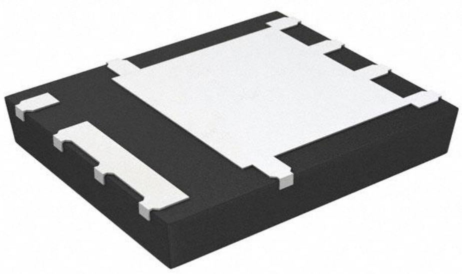
BSC016N06NSATMA1 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	BSC016N06NSATMA1-DG
Manufacturer	Infineon Technologies
Manufacturer Product Number	BSC016N06NSATMA1
Description	MOSFET N-CH 60V 30A/100A TDSON
Detailed Description	N-Channel 60 V 30A (Ta), 100A (Tc) 2.5W (Ta), 139W (Tc) Surface Mount PG-TDSON-8 FL

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
BSC016N06NSATMA1	Infineon Technologies
Series:	Product Status:
OptiMOS™	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
60 V	30A (Ta), 100A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
6V, 10V	1.6mOhm @ 50A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
2.8V @ 95μA	71 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	5200 pF @ 30 V
FET Feature:	Power Dissipation (Max):
-	2.5W (Ta), 139W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
PG-TDSON-8 FL	8-PowerTDFN
Base Product Number:	
BSC016	

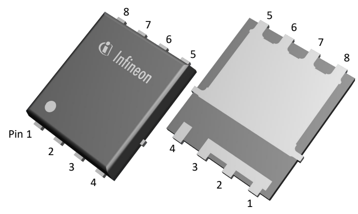
Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

MOSFET

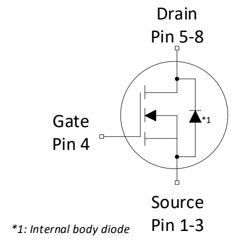
OptiMOS™ Power-MOSFET, 60 V

PG-TDSON-8



Features

- Optimized for synchronous rectification
- 175°C rated
- 100% avalanche tested
- Superior thermal resistance
- N-channel
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- Higher solder joint reliability due to enlarged source interconnection



Product validation

Fully qualified according to JEDEC for Industrial Applications

Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	1.6	mΩ
I_D	234	A
Q_{oss}	81	nC
Q_G(0V..10V)	71	nC

Hal Pb RoHS

Type/Ordering Code	Package	Marking	Related Links
BSC016N06NS	PG-TDSON-8	016N06NS	-

Table of Contents

1 Maximum ratings

unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Continuous drain current [1]	I_D	-	-	234 164 31	A	V_{GS}=10 V, T_C=25 °C V_{GS}=10 V, T_C=100 °C V_{GS}=10 V, T_A=25 °C, R_{thJA}=50 K/W [2]
Pulsed drain current [3]	$I_{D,pulse}$	-	-	936	A	T_C=25 °C
Avalanche energy, single pulse [4]	E_{AS}	-	-	380	mJ	I_D=50 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	167 3.0	W	T_C=25 °C T_A=25 °C, R_{thJA}=50 K/W
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 at 25°C. For higher case temperature 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

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}	-	-	20	K/W	-
Device on PCB, 6 cm^2 cooling area [5)]	R_{thJA}	-	-	50	K/W	-

5) 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

unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	60	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2.1	2.8	3.3	V	V_{DS}=V_{GS}, I_D=95 µA
Zero gate voltage drain current	I_{DSS}	-	0.5 10	1 100	µA	V_{DS}=60 V, V_{GS}=0 V, T_j=25 °C V_{DS}=60 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	$R_{DS(on)}$	-	1.4 1.9	1.6 2.4	mΩ	V_{GS}=10 V, I_D=50 A V_{GS}=6 V, I_D=12.5 A
Gate resistance [6)]	R_G	-	1.9	2.9	Ω	-
Transconductance	g_{fs}	70	140	-	S	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=50 A

6) Defined by design. Not subject to production test

Table 5 Dynamic characteristics [7)]

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	3900	5200	6500	pF	V_{GS}=0 V, V_{DS}=30 V, f=1 MHz
Output capacitance	C_{oss}	900	1200	1500	pF	V_{GS}=0 V, V_{DS}=30 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	14	48	96	pF	V_{GS}=0 V, V_{DS}=30 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	19	38	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r	-	9	18	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Turn-off delay time	$t_{d(off)}$	-	35	70	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Fall time	t_f	-	9	18	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω

7) Defined by design. Not subject to production test

Table 6 Gate charge characteristics [8)]

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	16	22	30	nC	V_{DD}=30 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{g(th)}$	10	14	19	nC	V_{DD}=30 V, I_D=50 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	8.8	13	20	nC	V_{DD}=30 V, I_D=50 A, V_{GS}=0 to 10 V

Table 6 Gate charge characteristics [8)]

