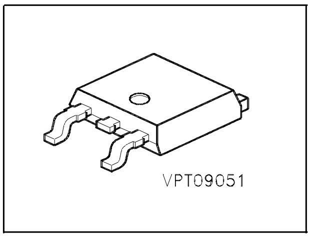
OptiMOS^{TM} Small-Signal MOSFET, -60V

Features

- ° P-channel
- ° Normal level
- ° AEC-Q101 Qualified
- ° 100% avalanche tested
- ° Pb-free lead plating; RoHS compliant
- ° Halogen-free according to IEC61249-2-21

Product Summary

Drain source voltage	V_{DS}	-60	V
Drain-source on-state resistance	$R_{DS(on)}$	0.075	Ω
Continuous drain current	I_D	-30	A



Product validation

° Qualified for automotive applications. Product validation according to AEC-Q101

Pin 1	PIN 2/4	PIN 3
G	D	S

Type	Package
SPD30P06P G	PG-TO252-3

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 -21.5	A
Pulsed drain current T_C = 25 °C	$I_{D\ puls}$	-120	
Avalanche energy, single pulse I_D = -30 A , V_{DD} = -25 V, R_{GS} = 25 Ω	E_{AS}	250	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	12.5	
Reverse diode dv/dt I_S = -30 A, V_{DS} = -48 V, di/dt = 200 A/µs, T_{jmax} = 175 °C	dv/dt	6	kV/µs
Gate source voltage	V_{GS}	±20	V
Power dissipation T_C = 25 °C	P_{tot}	125	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}	-	-	1.2	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	100	
SMD version, device on PCB: @ min. footprint @ 6 cm^2 cooling area [1]	R_{thJA}	 - -	 - -	 75 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} = 0 V, I_D = -250 µA	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = -1.7 mA	$V_{GS(th)}$	-2.1	-3	-4	
Zero gate voltage drain current V_{DS} = -60 V, V_{GS} = 0 V, T_j = 25 °C V_{DS} = -60 V, V_{GS} = 0 V, T_j = 150 °C	I_{DSS}	 - -	 -0.1 -10	 -1 -100	µA
Gate-source leakage current V_{GS} = -20 V, V_{DS} = 0 V	I_{GSS}	-	-10	-100	nA
Drain-source on-state resistance V_{GS} = -10 V, I_D = -21.5 A	$R_{DS(on)}$	-	0.069	0.075	Ω

[1] Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm^2 (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	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}$, I_D = -21.5 A	g_{fs}	5.2	10.4	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{iss}	-	1228	1535	pF
Output capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{oss}	-	387	383	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{rss}	-	142	177	
Turn-on delay time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -21.5 A, R_G = 1.6 Ω	$t_{d(on)}$	-	13	19.5	ns
Rise time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -21.5 A, R_G = 1.6 Ω	t_r	-	11	16.5	
Turn-off delay time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -21.5 A, R_G = 1.6 Ω	$t_{d(off)}$	-	30	45	
Fall time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -21.5 A, R_G = 1.6 Ω	t_f	-	20	30	

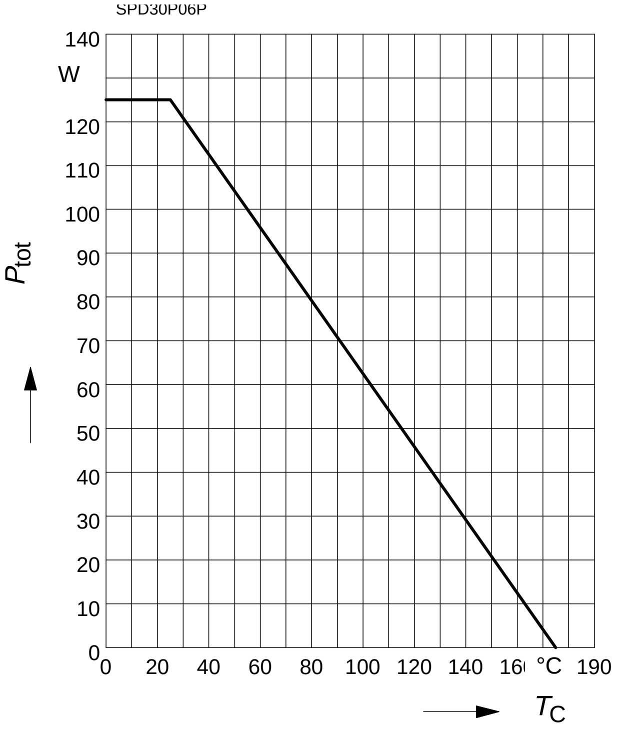
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate to source charge V_{DD} = -48 V, I_D = -30 A	Q_{gs}	-	3.7	5.6	nC
Gate to drain charge V_{DD} = -48 V, I_D = -30 A	Q_{gd}	-	13.8	20.7	
Gate charge total V_{DD} = -48 V, I_D = -30 A, V_{GS} = 0 to -10 V	Q_g	-	32	48	
Gate plateau voltage V_{DD} = -48 V , I_D = -30 A	$V_{(plateau)}$	-	-5.2	-	V

