

**OptiMOS™ Small-Signal MOSFET, -100 V**
**Features**

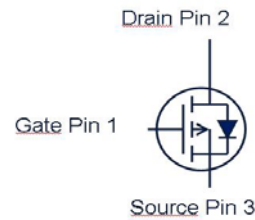
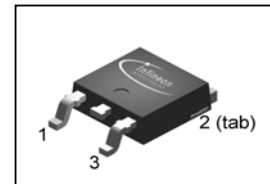
- ° P-channel
- ° Logic level
- ° AEC-Q101 Qualified
- ° 100% avalanche tested
- ° Pb-free lead plating; RoHS compliant
- ° Halogen-free according to IEC61249-2-21

**Product validation**

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


**Product Summary**

$V_{DS}$	-100	V
$R_{DS(on),max}$	850	mΩ
$I_D$	-4.2	A


**PG-TO-252-3**


Type	Package	Marking	Lead free	Packing	Tape and reel information
SPD04P10PL G	PG-TO252-3	04P10PL	Yes	Non dry	1000 pcs / reel

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

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	$I_D$	$T_C=25\text{ °C}$	-4.2	A
		$T_C=100\text{ °C}$	3.0	
Pulsed drain current	$I_{D,pulse}$	$T_C=25\text{ °C}$	-16.8	
Avalanche energy, single pulse	$E_{AS}$	$I_D=-4.2\text{ A}$ , $R_{GS}=25\text{ }\Omega$	57	mJ
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	38	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 175	°C
ESD class		JESD22-A114-HBM	1A (250 V to 500 V)	
Soldering temperature			260 °C	
IEC climatic category; DIN IEC 68-1			55/175/56	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - soldering point	$R_{thJC}$		-	-	3.9	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	minimal footprint, steady state	-	-	75	
		6 cm <sup>2</sup> cooling area <sup>1)</sup> , steady state	-	-	50	

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

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-1\text{ mA}$	-100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-380\text{ }\mu\text{A}$	-1	-1.5	-2	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-100\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$	-	-0.1	-1	$\mu\text{A}$
		$V_{DS}=-100\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^\circ\text{C}$	-	-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	$R_{DS(on)}$	$V_{GS}=-4.5\text{ V}, I_D=-2.75\text{ A}$	-	787	1050	$\text{m}\Omega$
		$V_{GS}=-10\text{ V}, I_D=-3.0\text{ A}$	-	550	850	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-3.0\text{ A}$	1.5	3.0	-	S

<sup>1)</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	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$	-	280	372	pF
Output capacitance	$C_{oss}$		-	70	94	
Reverse transfer capacitance	$C_{rss}$		-	34	51	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-50\text{ V}, V_{GS}=-$ $10\text{ V}, I_D=-4.2\text{ A},$ $R_G=6\ \Omega$	-	4.6	6.9	ns
Rise time	$t_r$		-	5.7	8.6	
Turn-off delay time	$t_{d(off)}$		-	18	27	
Fall time	$t_f$		-	5.0	7.5	

**Gate Charge Characteristics<sup>2)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=-80\text{ V}, I_D=-4.2\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	1.1	1.5	nC
Gate to drain charge	$Q_{gd}$		-	4.6	6.9	
Gate charge total	$Q_g$		-	12	16	
Gate plateau voltage	$V_{plateau}$		-	4.1	-	V