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Switching charge	Q_{sw}	14	21	30	nC	V_{DD}=30 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge total	Q_g	58	71	95	nC	V_{DD}=30 V, I_D=50 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	3.7	4.3	4.9	V	V_{DD}=30 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge total, sync. FET	$Q_{g(sync)}$	49	62	86	nC	V_{DS}=0.1 V, V_{GS}=0 to 10 V
Output charge	Q_{oss}	60	81	102	nC	V_{DD}=30 V, V_{GS}=0 V

8) See "Gate charge waveforms" for parameter definition. 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	-	-	167	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	936	A	T_C=25 °C
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=50 A, T_j=25 °C
Reverse recovery time [9)]	t_{rr}	24	61	98	ns	V_R=30 V, I_F=50A, di_F/dt=100 A/µs
Reverse recovery charge [9)]	Q_{rr}	39	78	156	nC	V_R=30 V, I_F=50A, di_F/dt=100 A/µs

9) Defined by design. Not subject to production test

4 Electrical characteristics diagrams

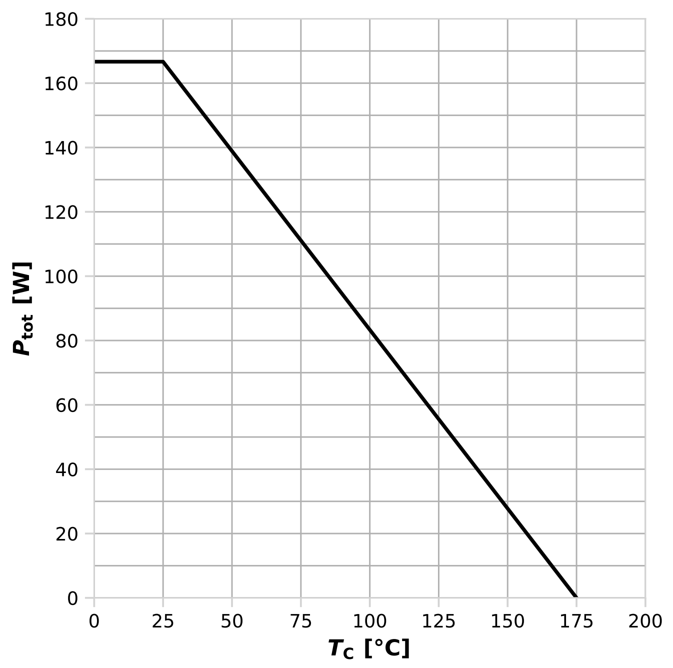
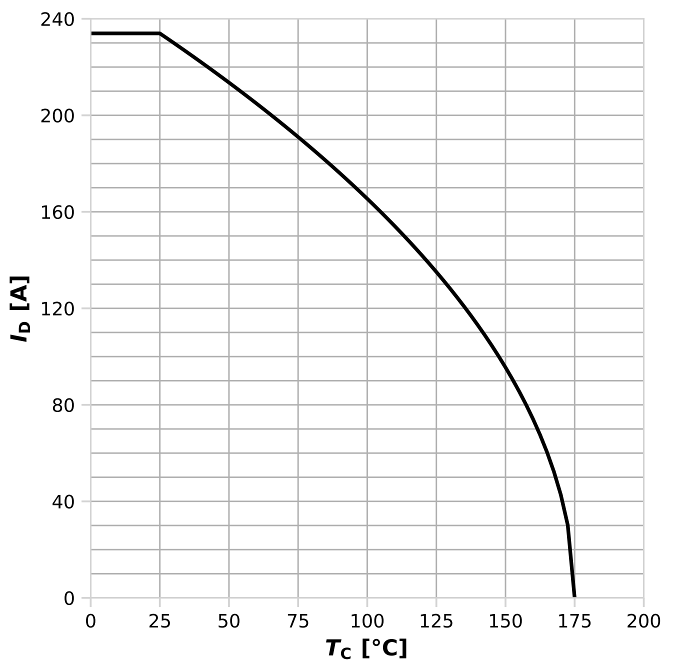
Diagram 1: Power dissipation	Diagram 2: Drain current
	