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current T_C = 25 °C	I_S	-	-	-30	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	-120	
Inverse diode forward voltage V_{GS} = 0 V, I_F = -30	V_{SD}	-	-1.3	-1.7	V
Reverse recovery time V_R = -30 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	64.6	97	ns
Reverse recovery charge V_R = -30 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	153	230	nC

Power dissipation

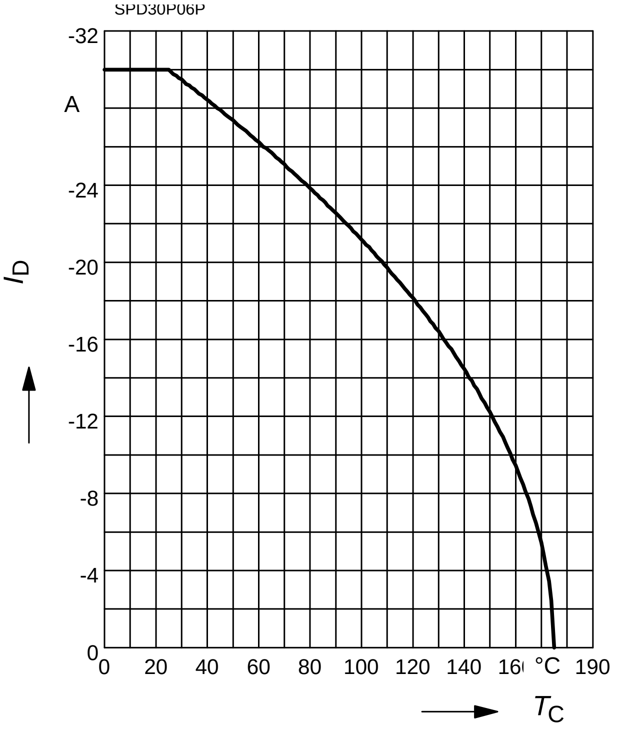
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

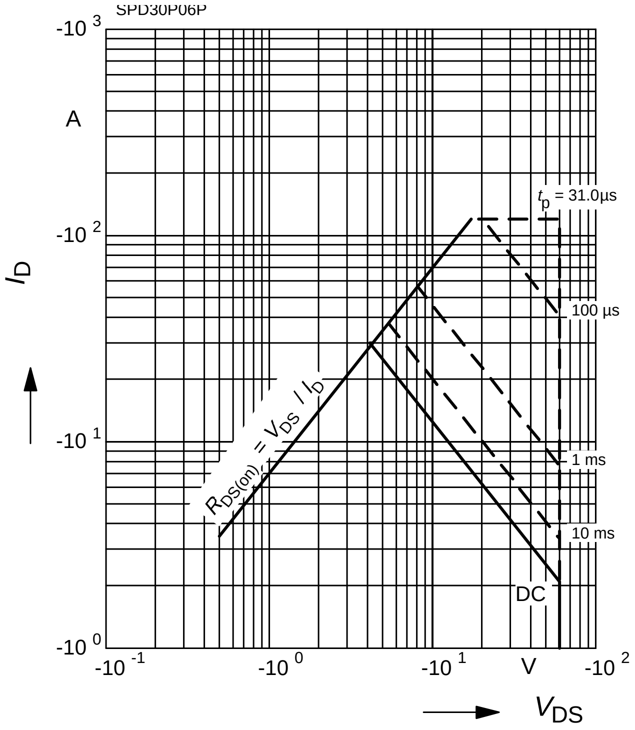
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

