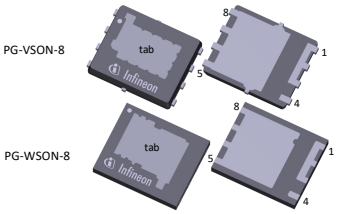
MOSFET

PG-VSON-8 / PG-WSON-8

OptiMOS™ Power-MOSFET, 40 V



Features

- Dual-side cooled package with lowest junction-top thermal resistance
- Optimized for sychronous rectification
- 175 °C rated
- Very low on-resistance $R_{DS(on)}$
- 100% avalanche tested
- Superior thermal resistance
- N-channel, logic level
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

Product validation

Qualified according to relevant JEDEC tests.

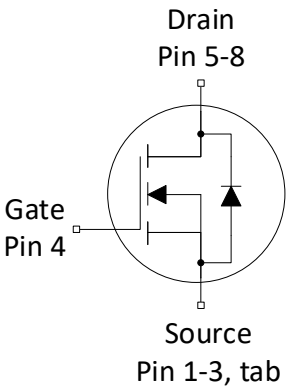
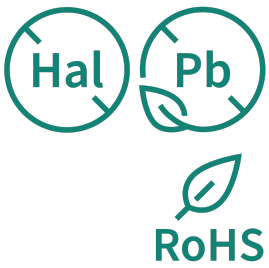


Table 1 Key performance parameters

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on),max}$	0.94	mΩ
I_D	301	A
Q_{oss}	84	nC
Q_g(0V..10V)	95	nC



Part number	Package	Marking	Related links
BSC009N04LSSC	PG-VSON-8 / PG-WSON-8	009N04SC	-

Table of contents

1 Maximum ratings

at T_A=25 °C, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain current [1]	I_D	-	-	301	A	V_{GS}=10 V, T_C=25 °C
				213		V_{GS}=10 V, T_C=100 °C
				262		V_{GS}=4.5 V, T_C=25 °C
				185		V_{GS}=4.5 V, T_C=100 °C
				40		V_{GS}=10 V, T_A=25 °C, R_{thJA}=50 K/W [2]
Pulsed drain current [3]	$I_{D,pulse}$	-	-	1204	A	T_C=25 °C
Avalanche current, single pulse [4]	I_{AS}			50		
Avalanche energy, single pulse	E_{AS}	-	-	330	mJ	I_D=50 A, R_{GS}=25 Ω
Gate source voltage [5]	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	167	W	T_C=25 °C
				3.0		T_A=25 °C, R_{thJA}=50 K/W [2]
Operating and storage temperature	T_j, T_{stg}	-55	-	175	°C	-

[1] Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature as specified. For other case temperatures please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.

[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.

[3] See Diagram 3 for more detailed information

[4] See Diagram 13 for more detailed information

[5] The negative rating is for low duty cycle pulse occurrence. No continuous rating is implied

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, bottom	R_{thJC}	-	0.5	0.9	K/W	-
Thermal resistance, junction - case, top	R_{thJC}		0.43	0.86		
Device on PCB, 6 cm^2 cooling area [6]	R_{thJA}		-	50		

[6] 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.

3 Electrical characteristics

at T_j=25 °C, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	40	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	1.2	-	2	V	V_{DS}=V_{GS}, I_D=250 µA
Zero gate voltage drain current	I_{DSS}	-	0.1	1	µA	V_{DS}=40 V, V_{GS}=0 V, T_j=25 °C
			10	100		V_{DS}=40 V, V_{GS}=0 V, T_j=125 °C
Gate-source leakage current	I_{GSS}	-	10	100	nA	V_{GS}=20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	-	0.96	1.24	mΩ	V_{GS}=4.5 V, I_D=50 A
			0.78	0.94		V_{GS}=10 V, I_D=50 A
Gate resistance [7]	R_G	-	0.8	1.6	Ω	-
Transconductance	g_{fs}	140	280	-	S	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=50 A

[7] Defined by design. Not subject to production test

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance [8]	C_{iss}	-	6800	9520	pF	V_{GS}=0 V, V_{DS}=20 V, f=1 MHz
Output capacitance [8]	C_{oss}		1900	2660		
Reverse transfer capacitance [8]	C_{rss}		160	320		
Turn-on delay time	$t_{d(on)}$	-	10	-	ns	V_{DD}=20 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$,ext=1.6 Ω
Rise time	t_r		12			
Turn-off delay time	$t_{d(off)}$		46			
Fall time	t_f		9			

[8] Defined by design. Not subject to production test

Table 6 Gate charge characteristics [9)]

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	16	-	nC	V_{DD}=20 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{g(th)}$		11	-	nC	
Gate to drain charge [10)]	Q_{gd}		15	21	nC	
Switching charge	Q_{sw}		21	-	nC	
Gate charge total [10)]	Q_g		95	133	nC	
Gate plateau voltage	$V_{plateau}$		2.4	-	V	
Gate charge total [10)]	Q_g	-	49	69	nC	V_{DD}=20 V, I_D=50 A, V_{GS}=0 to 4.5 V
Gate charge total, sync. FET	$Q_{g(sync)}$	-	84	-	nC	V_{DS}=0.1 V, V_{GS}=0 to 10 V
Output charge [10)]	Q_{oss}	-	84	118	nC	V_{DD}=20 V, V_{GS}=0 V

