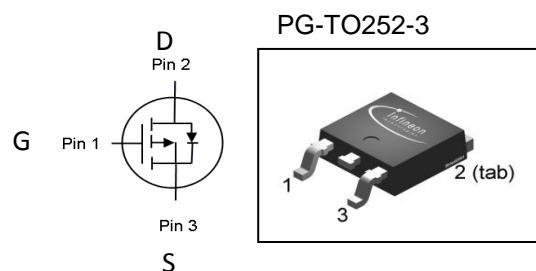


**OptiMOS™ P3 Power-Transistor**
**Features**

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


**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



Type	Package	Marking	Lead free	Packing
IPD042P03L3 G	PG-TO252-3	042P03L	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	$E_{AS}$	$I_D=-70\text{ A}, R_{GS}=25\text{ }\Omega$	269	mJ
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	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	

<sup>1)</sup> 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 <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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-270\mu\text{A}$	-2.0	-1.5	-1.0	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	-1	$\mu\text{A}$
		$V_{DS}=-30\text{ V}, V_{GS}=0\text{ V}, T_j=175\text{ °C}$	-	-	-300	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5\text{ V}, I_D=-70\text{ A}$	-	4.6	6.8	m $\Omega$
		$V_{GS}=-10\text{ V}, I_D=-70\text{ A}$	-	3.5	4.2	
Gate resistance	$R_G$		-	2.4	-	$\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-70\text{ A}$	65	130	-	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	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=-15\text{ V},$ $f=1\text{ MHz}$	-	9290	12400	pF
Output capacitance	$C_{oss}$		-	3570	4750	
Reverse transfer capacitance	$C_{rss}$		-	150	220	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15\text{ V}, V_{GS}=-10\text{ V}, I_D=-70\text{ A},$ $R_{G,ext}=6\ \Omega$	-	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<sup>3)</sup>**

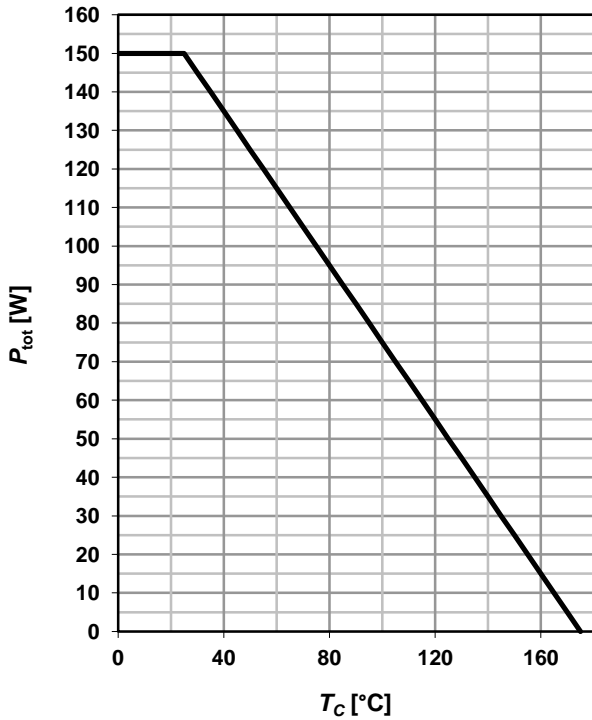
Gate to source charge	$Q_{gs}$	$V_{DD}=-15\text{ V}, I_D=-70\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	31	41	nC
Gate charge at threshold	$Q_{g(th)}$		-	15	20	
Gate to drain charge	$Q_{gd}$		-	14	21	
Switching charge	$Q_{sw}$		-	30	42	
Gate charge total	$Q_g$		-	131	175	
Gate plateau voltage	$V_{plateau}$		-	3.3	-	V
Output charge	$Q_{oss}$	$V_{DD}=-15\text{ V}, V_{GS}=0\text{ V}$	-	84	111	nC

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_C=25\text{ }^\circ\text{C}$	-	-	70	A
Diode pulse current	$I_{S,pulse}$		-	-	280	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=-70\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-	-1.1	V
Reverse recovery time	$t_{rr}$	$V_R=15\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	54	68	ns
Reverse recovery charge	$Q_{rr}$		-	61	76	