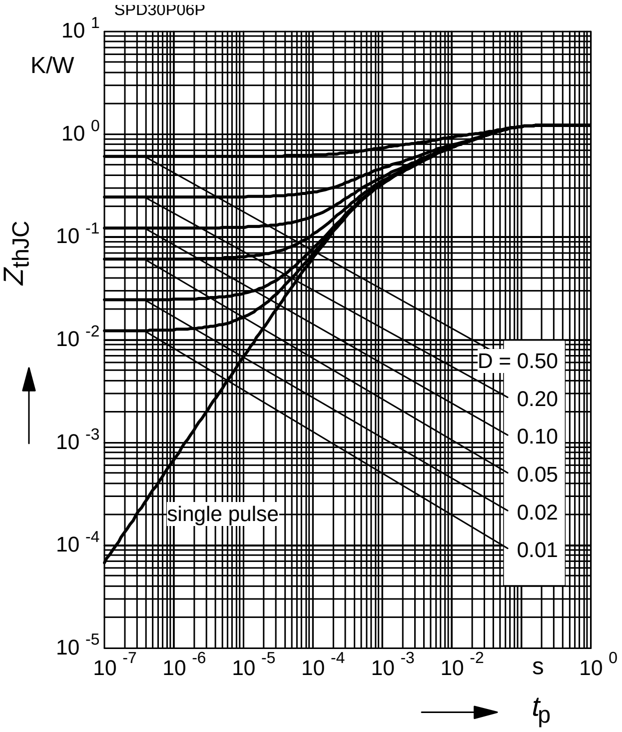
parameter : $D = 0$, $T_C = 25$ °C



Transient thermal impedance

$Z_{thJC} = f(t_p)$

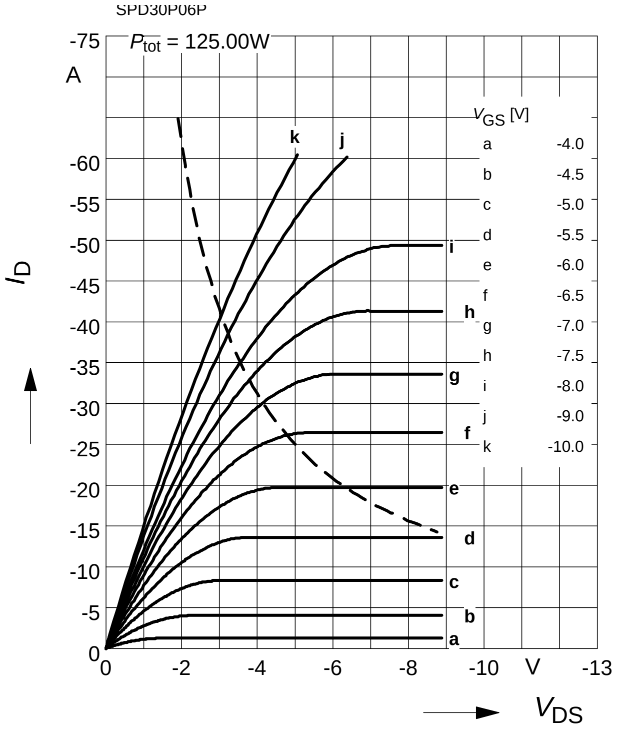
parameter : $D = t_p / T$



Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

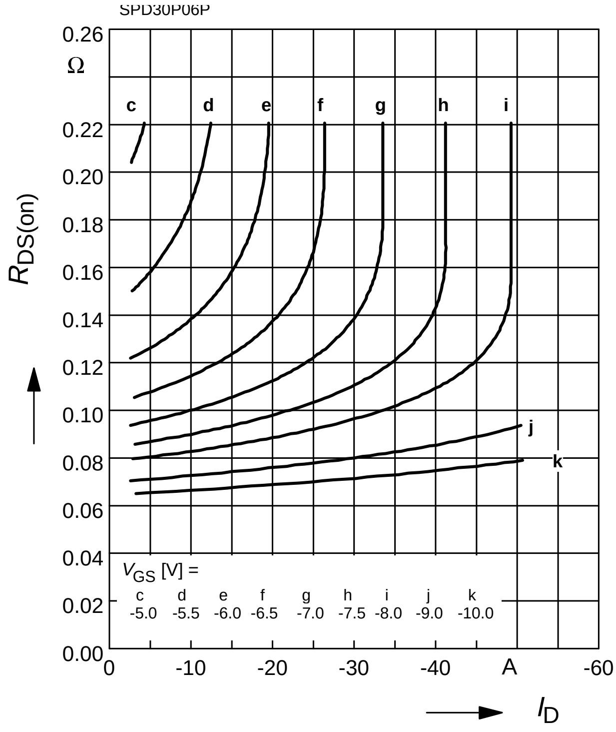
parameter: t_p = 80 µs



Typ. drain-source-on-resistance

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