P_{tot}=f(T_C)	I_D=f(T_C); V_{GS}≥10 V

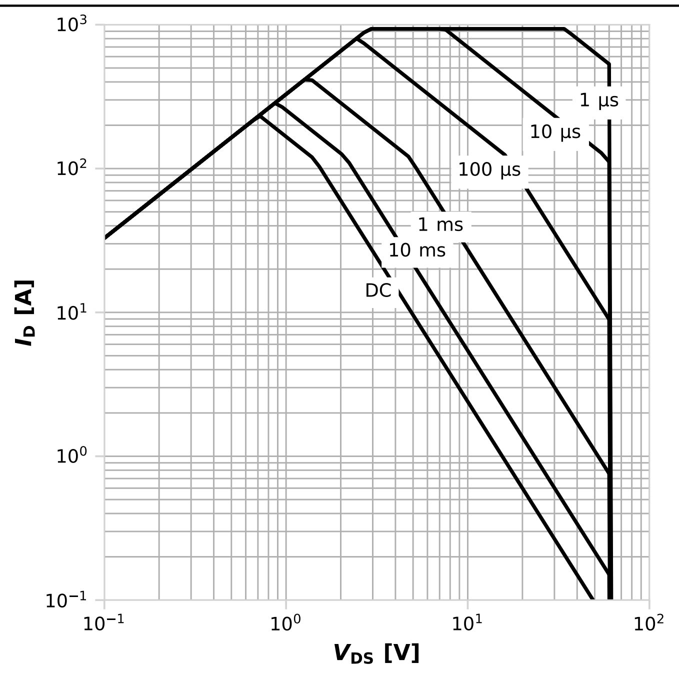
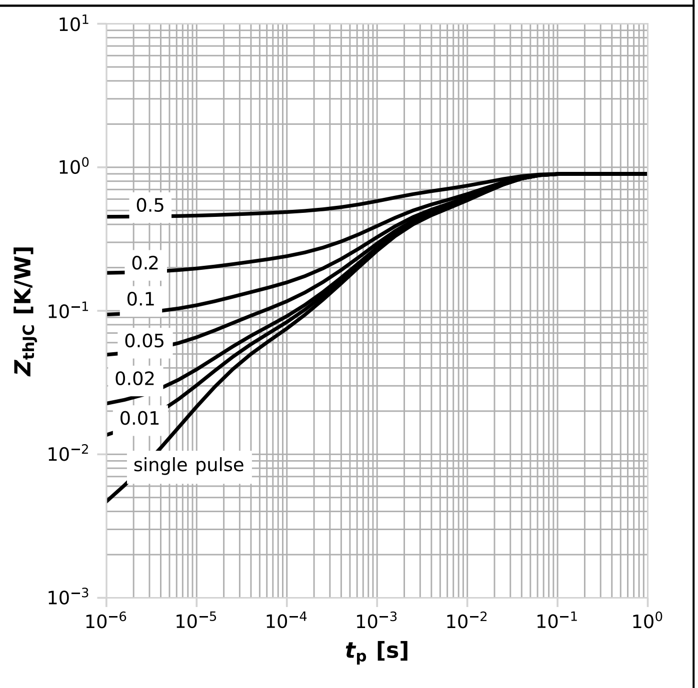
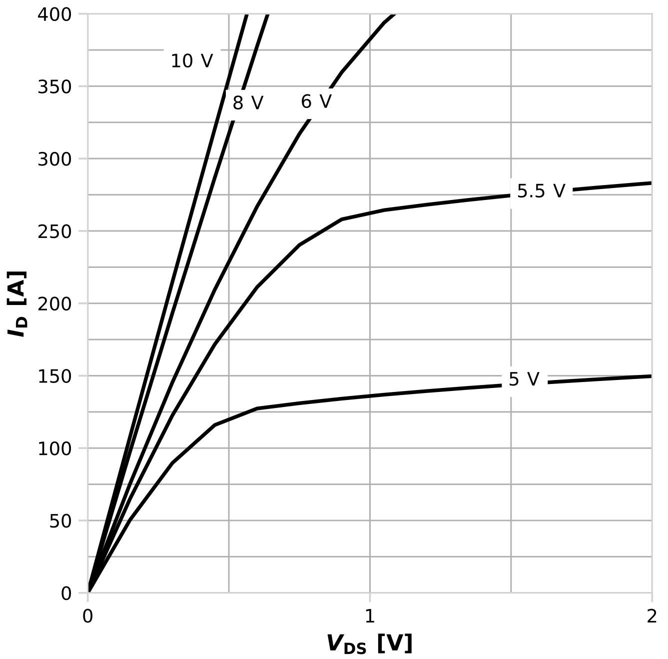
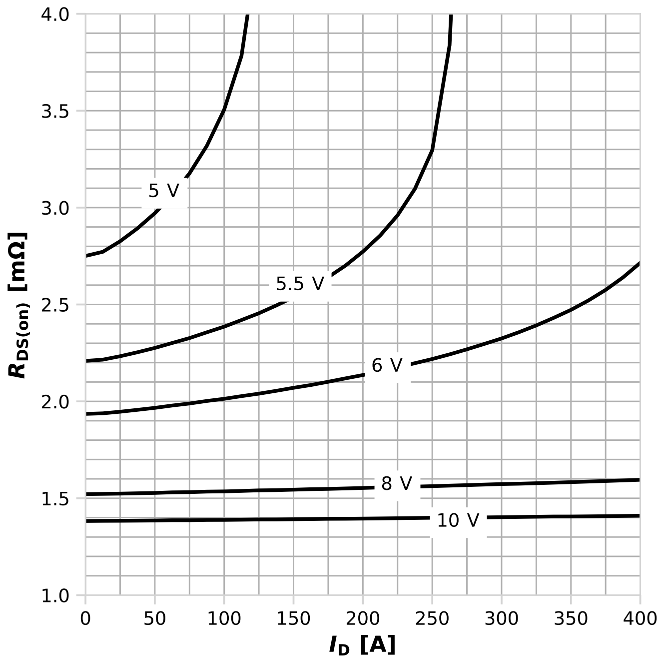
Diagram 3: Safe operating area	Diagram 4: Max. transient thermal impedance
	