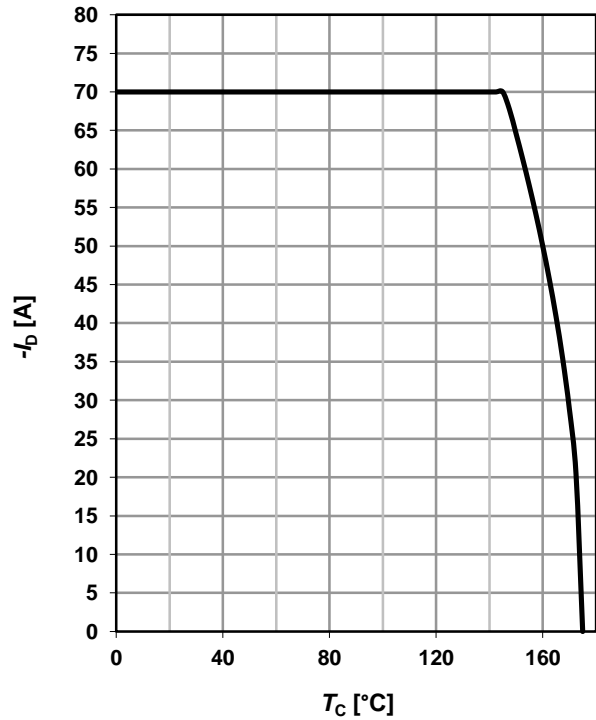
**1 Power dissipation**

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



**2 Drain current**

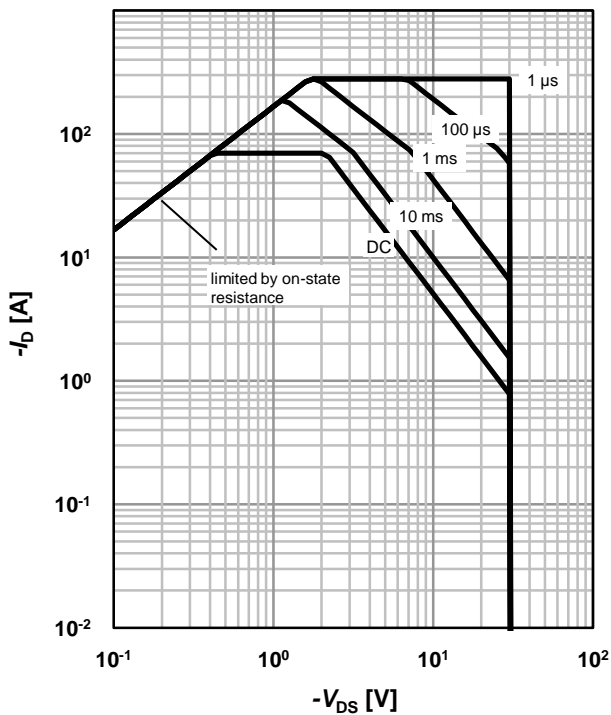
$I_D=f(T_C); |V_{GS}| \geq 10 \text{ V}; t_p \leq 10 \text{ s}$



**3 Safe operating area**

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

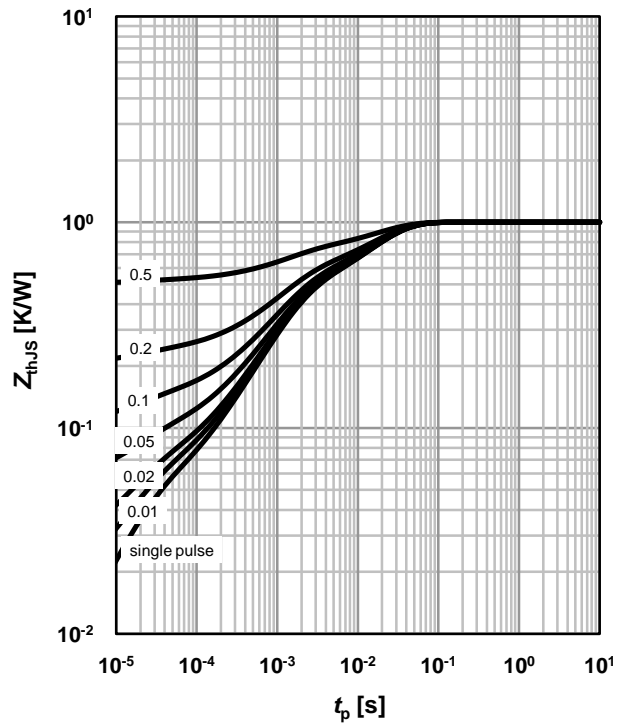
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJS}=f(t_p)$