[9)] See "Gate charge waveforms" for parameter definition

[10)] Defined by design. Not subject to production test

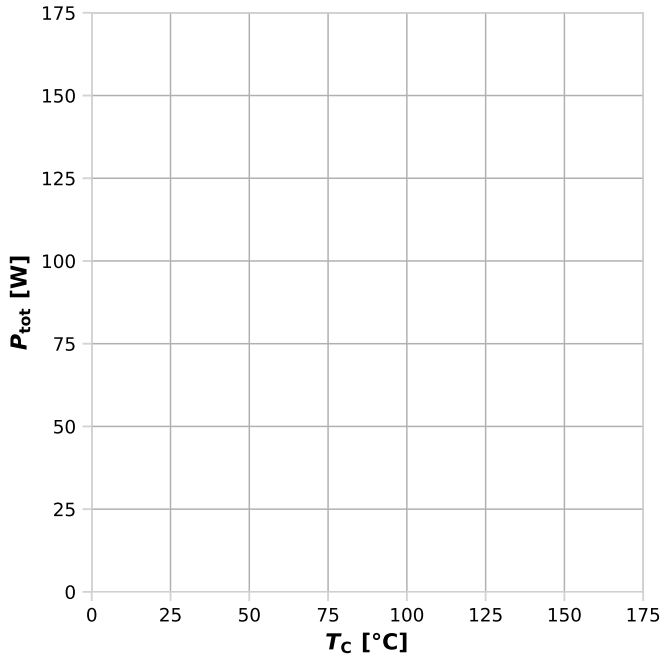
Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	160	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$			1204		
Diode forward voltage	V_{SD}	-	0.80	1	V	V_{GS}=0 V, I_F=50 A, T_j=25 °C
Reverse recovery time [11)]	t_{rr}	-	36	72	ns	V_R=20 V, I_F=50A, di_F/dt=400 A/µs
Reverse recovery charge	Q_{rr}	-	50	-	nC	V_R=15 V, I_F=I_S, di_F/dt=400 A/µs

[11)] Defined by design. Not subject to production test

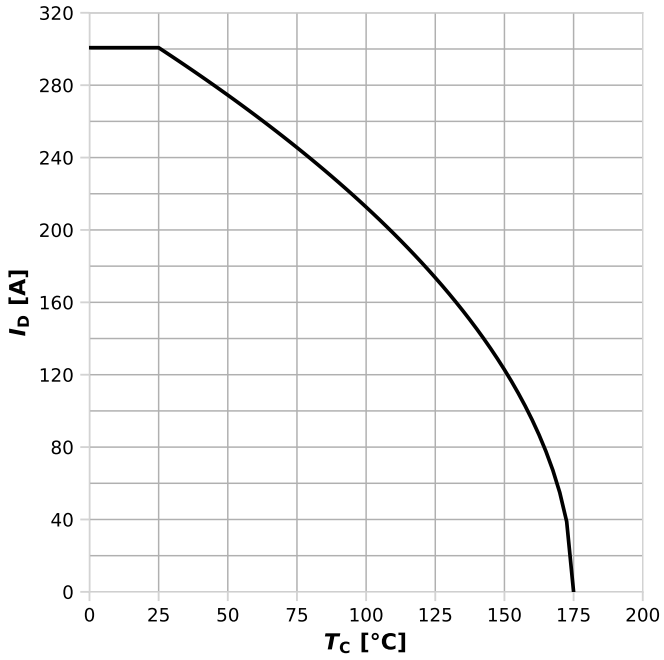
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



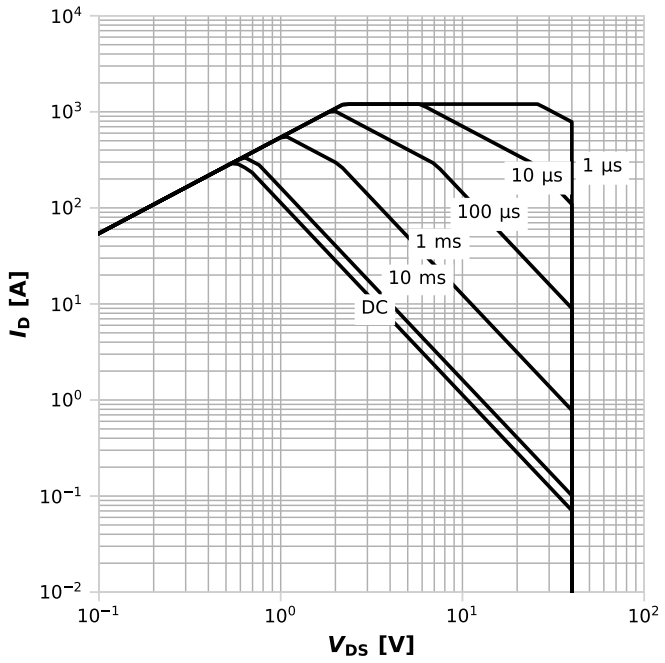
P_{tot}=f(T_C)