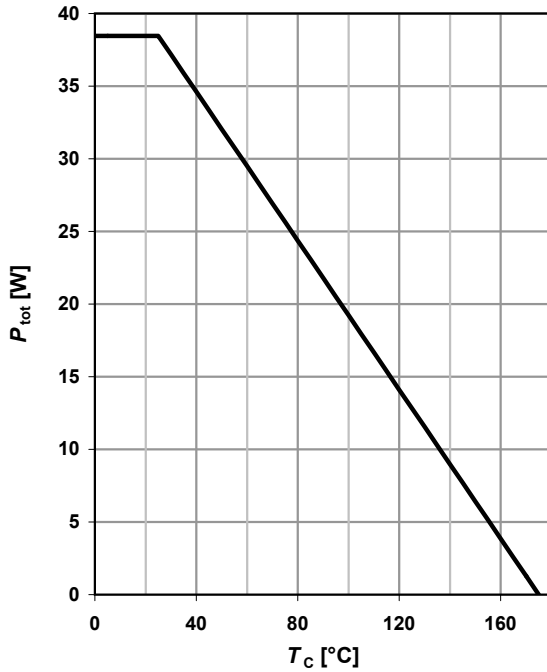
**Reverse Diode**

Diode continuous forward current	$I_S$	$T_C=25\text{ }^\circ\text{C}$	-	-	-4.2	A
Diode pulse current	$I_{S,pulse}$		-	-	16.8	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=-4.2\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.94	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=50\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	68	85	ns
Reverse recovery charge	$Q_{rr}$		-	178	223	nC

<sup>2)</sup> See figure 16 for gate charge parameter definition

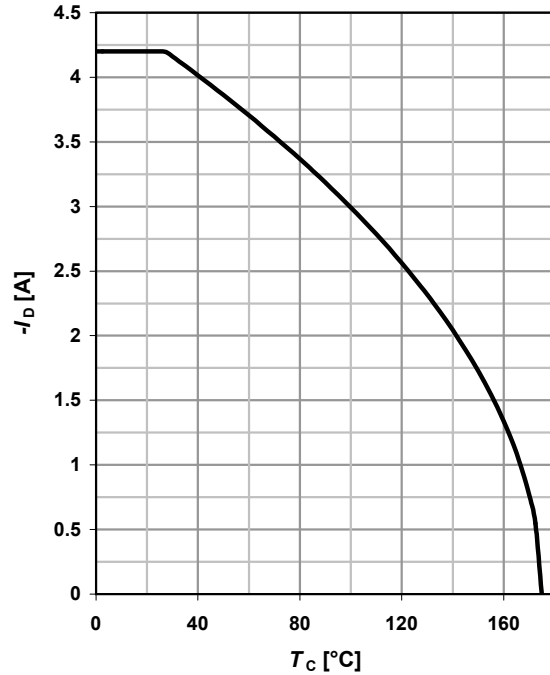
**1 Power dissipation**

$$P_{tot} = f(T_C)$$



**2 Drain current**

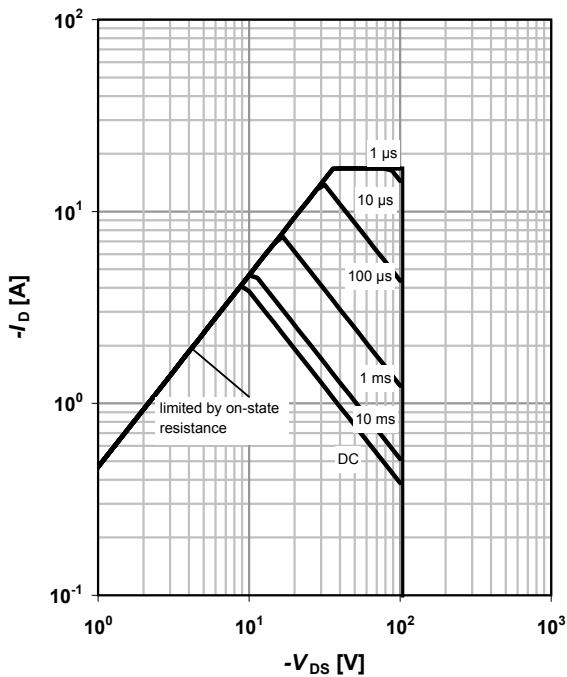
$$I_D = f(T_C); |V_{GS}| \geq 10 \text{ V}$$