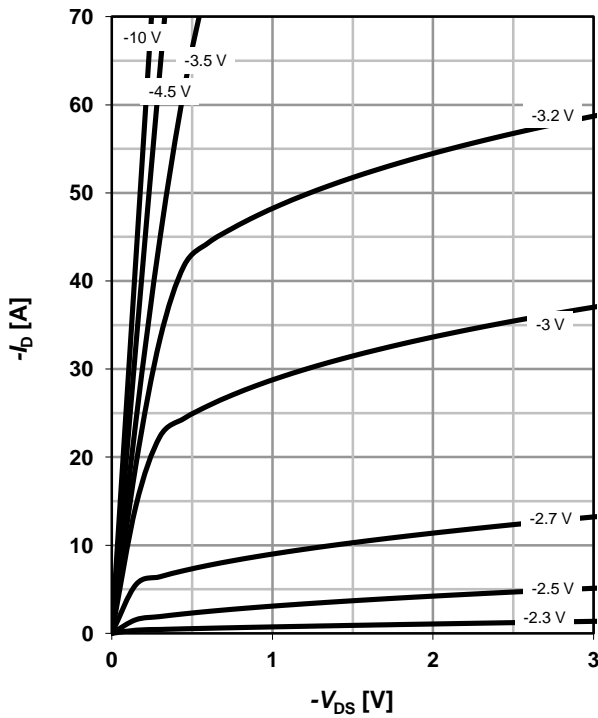
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

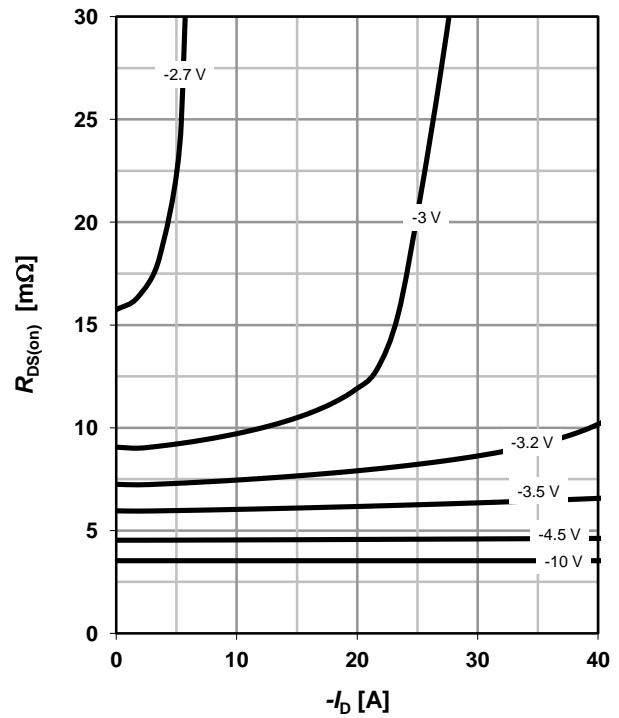
parameter:  $V_{GS}$



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

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

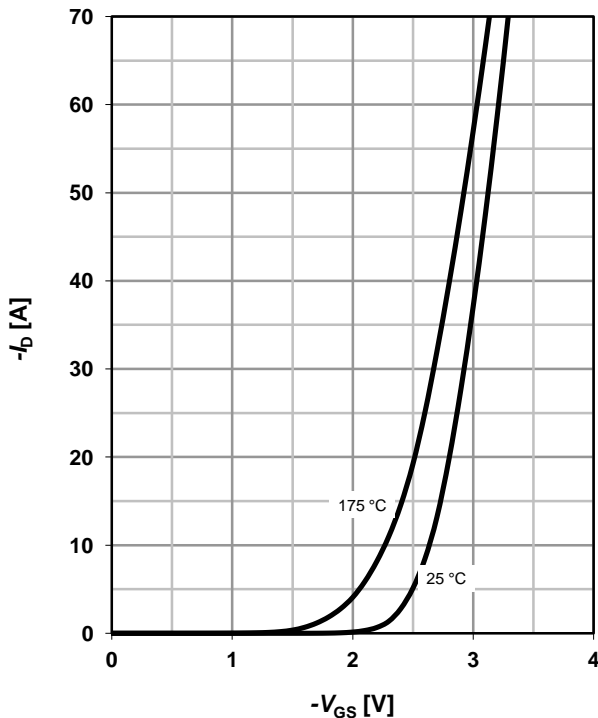
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