Diagram 2: Drain current



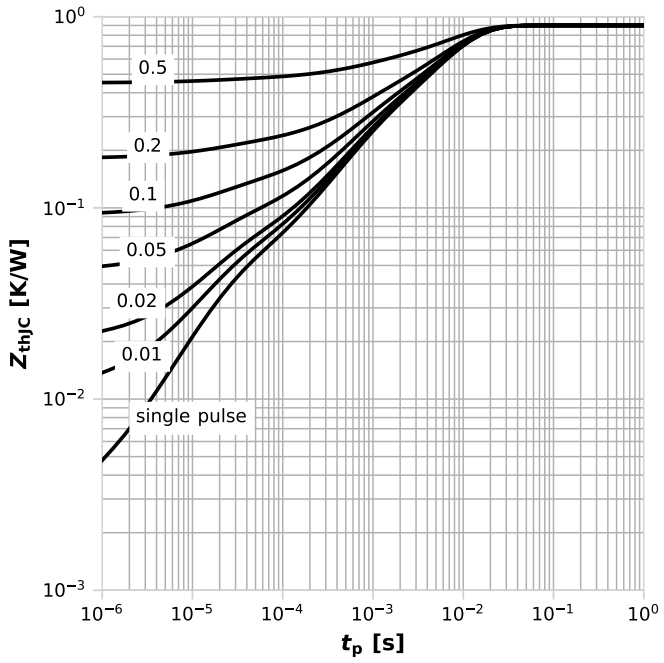
I_D=f(T_C); V_{GS}≥10 V

Diagram 3: Safe operating area



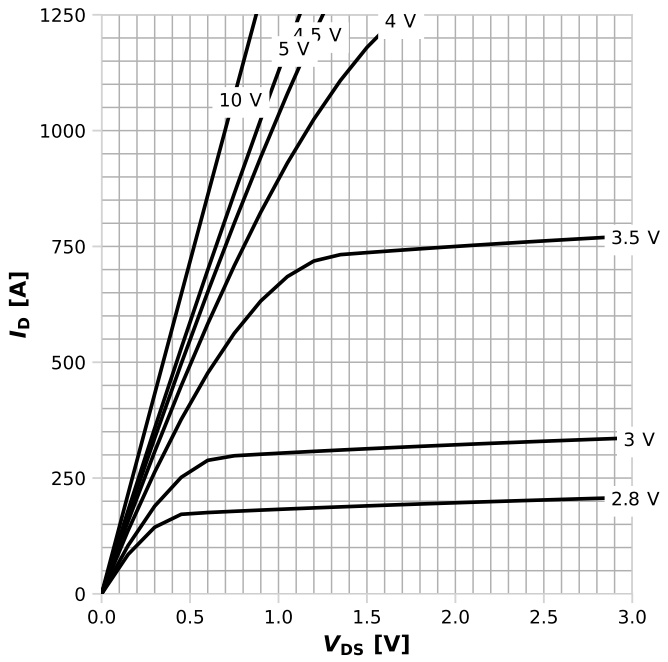
I_D=f(V_{DS}); T_C=25 °C; D=0; parameter: t_p