**3 Safe operating area**

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

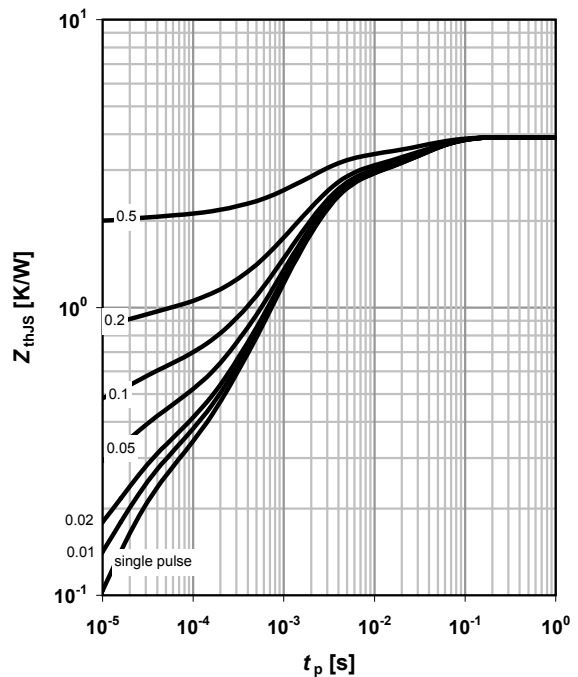
parameter:  $t_p$



**4 Max. transient thermal impedance**

$$Z_{thJC} = f(t_p)$$

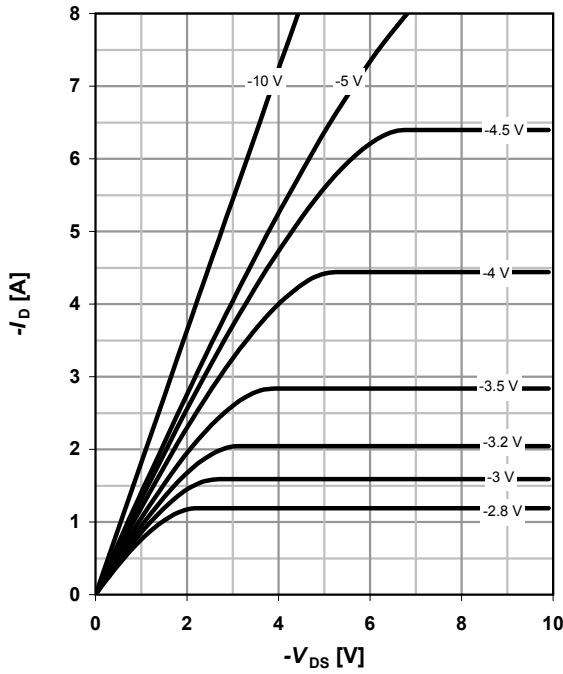
parameter:  $D = t_p/T$



**5 Typ. output characteristics**

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