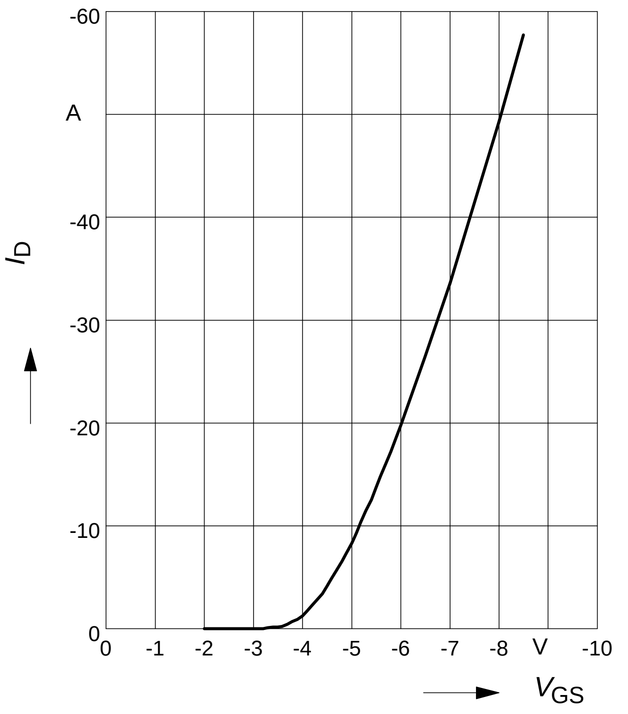
parameter: V_{GS}



Typ. transfer characteristics $I_D = f(V_{GS})$

$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

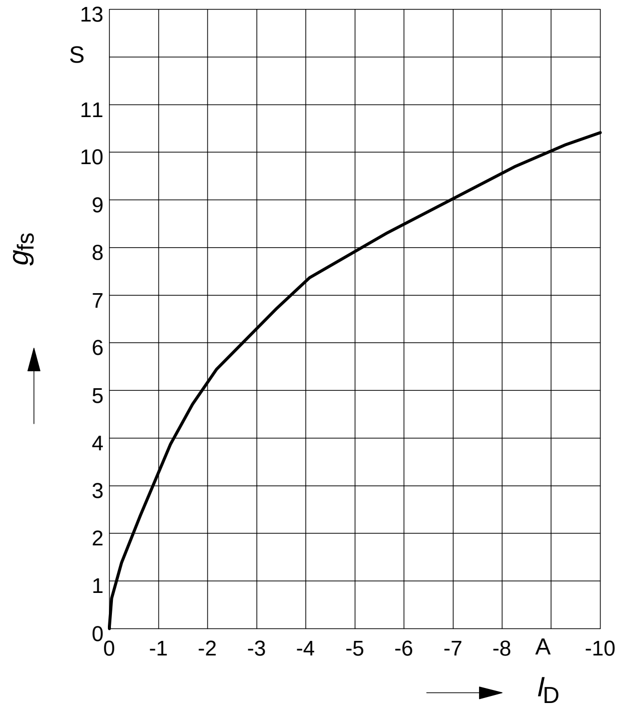
parameter: t_p = 80 µs



Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j=25°C

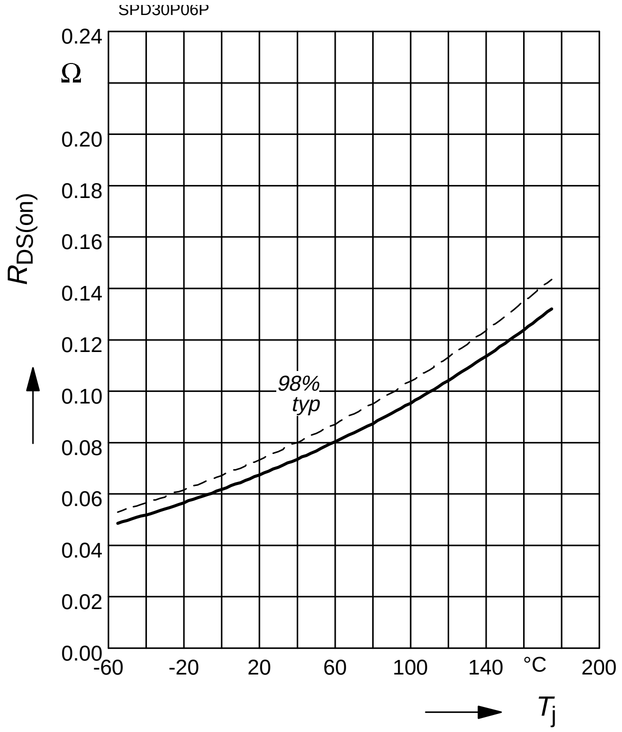
parameter: g_{fs}



Drain-source on-state resistance

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