Diagram 4: Max. transient thermal impedance



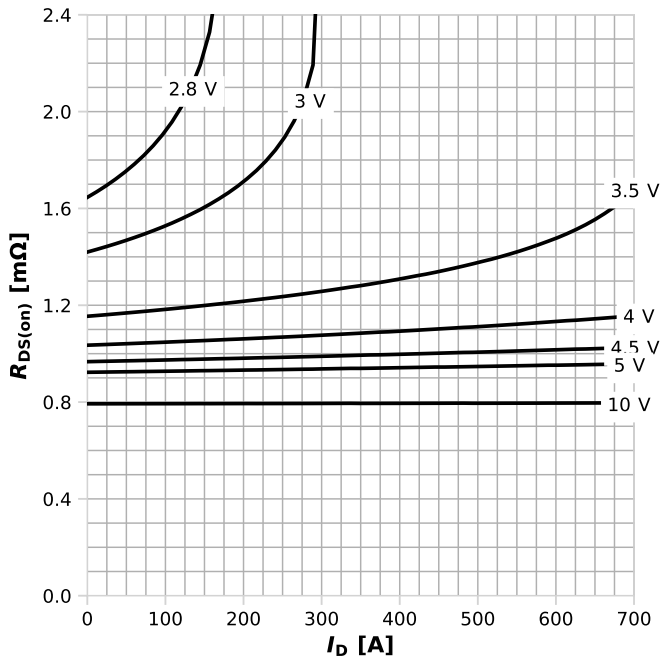
Z_{thJC}=f(t_p); parameter: D=t_p/T

Diagram 5: Typ. output characteristics



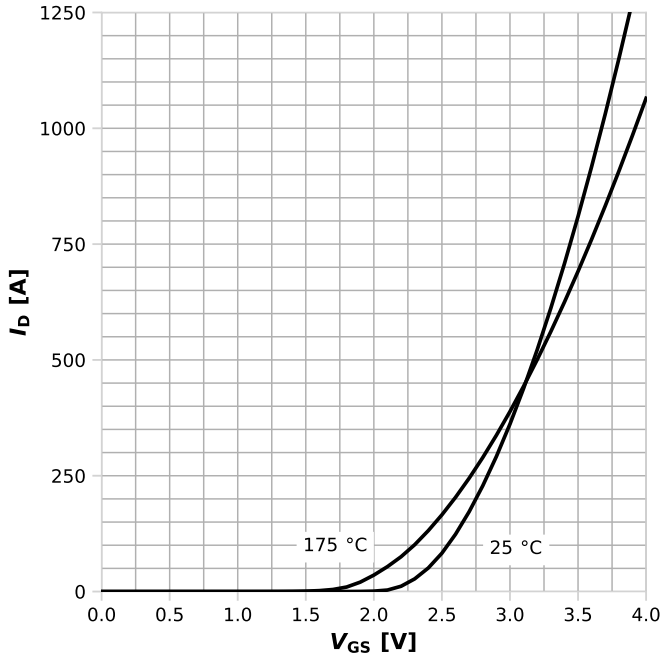
I_D=f(V_{DS}), T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



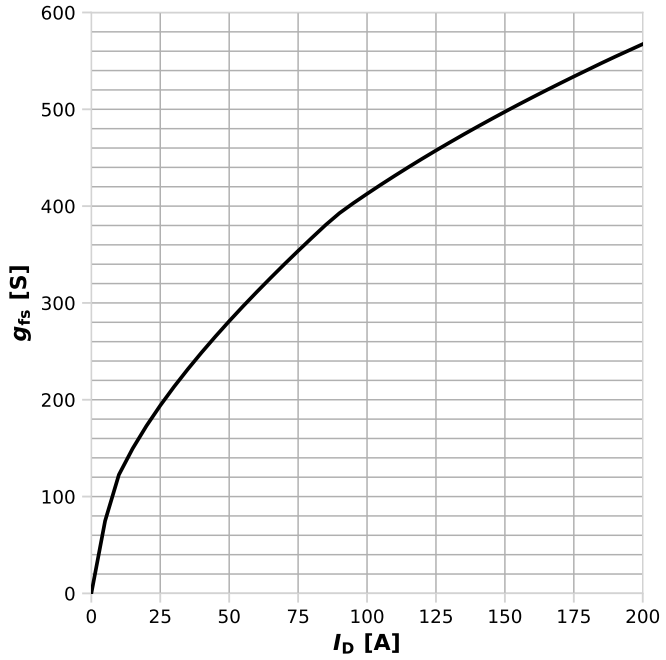
$R_{DS(on)}$=f(I_D), T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



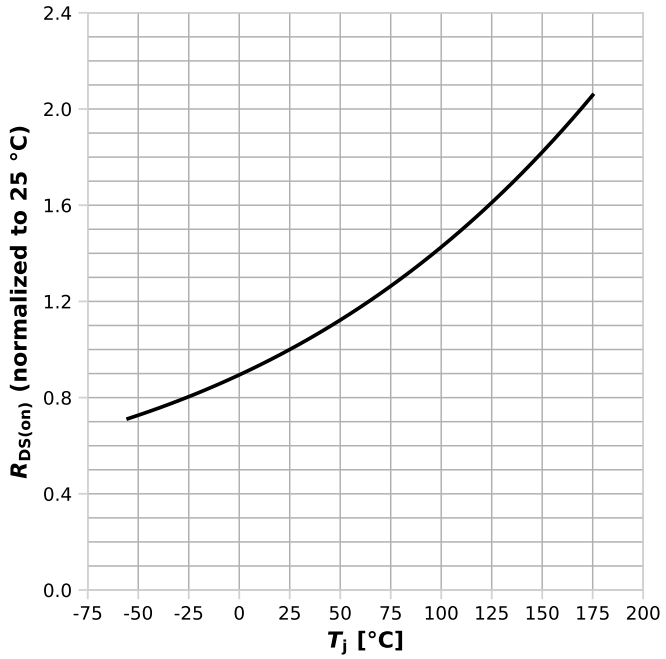
I_D=f(V_{GS}), $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



