MOSFET

OptiMOS™3 Power-MOSFET, 80 V

MG-WDSON-2-6

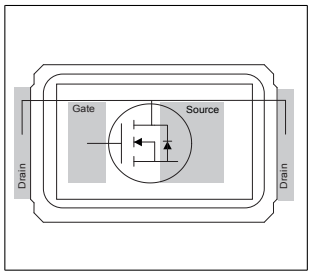


Features

- Optimized technology for DC/DC converters
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Low profile (<0.7mm)
- Dual sided cooling
- Low parasitic inductance
- N-channel, normal level

Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	80	V
$R_{DS(on),max}$	10.4	mΩ
I_D	50	A



Type / Ordering Code	Package	Marking	Related Links
BSB104N08NP3 G	MG-WDSON-2	0308	-

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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	I_D	- - -	- - -	50 32 13	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}=45 K/W[1)]
Pulsed drain current[2)]	$I_{D,pulse}$	-	-	200	A	T_C=25 °C
Avalanche energy, single pulse[3)]	E_{AS}	-	-	110	mJ	I_D=30 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	- -	- -	42 2.8	W	T_C=25 °C T_A=25 °C, R_{thJA}=45 K/W[1)]
Operating and storage temperature	T_j, T_{stg}	-40	-	150	°C	-

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, bottom	R_{thJC}	-	1.0	-	K/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	-	3.0	K/W	-
Device on PCB, 6 cm^2 cooling area[1)]	R_{thJA}	-	-	45	K/W	-

[1)] 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.
[2)] See Diagram 3 for more detailed information
[3)] See Diagram 13 for more detailed information

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	$V_{(BR)DSS}$	80	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2.0	2.7	3.5	V	V_{DS}=V_{GS}, I_D=40 µA
Zero gate voltage drain current	I_{DSS}	- -	0.1 10	10 100	µA	V_{DS}=80 V, V_{GS}=0 V, T_j=25 °C V_{DS}=80 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	$R_{DS(on)}$	-	9.3	10.4	mΩ	V_{GS}=10 V, I_D=10 A
Gate resistance	R_G	-	2	-	Ω	-
Transconductance	g_{fs}	23	46	-	S	|V_{DS}|>2|I_D|$R_{DS(on)max}$, I_D=30 A

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	1600	2100	pF	V_{GS}=0 V, V_{DS}=40 V, f=1 MHz
Output capacitance	C_{oss}	-	430	570	pF	V_{GS}=0 V, V_{DS}=40 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	29	44	pF	V_{GS}=0 V, V_{DS}=40 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	9	-	ns	V_{DD}=40 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r	-	4	-	ns	V_{DD}=40 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Turn-off delay time	$t_{d(off)}$	-	19	-	ns	V_{DD}=40 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Fall time	t_f	-	4	-	ns	V_{DD}=40 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω

Table 6 Gate charge characteristics[1)]

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	8	11	nC	V_{DD}=40 V, I_D=30 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	5	8	nC	V_{DD}=40 V, I_D=30 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	8	13	nC	V_{DD}=40 V, I_D=30 A, V_{GS}=0 to 10 V
Gate charge total	Q_g	-	23	31	nC	V_{DD}=40 V, I_D=30 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	5.0	-	V	V_{DD}=40 V, I_D=30 A, V_{GS}=0 to 10 V
Output charge	Q_{oss}	-	31	42	nC	V_{DD}=40 V, V_{GS}=0 V

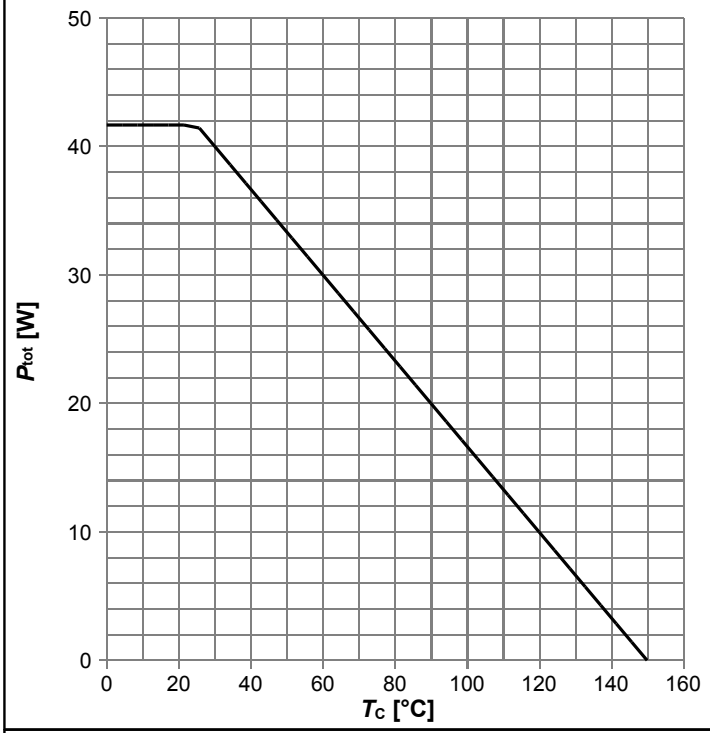
[1)] See ″Gate charge waveforms″ for parameter definition