I_D=f(V_{DS}); T_C=25 °C; D=0; parameter: t_p	Z_{thJC}=f(t_p); parameter: D=t_p/T

Diagram 5: Typ. output characteristics



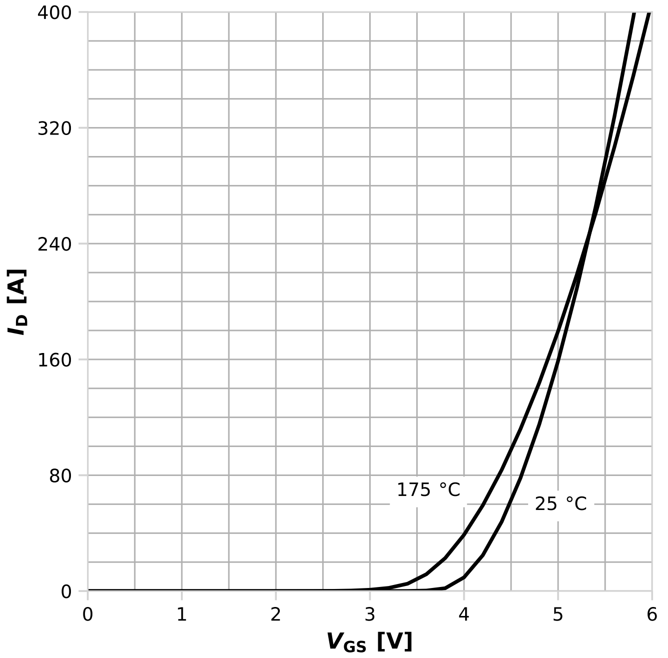
I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



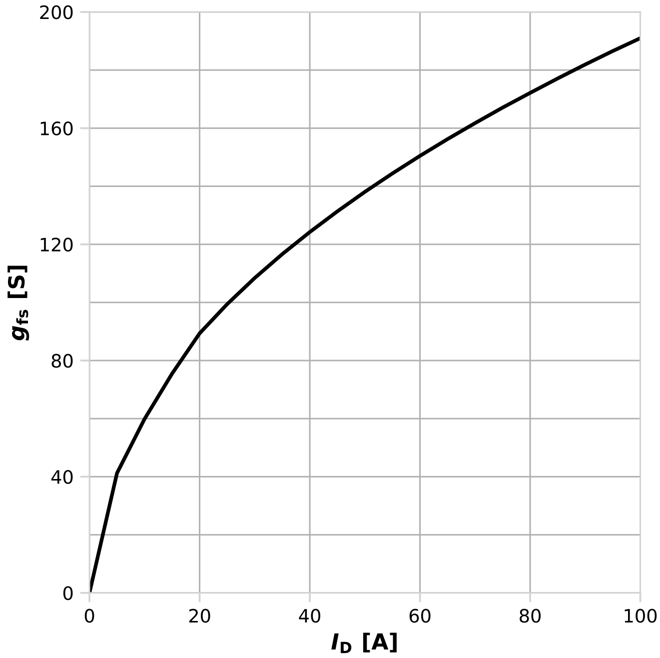
$R_{DS(on)}$=f(I_D); T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



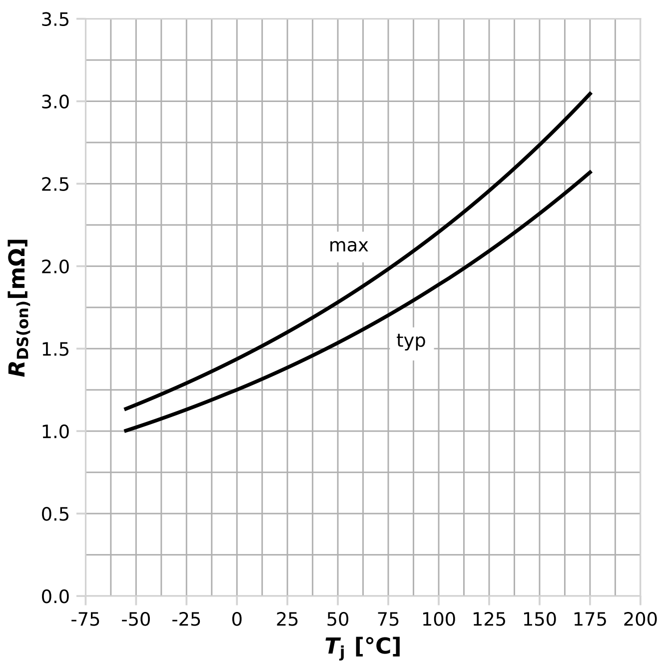
I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