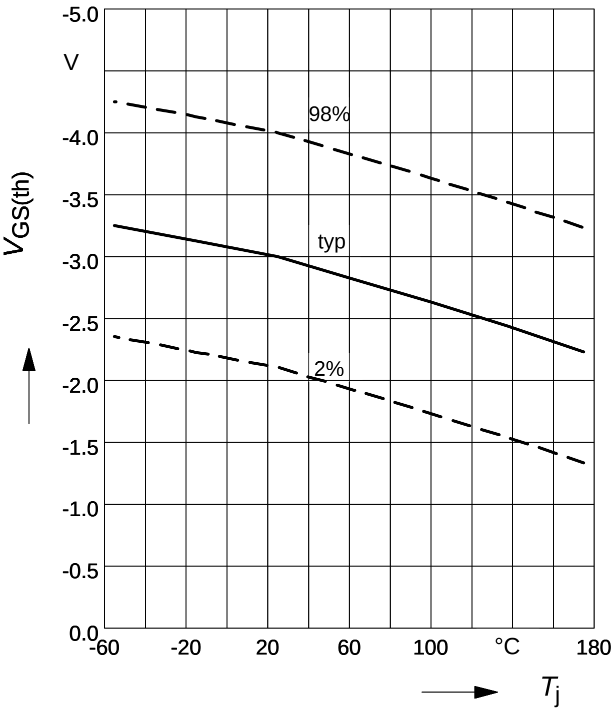
parameter : I_D = -21.5 A, V_{GS} = -10 V



Gate threshold voltage

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

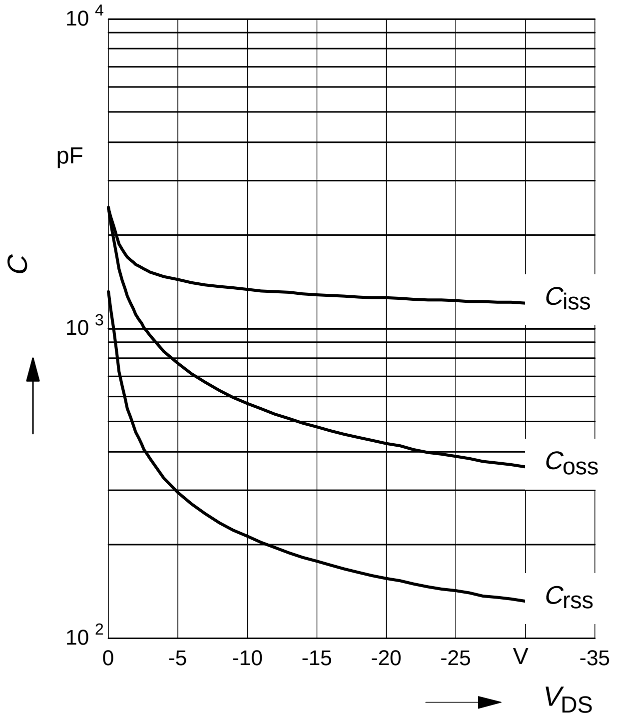
parameter: $V_{GS} = V_{DS}$, I_D = -1.7 mA



Typ. capacitances

$C = f(V_{DS})$

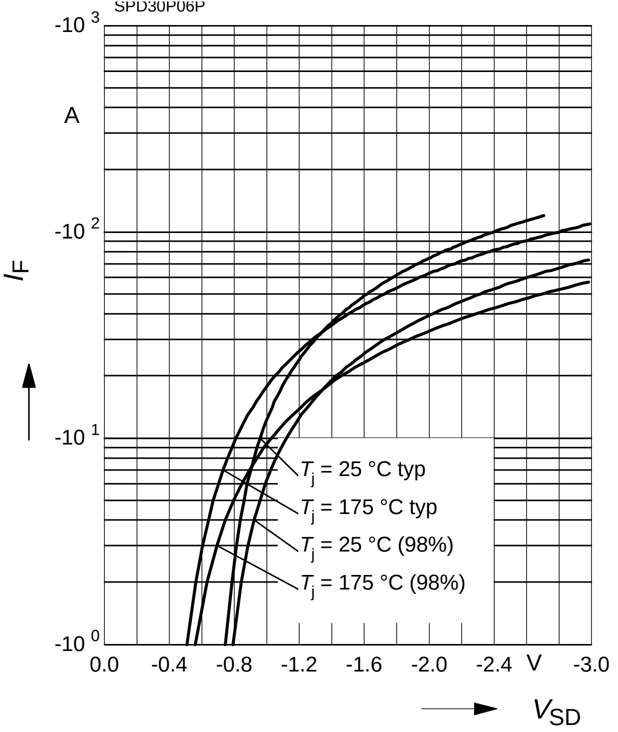
parameter: V_{GS}=0V, f=1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