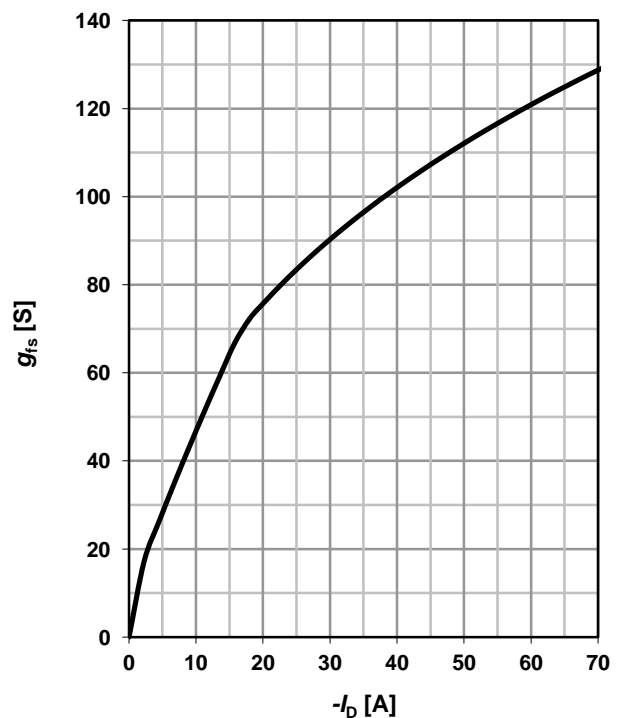
$I_D=f(V_{GS}); |V_{DS}|>2|I_D|R_{DS(on)max}$