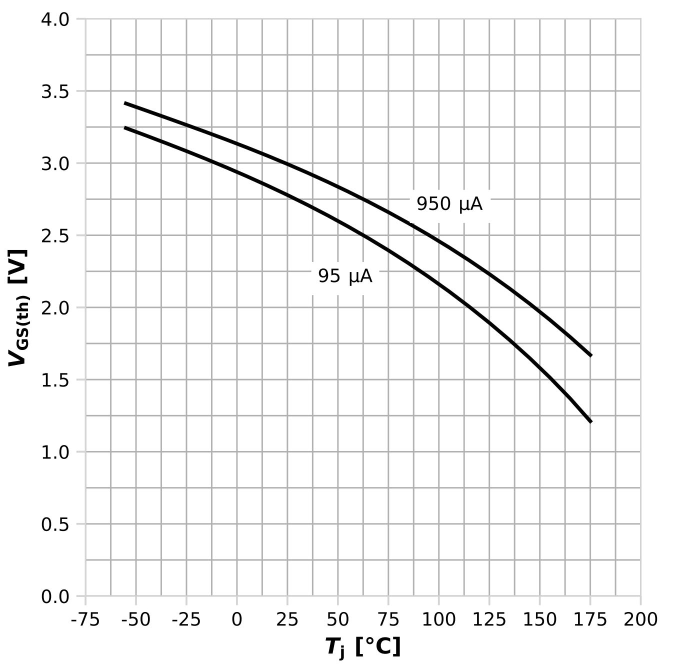
g_{fs}=f(I_D); T_j=25 °C

Diagram 9: Drain-source on-state resistance



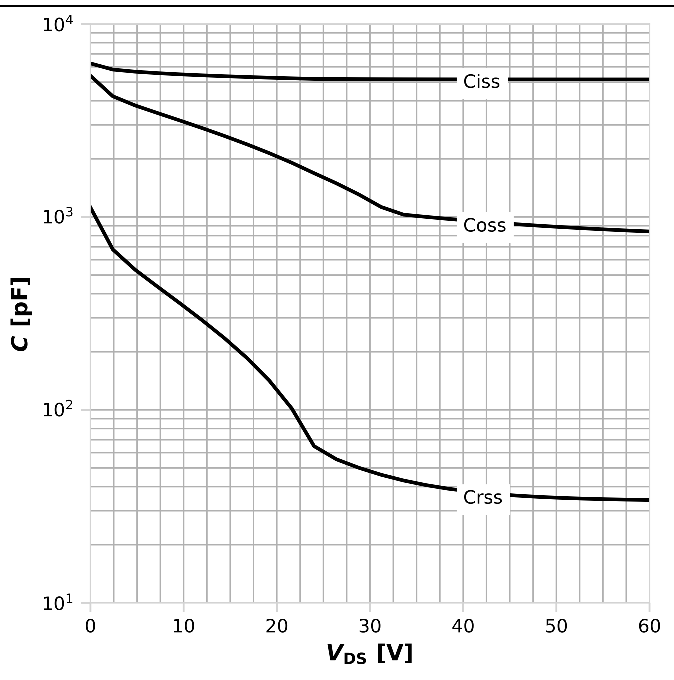
$R_{DS(on)}$=f(T_j); I_D=50 A; V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



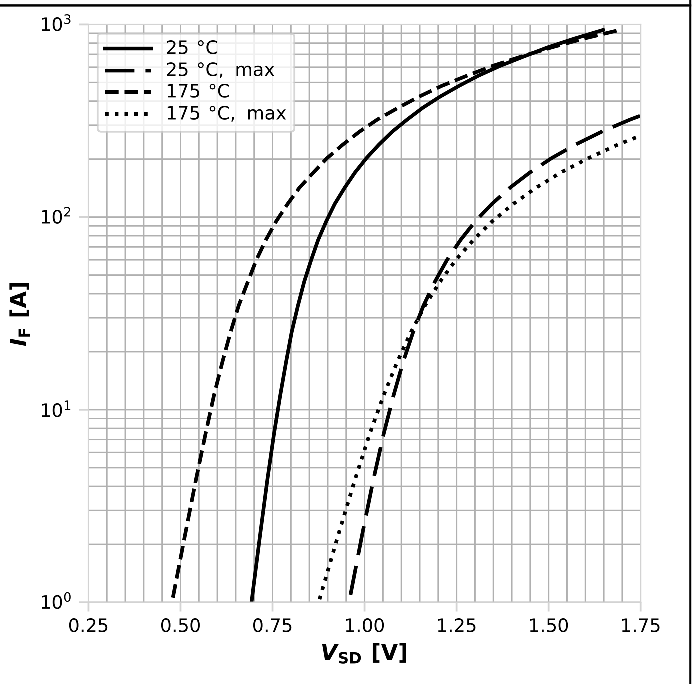
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}