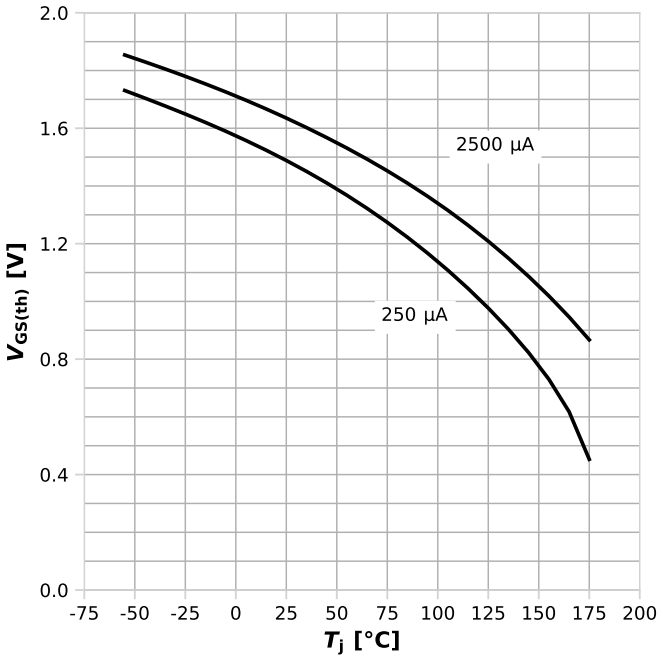
g_{fs}=f(I_D), V_{DS}=3 V, T_j=25 °C

Diagram 9: Normalized drain-source on resistance



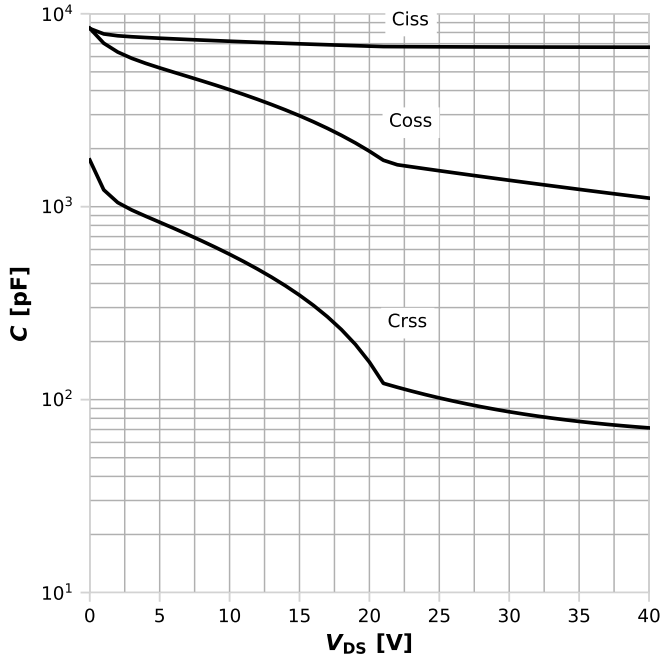
$R_{DS(on)}$=f(T_j), I_D=25 A, V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



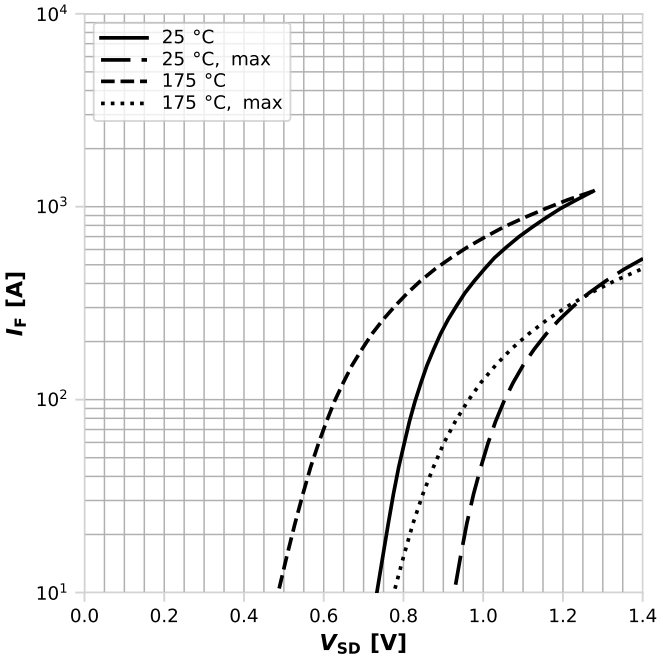
$V_{GS(th)}$=f(T_j), V_{GS}=V_{DS}; parameter: I_D