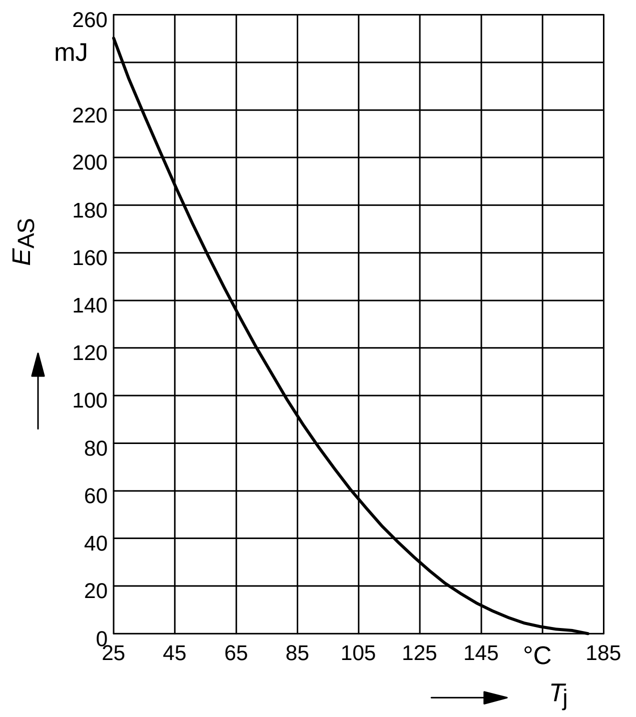
parameter: T_j , tp = 80 µs



Avalanche energy

$E_{AS} = f(T_j)$

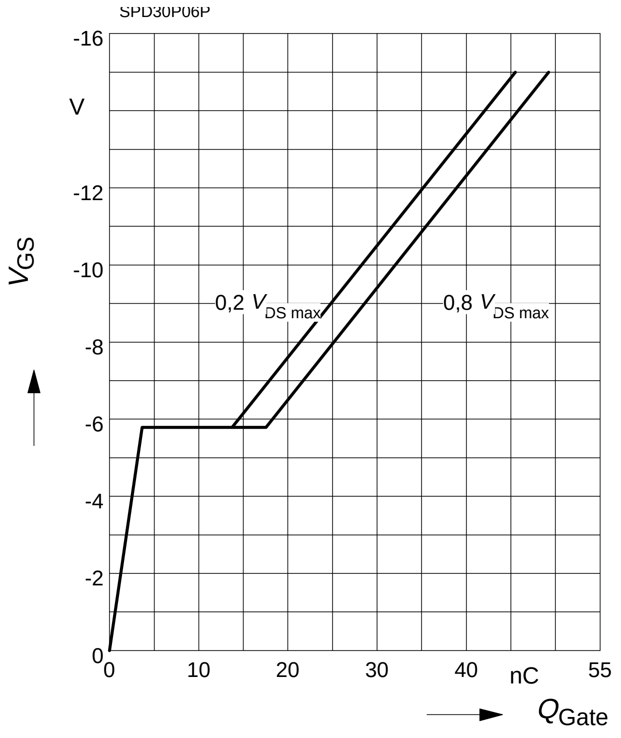
para.: I_D = -30 A , V_{DD} = -25 V, R_{GS} = 25 Ω