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

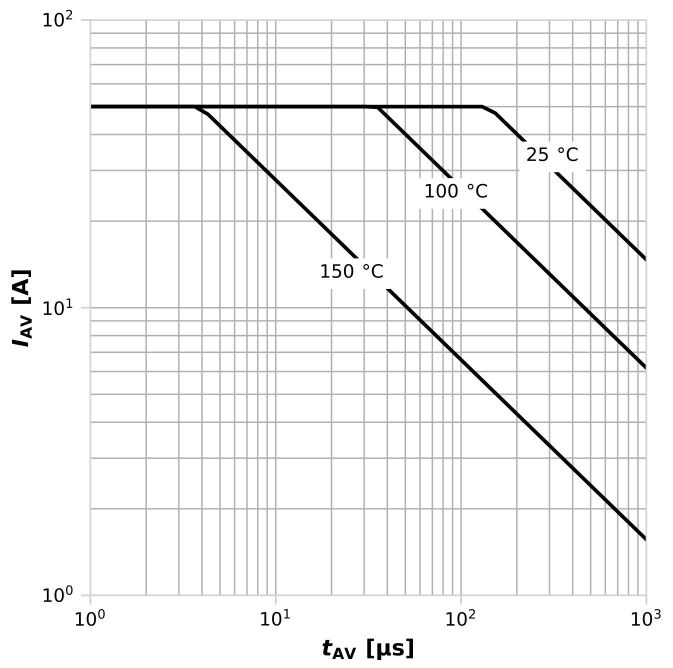
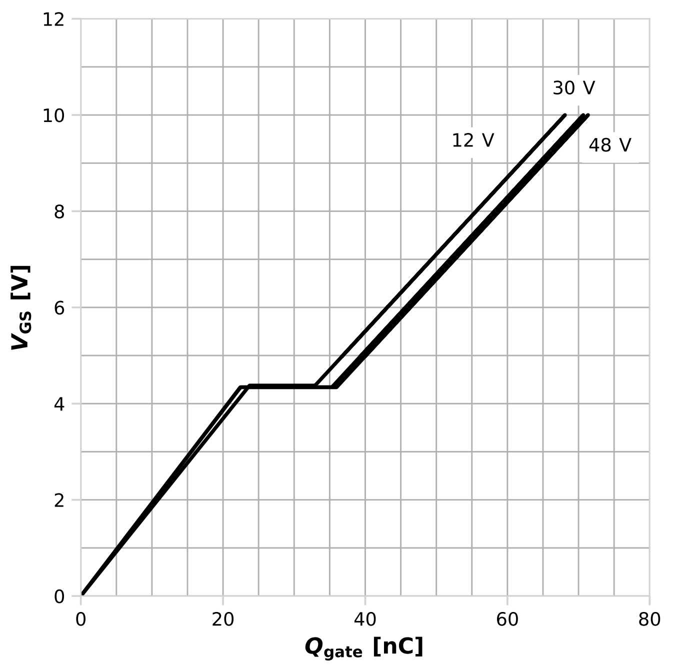
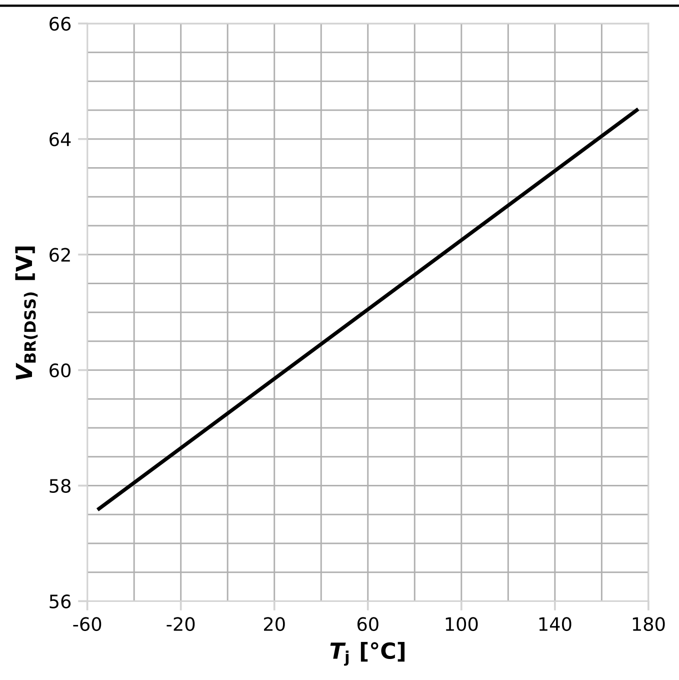