parameter:  $T_j$



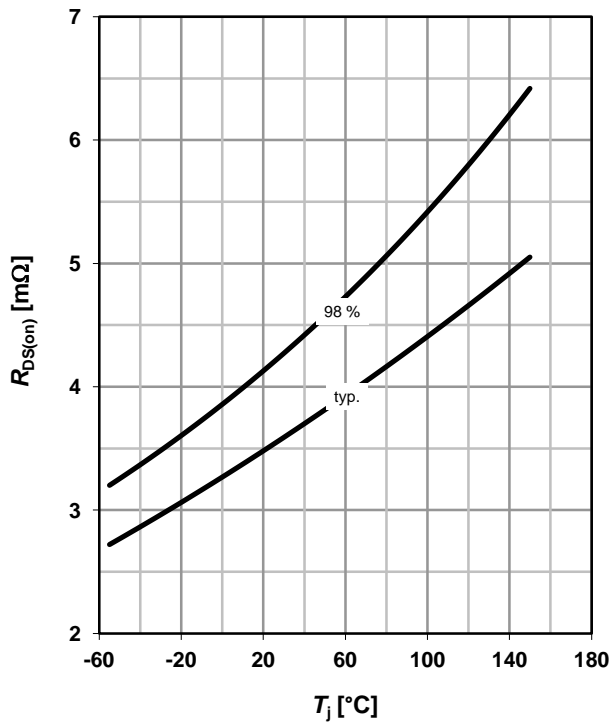
**8 Typ. forward transconductance**

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



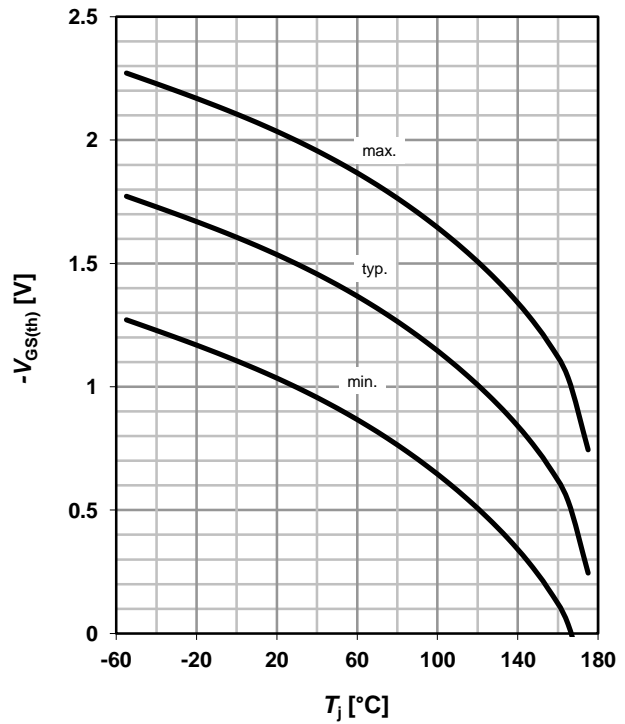
**9 Drain-source on-state resistance**

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



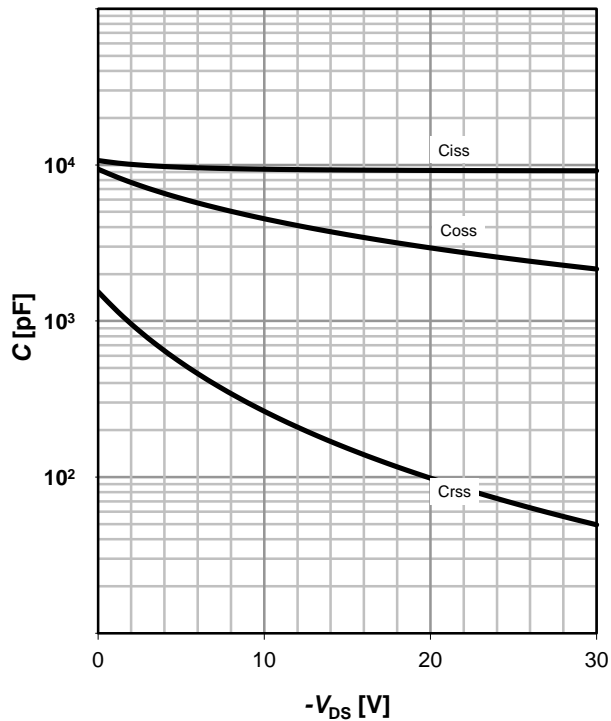
**10 Typ. gate threshold voltage**

$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=-270\text{ }\mu\text{A}$



**11 Typ. capacitances**

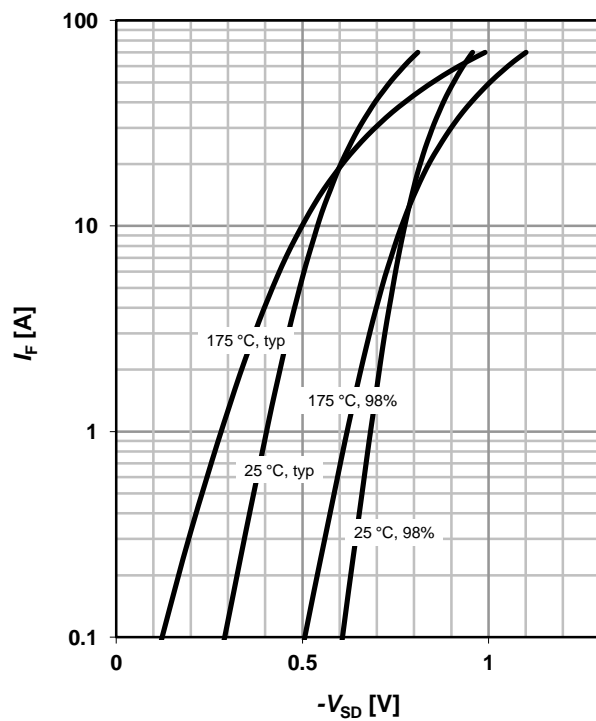
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