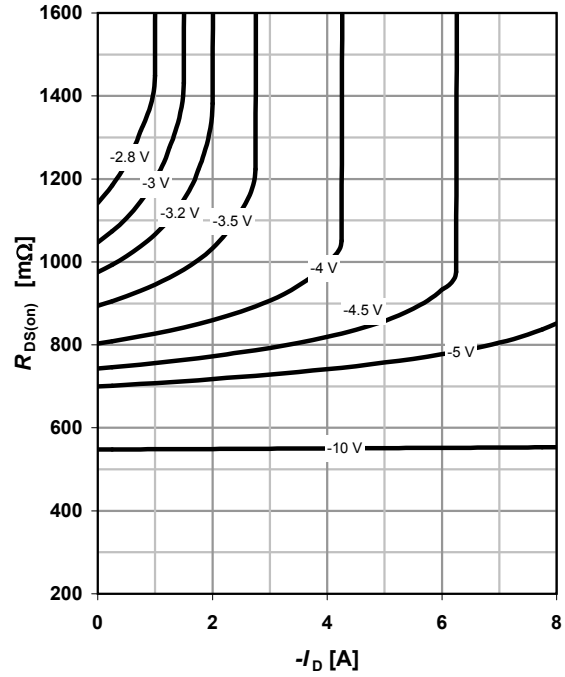
parameter:  $V_{GS}$



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

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

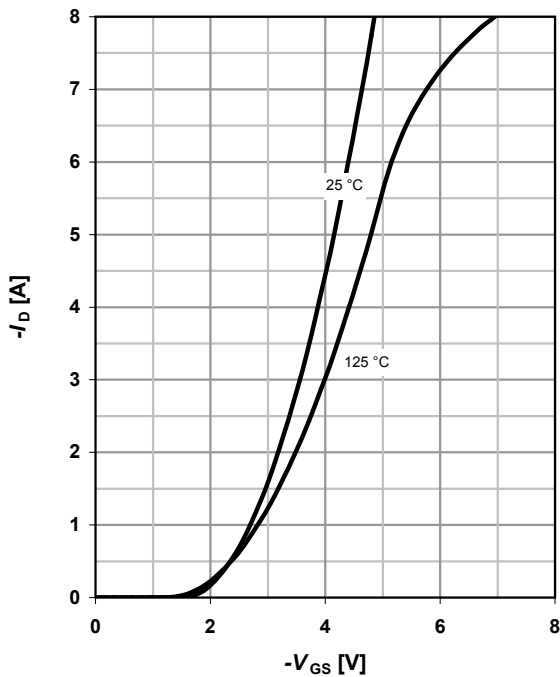
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

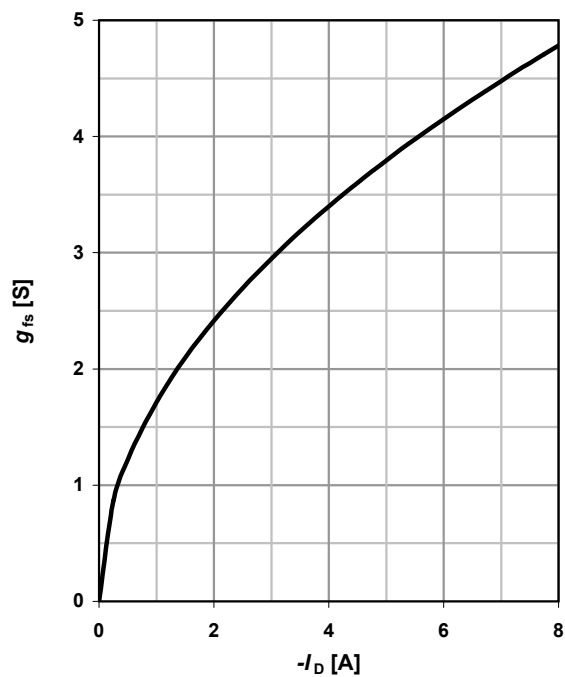
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