Diagram 11: Typ. capacitances



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

Diagram 12: Forward characteristics of reverse diode



I_F=f(V_{SD}); parameter: T_j

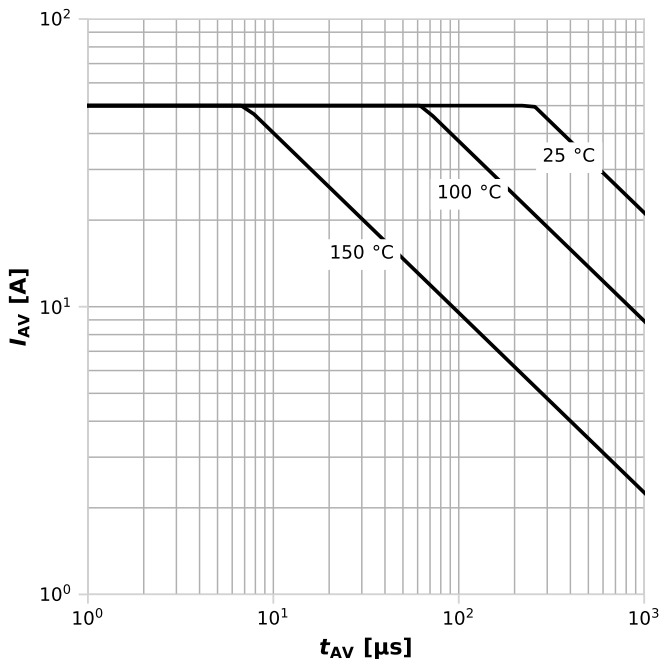
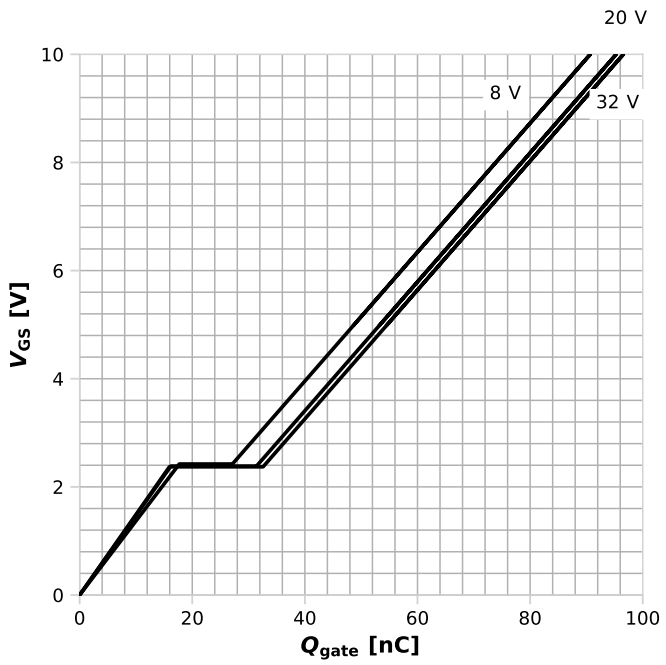
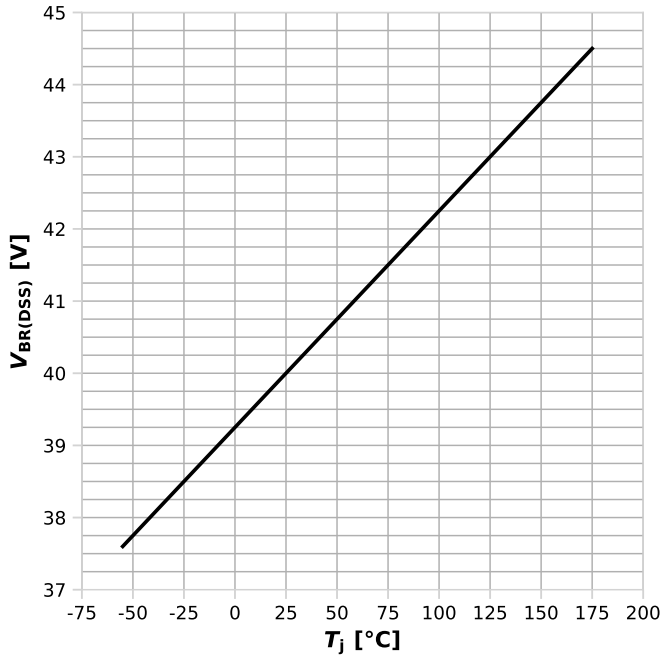
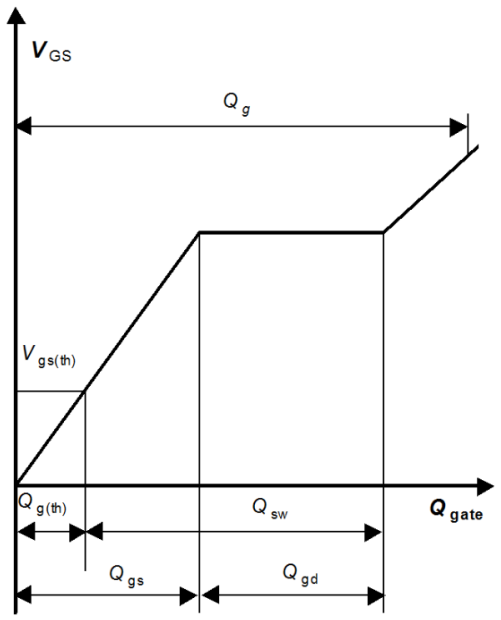
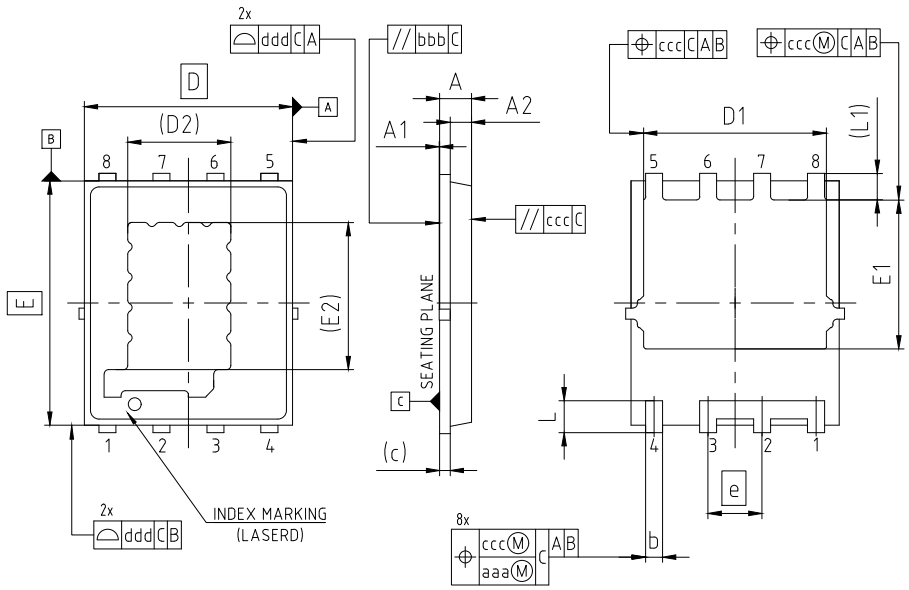
Diagram 13: Avalanche characteristics	Diagram 14: Typ. gate charge
	