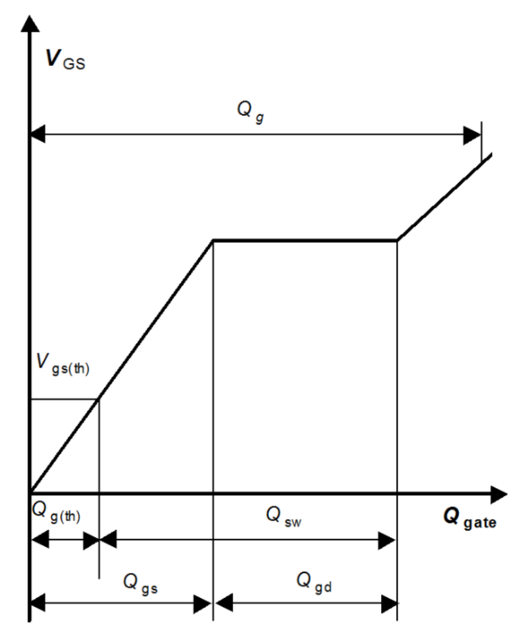
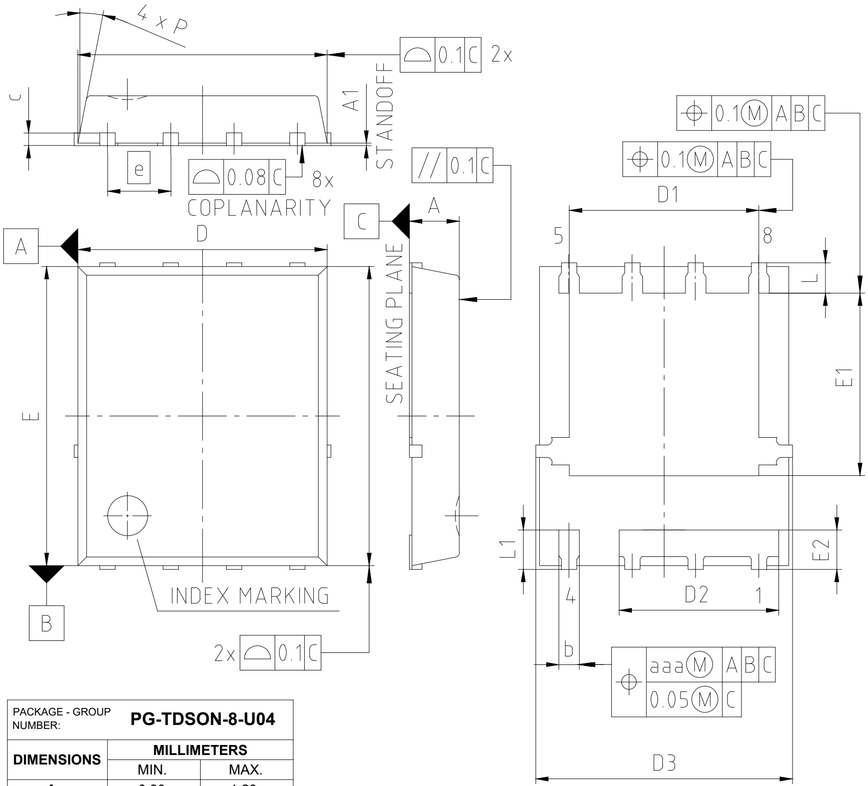
Diagram 13: Avalanche characteristics	Diagram 14: Typ. gate charge
	