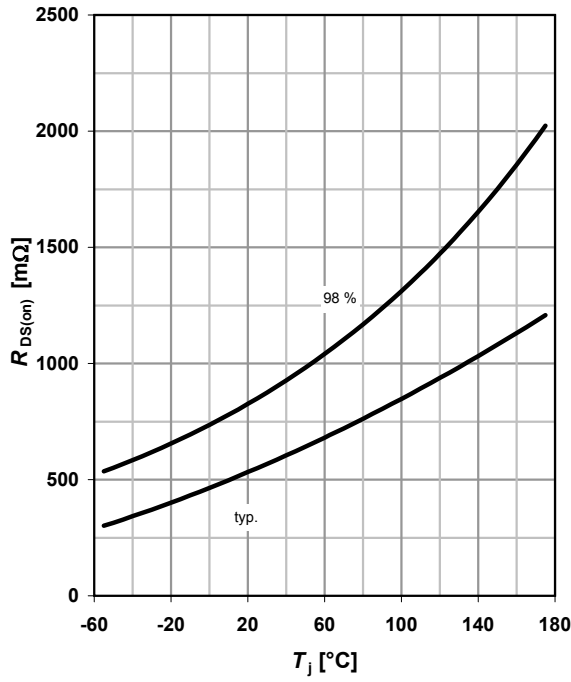
**8 Typ. forward transconductance**

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



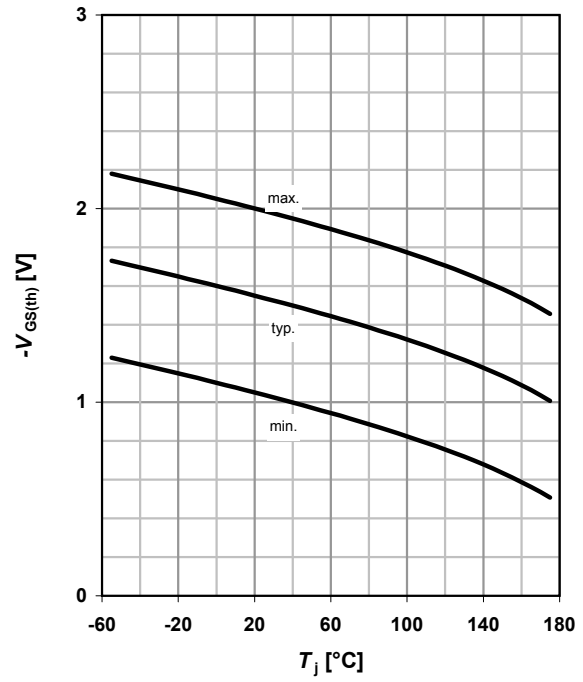
**9 Drain-source on-state resistance**

$R_{DS(on)} = f(T_j); I_D = -3 \text{ A}; V_{GS} = -10 \text{ V}$



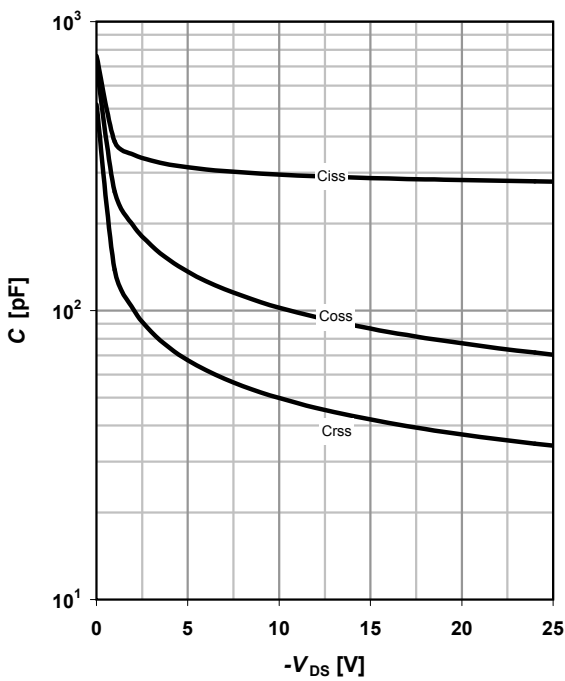
**10 Typ. gate threshold voltage**

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -380 \mu\text{A}$



**11 Typ. capacitances**

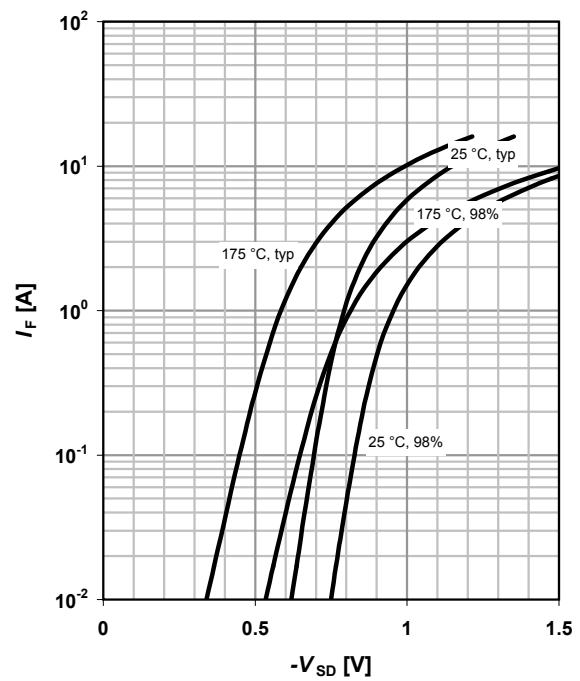
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