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j,start}$	V_{GS}=f(Q_{gate}), I_D=50 A pulsed, T_j=25 °C; parameter: V_{DD}

Diagram 15: Min. drain-source breakdown voltage	Gate charge waveforms
	
$V_{BR(DSS)}$=f(T_j); I_D=1 mA	-

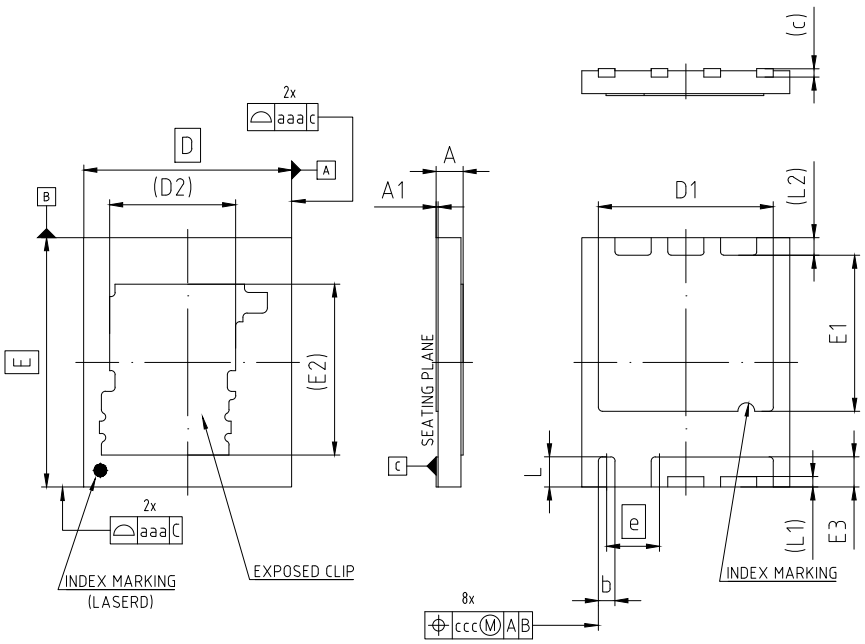
5 Package outlines



PACKAGE - GROUP NUMBER:	PG-VSON-8-U01				
DIMENSIONS	MILLIMETERS		DIMENSIONS	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.65	0.85	e	1.27	
A1	0.00	0.05	L	0.70	0.90
A2	0.45	0.55	L1	0.52	0.72
b	0.35	0.55	aaa	0.05	
c	0.25		bbb	0.08	
D	4.90		ccc	0.10	
D1	4.20	4.40	ddd	0.15	
D2	2.43				
E	5.75				
E1	3.40	3.60			
E2	3.46				

NOTE: DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

Figure 1 Outline PG-VSON-8 / PG-WSON-8, dimensions in mm



PACKAGE - GROUP NUMBER:	PG-WSON-8-U01					
DIMENSIONS	MILLIMETERS		DIMENSIONS	MILLIMETERS		
	MIN.	MAX.		MIN.	MAX.	
A	0.55	0.75	e	1.27		
A1	0.00	0.05	L	0.68	0.78	
b	0.35	0.45	L1	0.25		
c	0.20		L2	0.42		
D	5.00		aaa	0.05		
D1	4.11	4.31	ccc	0.10		
D2	3.03					
E	6.00					
E1	3.66	3.86				
E2	4.11					
E3	0.63	0.83				