Typ. gate charge

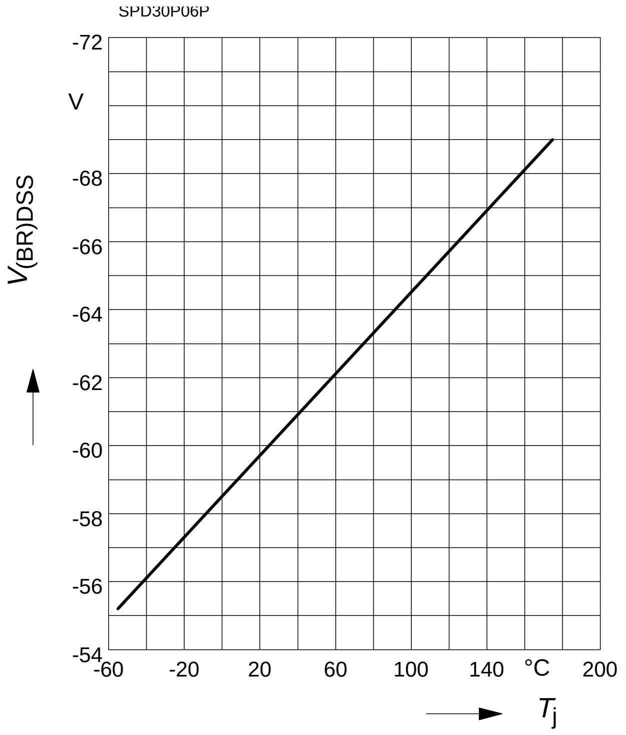
$V_{GS} = f(Q_{Gate})$

parameter: I_D = -30 A pulsed

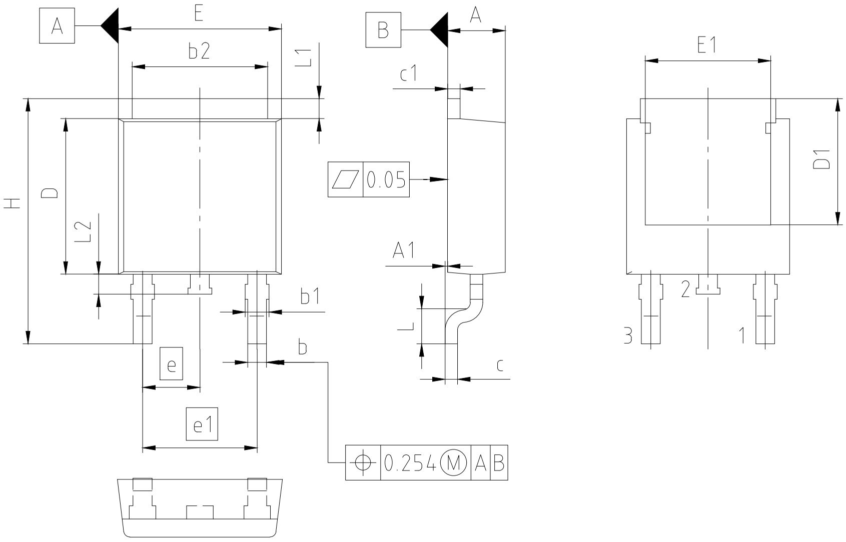


Drain-source breakdown voltage

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



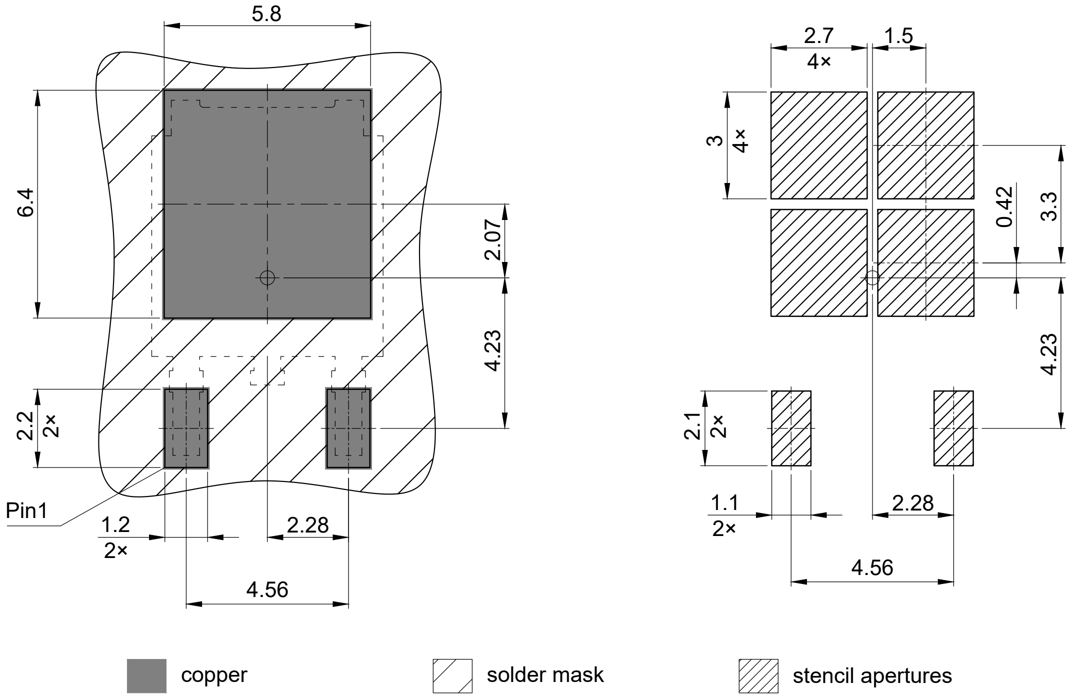
5 Package outlines



PACKAGE - GROUP NUMBER:	PG-TO252-3-U02	
DIMENSIONS	**MILLIMETERS**	
	MIN.	MAX.
A	2.16	2.41
A1	0.00	0.15
b	0.64	0.89
b1	0.65	1.15
b2	4.95	5.50
c	0.46	0.61
c1	0.40	0.98
D	5.97	6.22
D1	5.02	5.84
E	6.35	6.73
E1	4.32	5.50
e	2.29	
e1	4.57	
N	3	
H	9.40	10.48
L	1.18	1.78
L1	0.89	1.27
L2	0.51	1.02

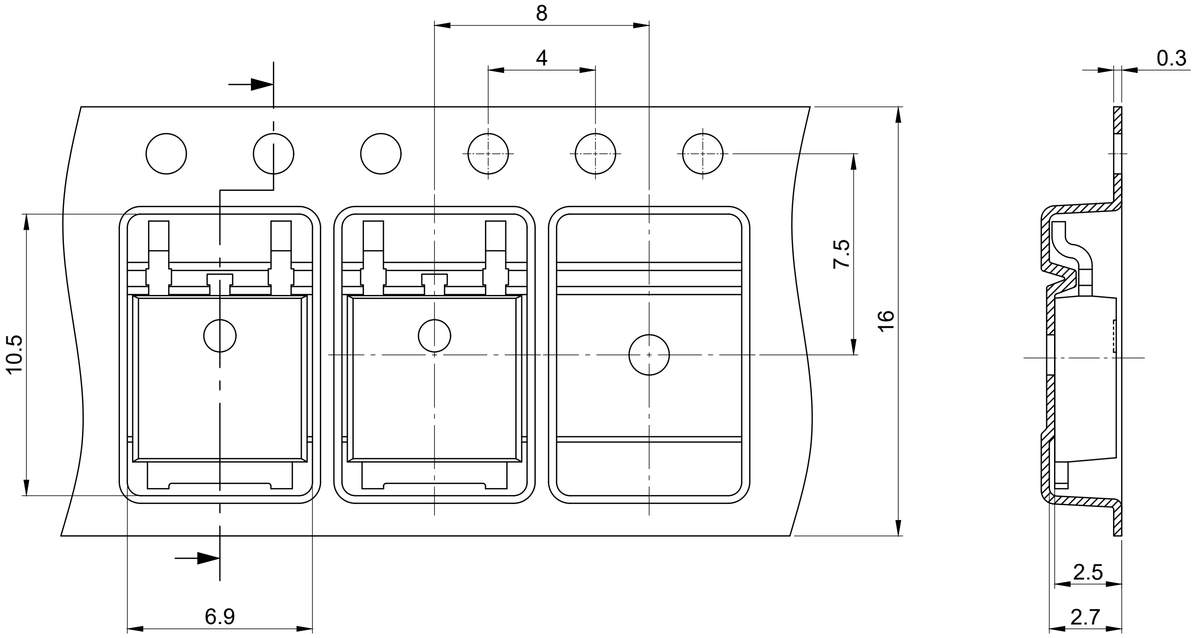
ALL DIMENSIONS REFER TO JEDEC
STANDARD TO-252 AND DO NOT INCLUDE MOLD
FLASH OR PROTRUSIONS.

Figure 1 Outline PG-TO252-3, dimensions in mm



All dimensions are in units mm
All pads are solder mask defined

Figure 2 Footprint drawing PG-TO252-3, dimensions in mm



All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [⊲⊕]

Figure 3 Packaging variant PG-TO252-3, dimensions in mm

Revision history

SPD30P06P G

Revision 2026-03-09, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2026-03-09	Update to halogen free, features and package drawings

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