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j(start)}$	V_{GS}=f(Q_{gate}); I_D=50 A pulsed; parameter: V_{DD}

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

5 Package Outlines



PACKAGE - GROUP NUMBER:	PG-TDSON-8-U04	
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	0.90	1.20
A1	0	0.05
b	0.26	0.54
c	0.15	0.35
D	4.80	5.35
D1	3.70	4.40
D2	2.94	3.25
D3	4.80	5.15
E	5.70	6.10
E1	3.40	3.76
E2	0.69	0.90
e	1.27	
L	0.45	0.72
L1	0.69	0.90
aaa	0.10	0.25
P	8°	12°

1) EXCLUDING MOLD FLASH
2) REMOVAL ON MOLD GATE
INTRUSION 0.1 MM
PROTRUSION 0.1 MM
3) LEAD LENGTH UP TO ANTI FLASH LINE
4) ALL METAL SURFACES ARE PLATED,
EXCEPT AREA OF CUT

Figure 1 Outline PG-TDSON-8, dimensions in mm

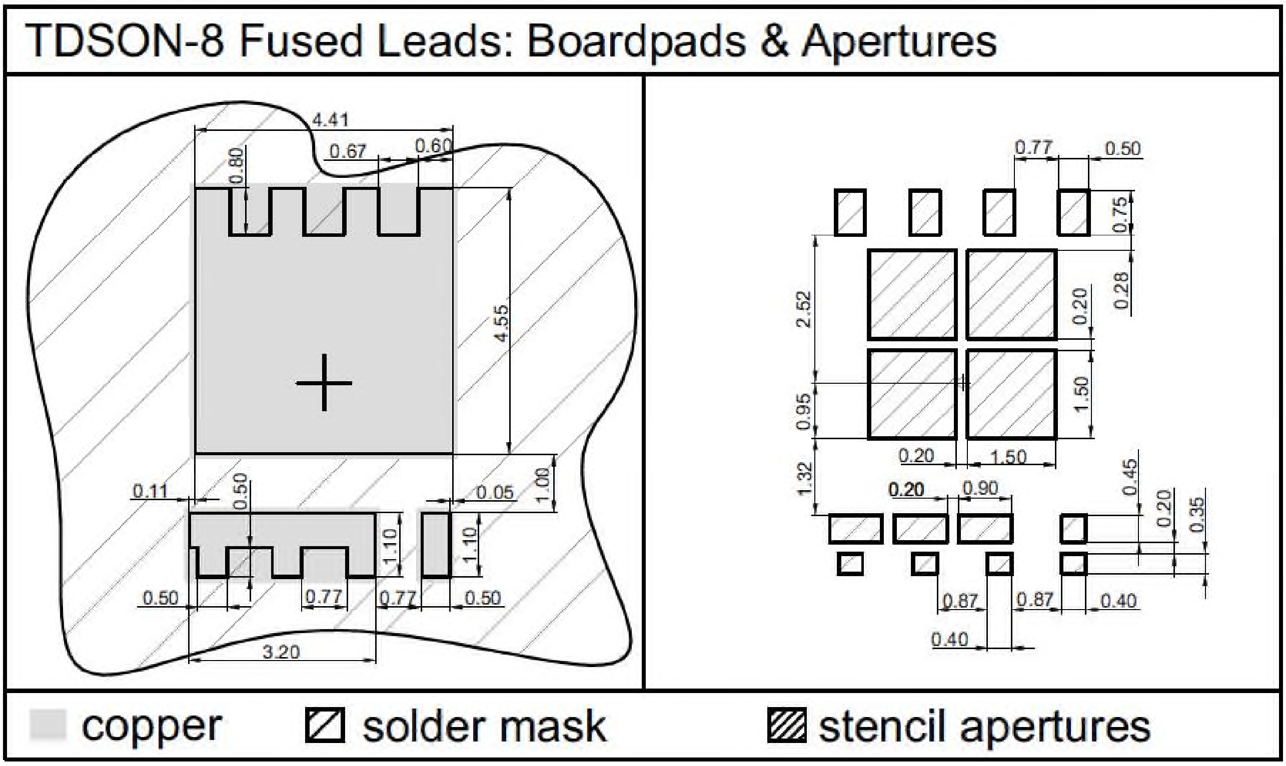


Figure 2 Outline PG-TDSON-8, dimensions in mm

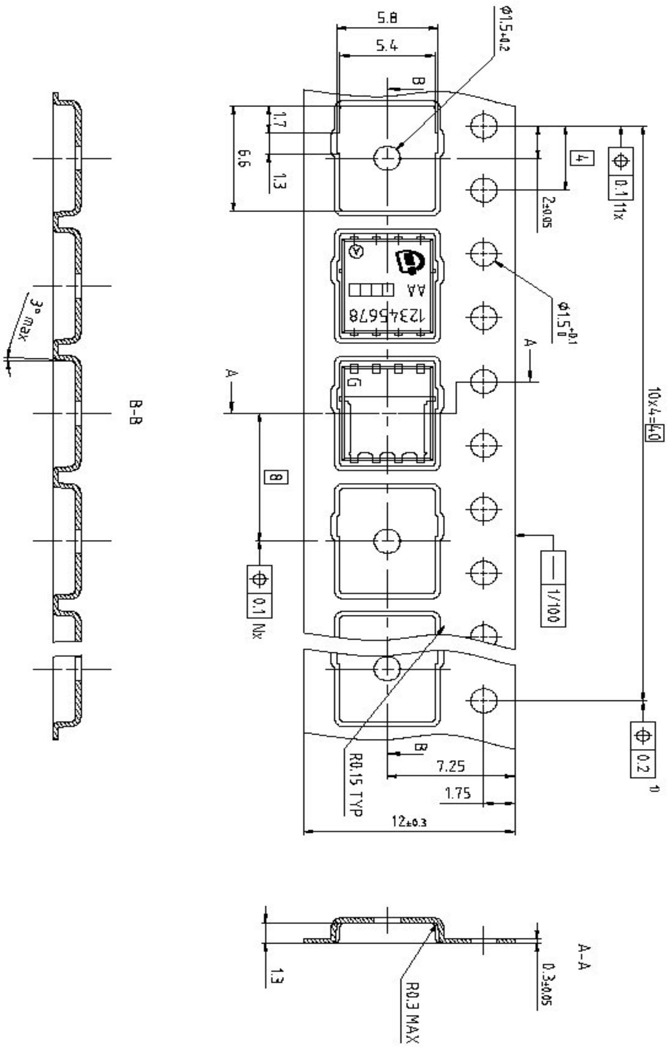


Figure 3 Outline PG-TDSON-8, dimensions in mm

Revision History

BSC016N06NS

Revision 2024-06-11, Rev. 2.6

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2012-06-18	Release of final version
2.3	2014-11-11	Added RthJC_typ and footprint drawing, insert footnote "Define by design...."
2.4	2019-10-17	Update package drawings
2.5	2020-03-17	Update current rating
2.6	2024-06-11	Upgrade Operating and storage temperature max to 175°C. Update drawings in section 5 Package Outlines. Production validation added on page1.Updated foot notes.

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Infineon Technologies AG
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