NOTE: DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

Figure 2 PG-VSON-8 / PG-WSON-8, dimensions in mm

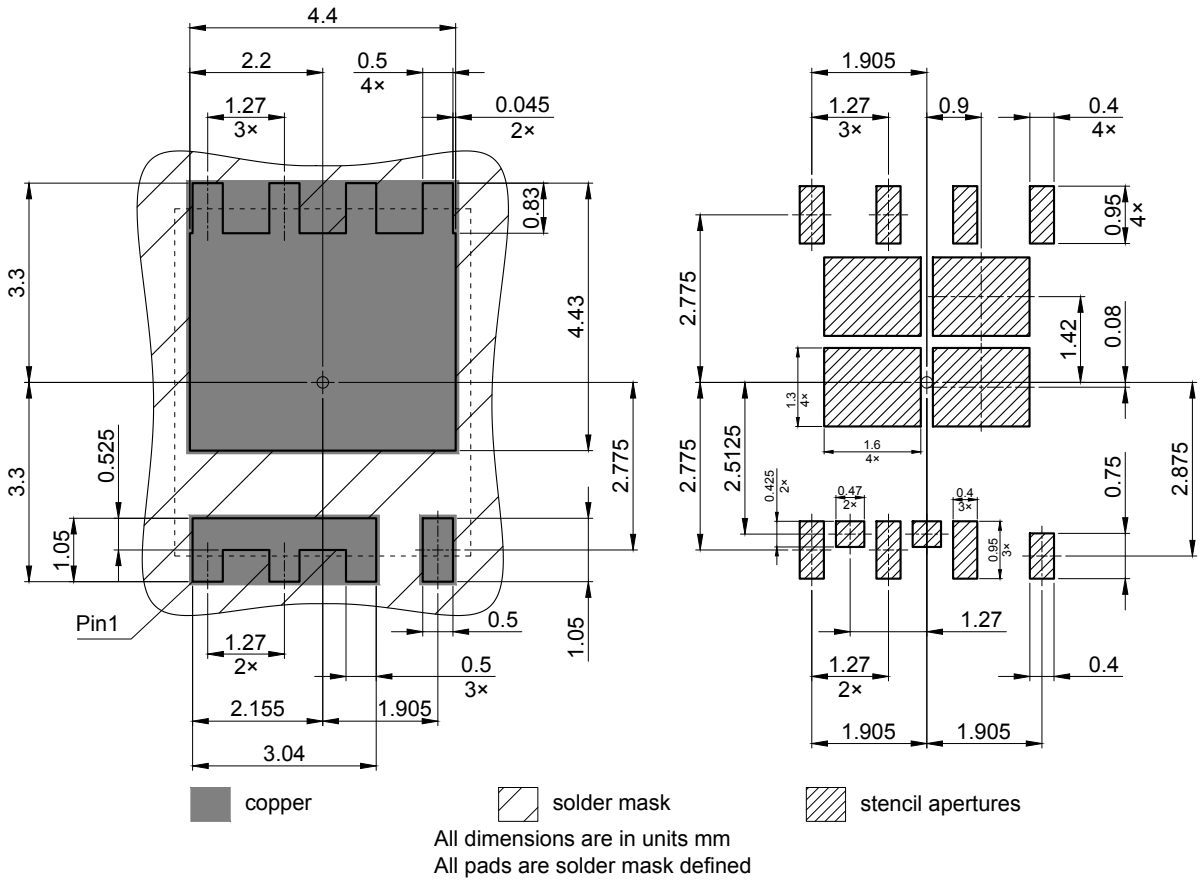


Figure 3 Footprint drawing PG-VSON-8 / PG-WSON-8, dimensions in mm

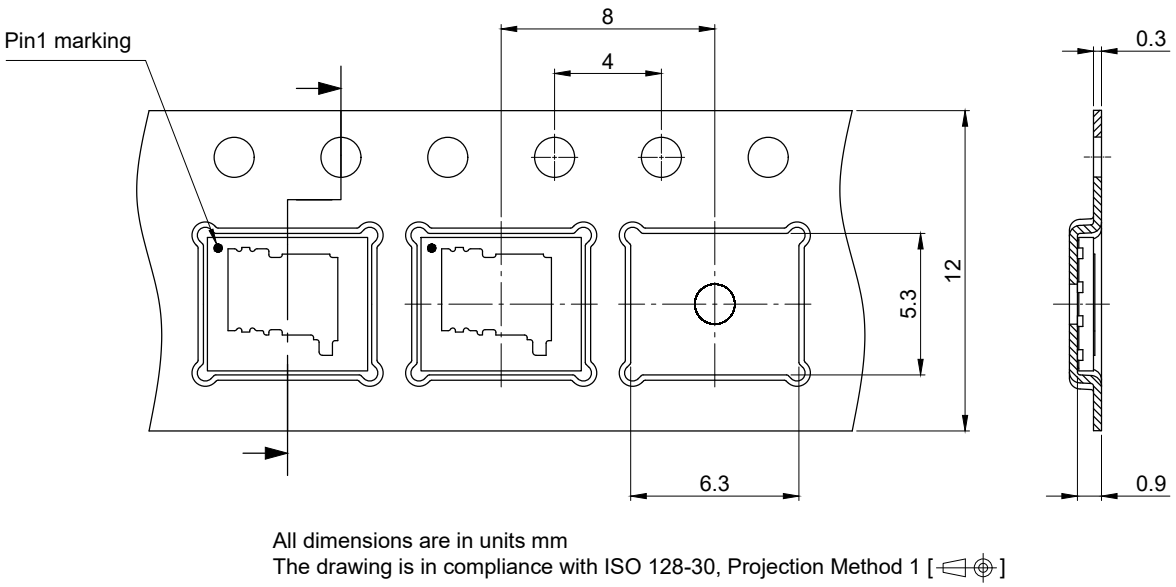


Figure 4 Packaging variant PG-VSON-8 / PG-WSON-8, dimensions in mm

Revision history

BSC009N04LSSC

Revision 2026-04-23, Rev. 2.4

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2022-08-04	Release of final version
2.1	2022-10-06	Update "Features
2.2	2025-06-09	Update package drawings
2.3	2025-12-17	Update switching symbol
2.4	2026-04-23	Update 3D image and schematics

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