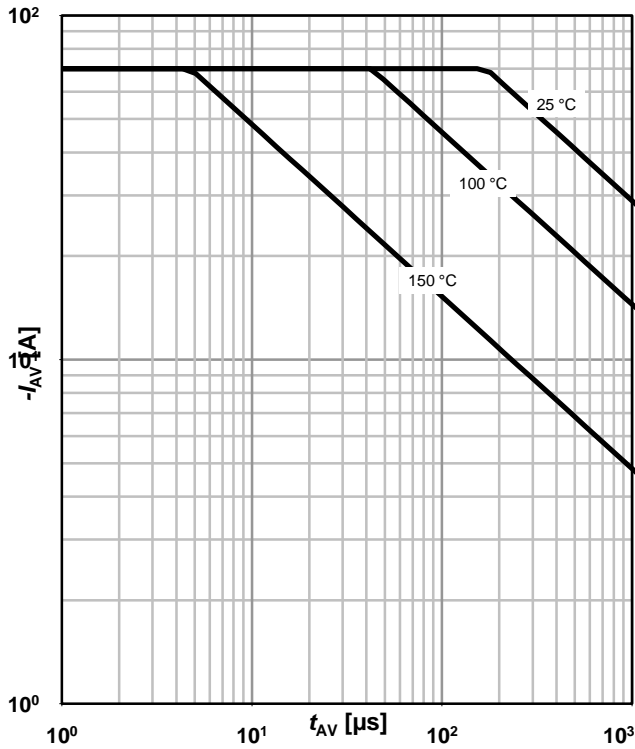
parameter:  $T_j$



**13 Avalanche characteristics**

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

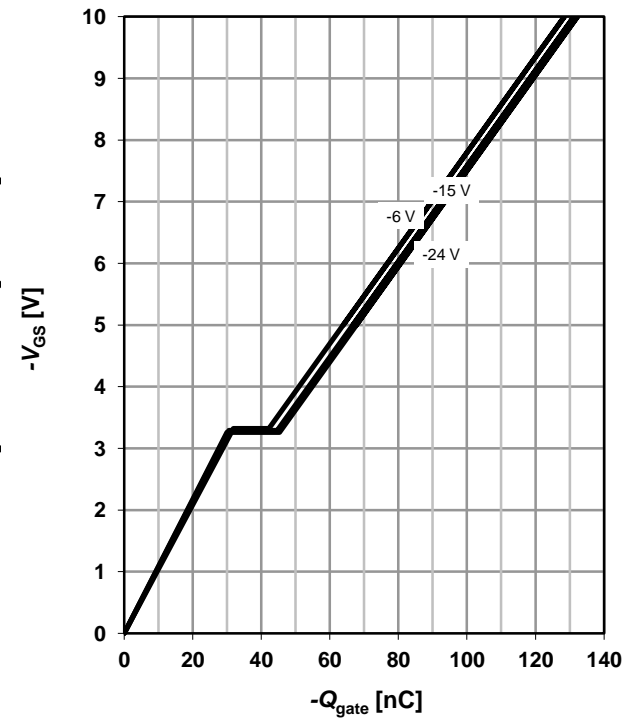
parameter:  $T_{j(\text{start})}$



**14 Typ. gate charge**

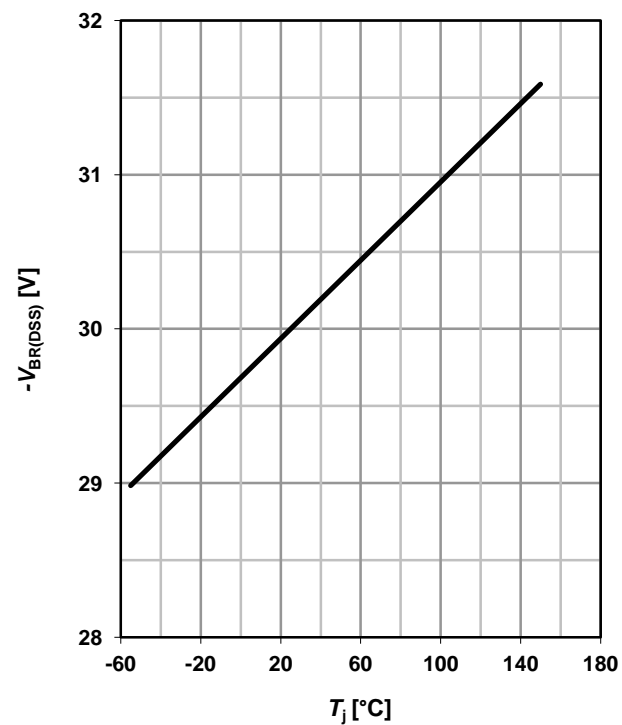
$V_{GS}=f(Q_{\text{gate}}); I_D=-70 \text{ A pulsed}$