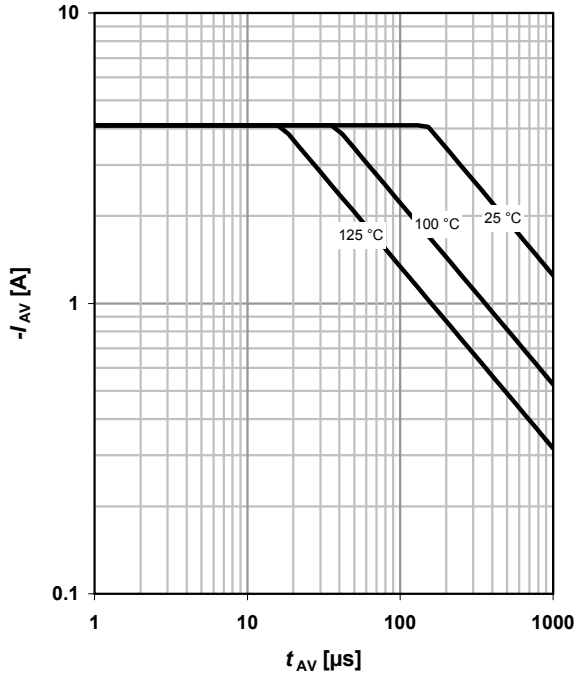
parameter:  $T_j$



**13 Avalanche characteristics**

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

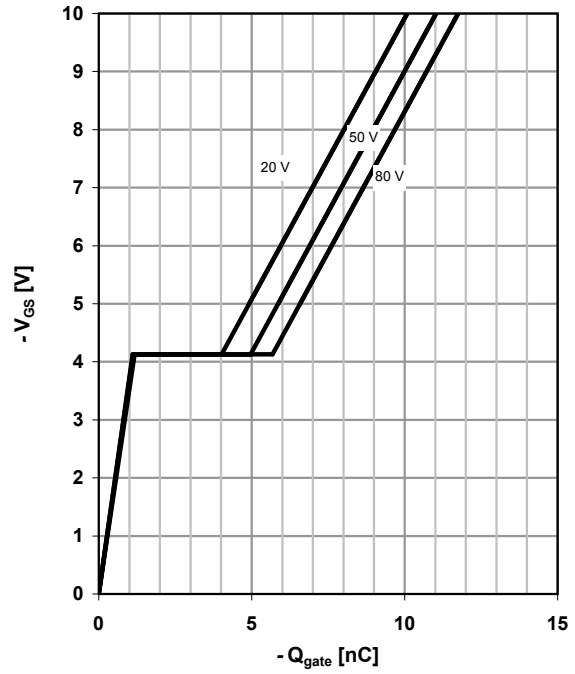
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

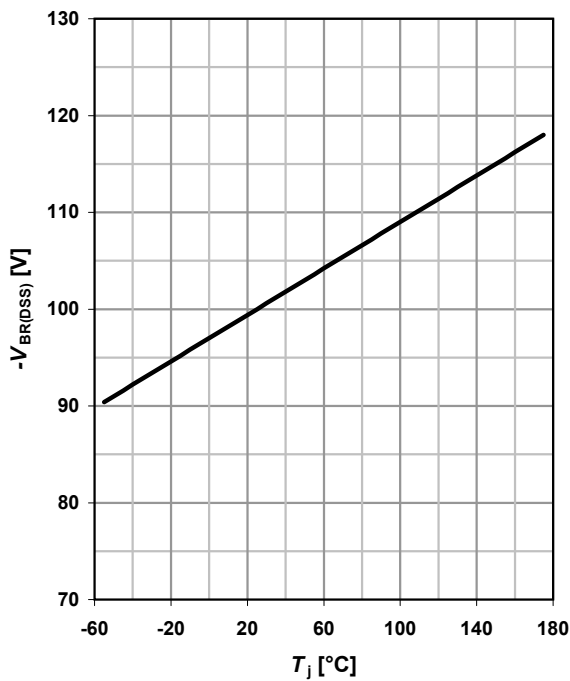
$V_{GS}=f(Q_{gate}); I_D=-4.2$  A pulsed

