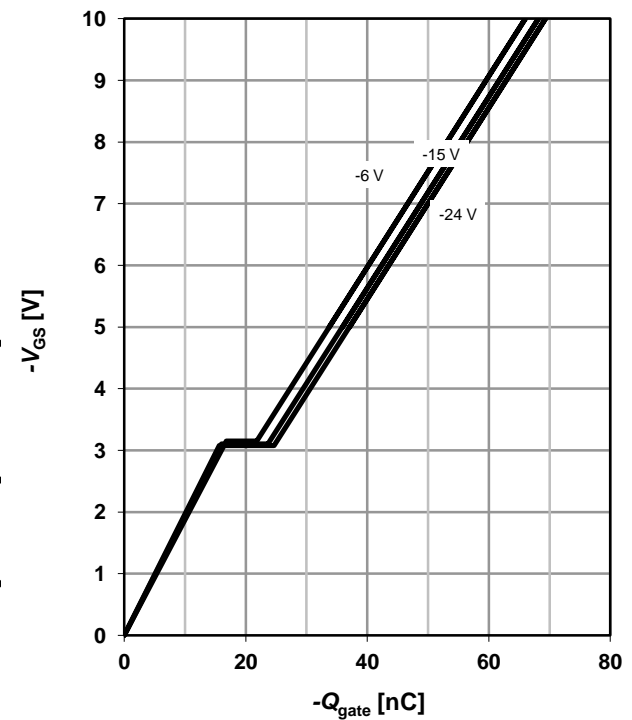
parameter:  $T_{j(\text{start})}$



**14 Typ. gate charge**

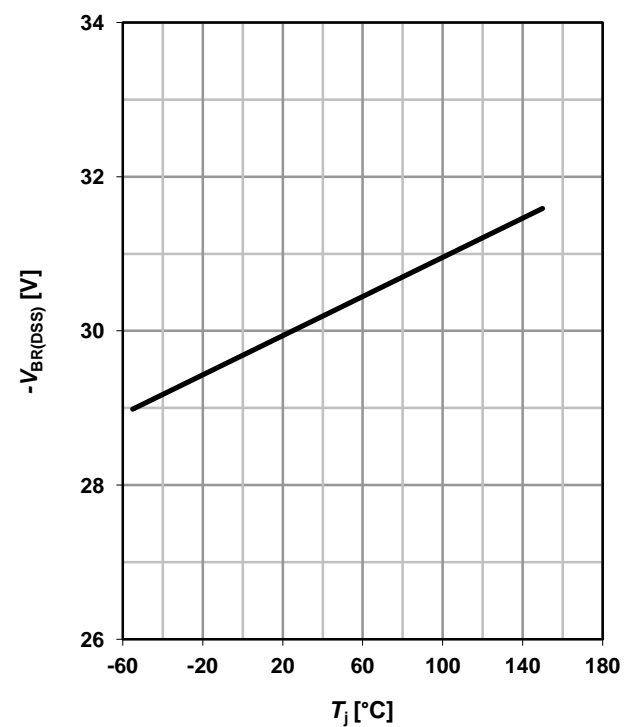
$V_{GS}=f(Q_{\text{gate}}); I_D=-70 \text{ A pulsed}$

parameter:  $V_{DD}$



**15 Drain-source breakdown voltage**

$V_{BR(DSS)}=f(T_j); I_D=-250 \mu\text{A}$

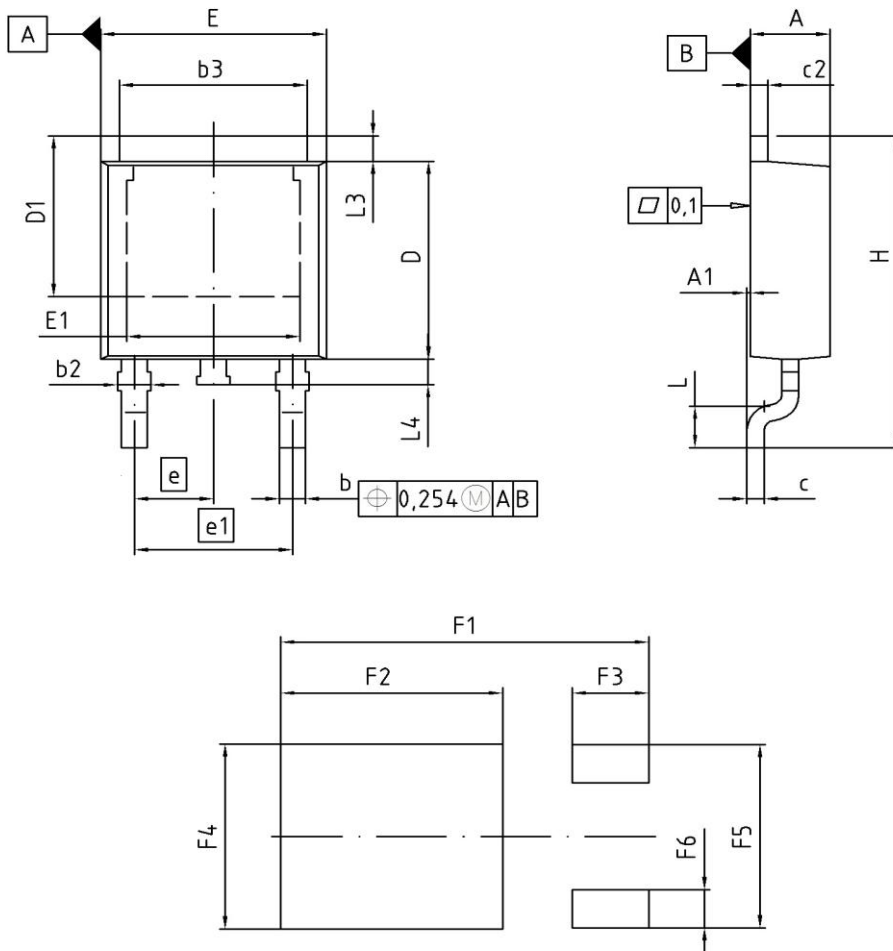


**16 Gate charge waveforms**



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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