parameter:  $V_{DD}$

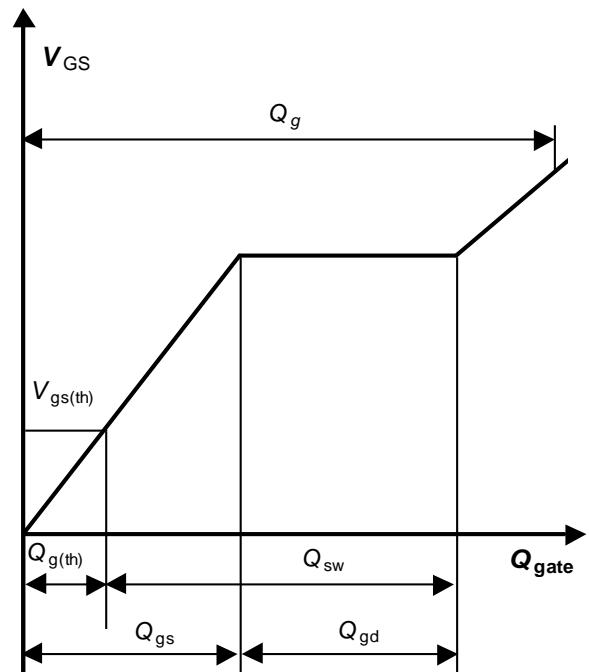


**15 Drain-source breakdown voltage**

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

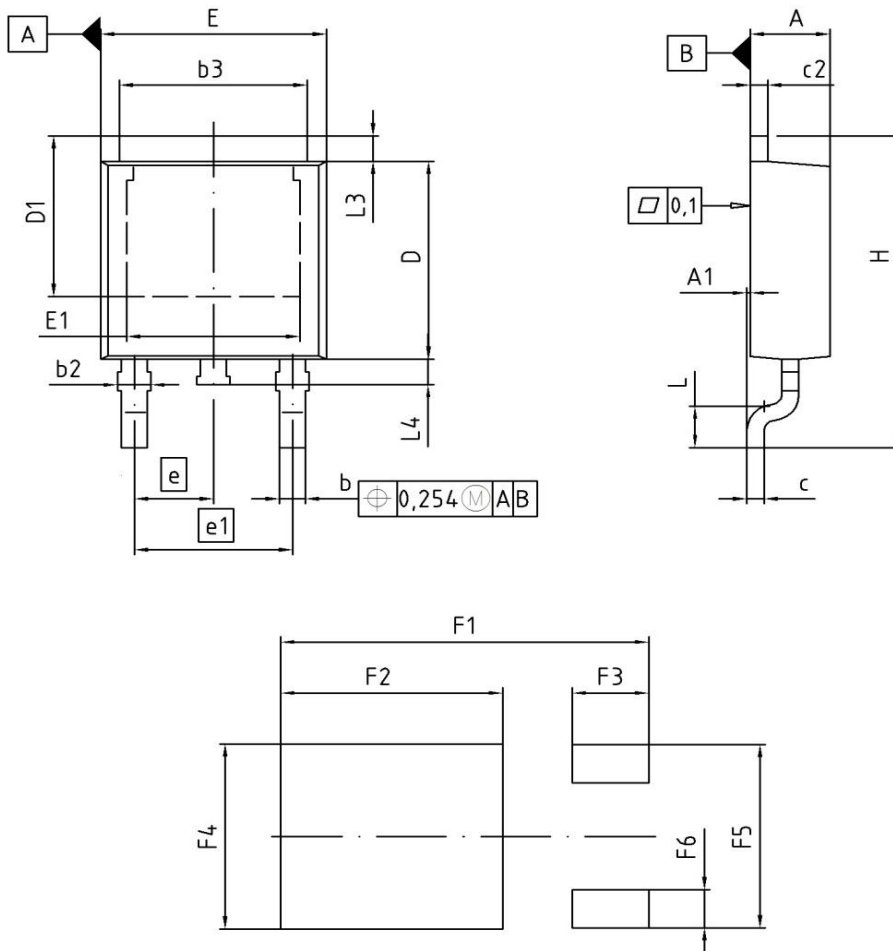


**16 Gate charge waveforms**



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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