parameter:  $V_{DD}$

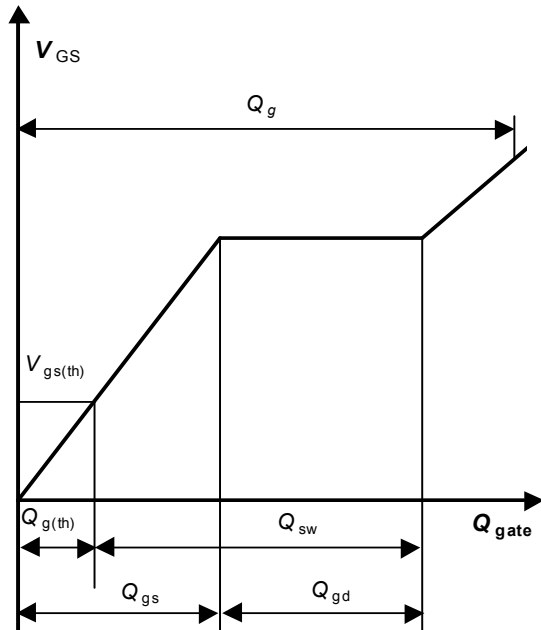


**15 Drain-source breakdown voltage**

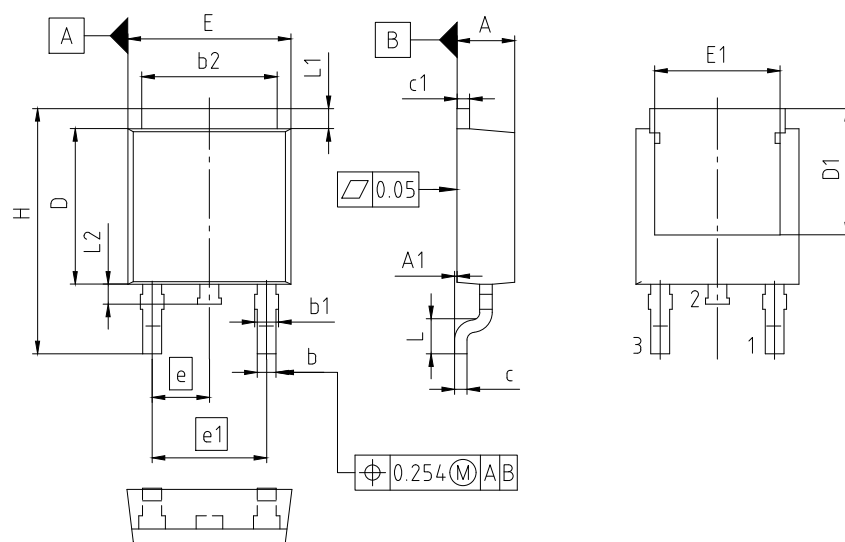
$V_{BR(DSS)}=f(T_j); I_D=-1$  mA



**16 Gate charge waveforms**



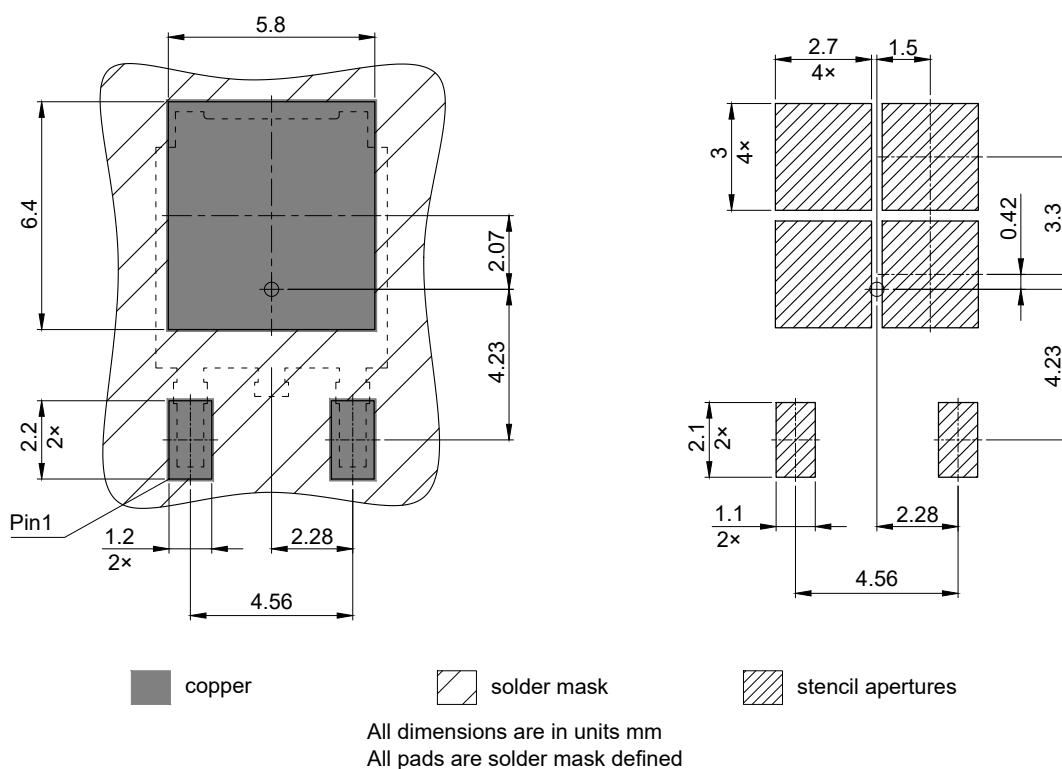
## 5 Package outlines



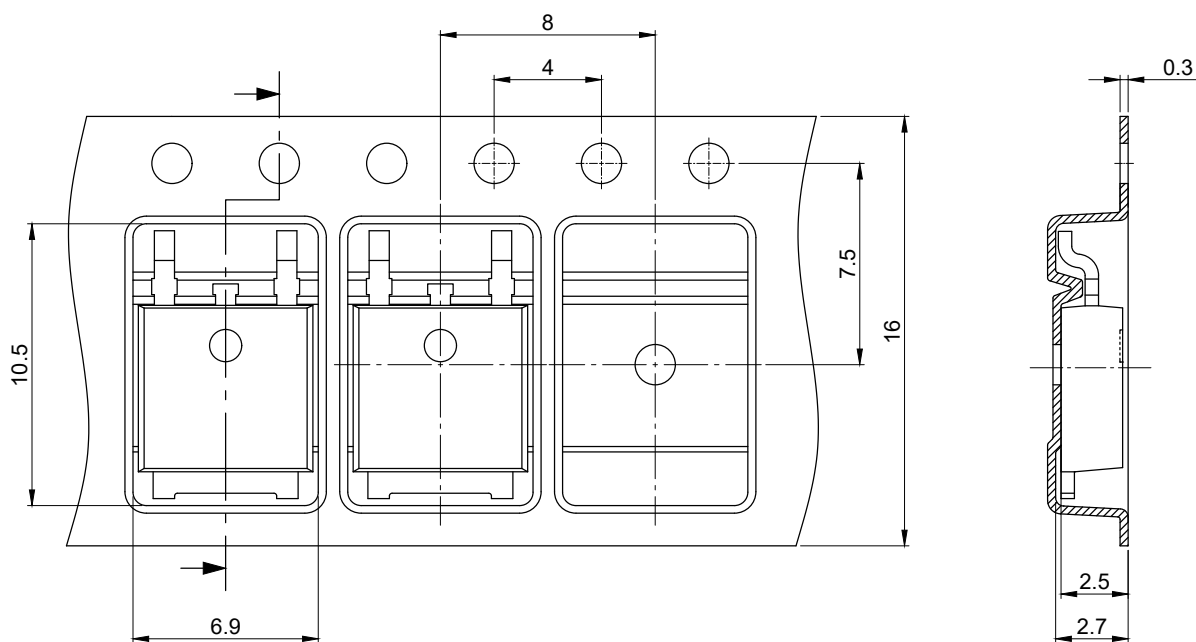
PACKAGE - GROUP NUMBER: PG-T0252-3-U02		
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	2.16	2.41
A1	0.00	0.15
b	0.64	0.89
b1	0.65	1.15
b2	4.95	5.50
c	0.46	0.61
c1	0.40	0.98
D	5.97	6.22
D1	5.02	5.84
E	6.35	6.73
E1	4.32	5.50
e	2.29	
e1	4.57	
N	3	
H	9.40	10.48
L	1.18	1.78
L1	0.89	1.27
L2	0.51	1.02

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

Figure 1 Outline PG-T0252-3, dimensions in mm



**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**

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SPD04P10PL G

**Revision 2026-02-26, Rev. 1.0**

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Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2026-02-26	Update to Halogen free, package drawings, features and Id for V(BR)DSS

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