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	30	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	200	A	T_C=25 °C
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=30 A, T_j=25 °C
Reverse recovery time	t_{rr}	-	43	-	ns	V_R=40 V, I_F=30 A, di_F/dt=100 A/µs
Reverse recovery charge	Q_{rr}	-	55	-	nC	V_R=40 V, I_F=30 A, di_F/dt=100 A/µs

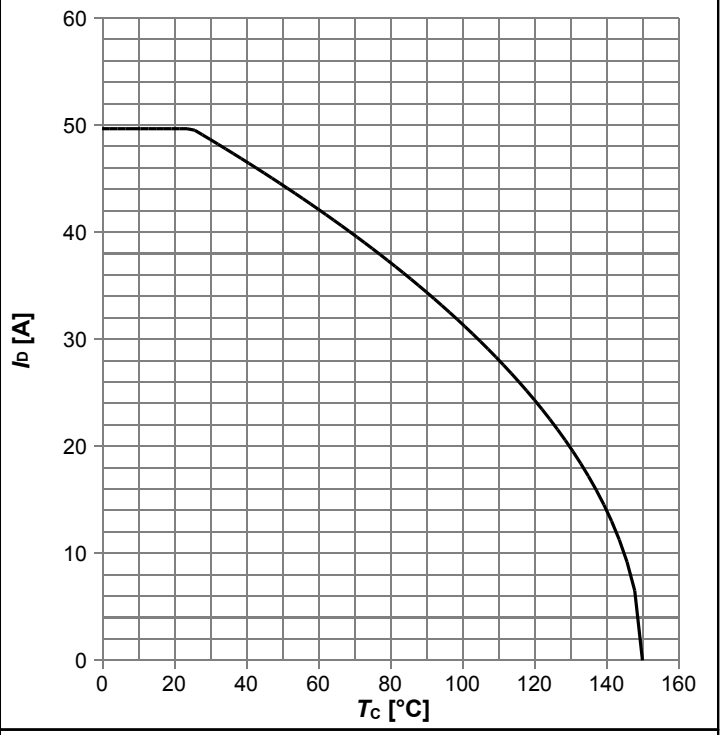
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



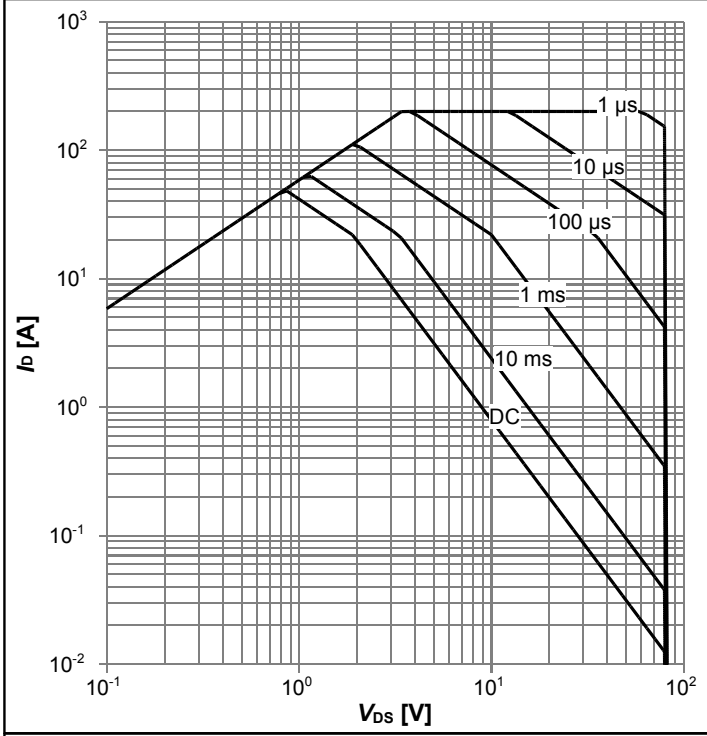
$P_{tot}=f(T_C)$

Diagram 2: Drain current



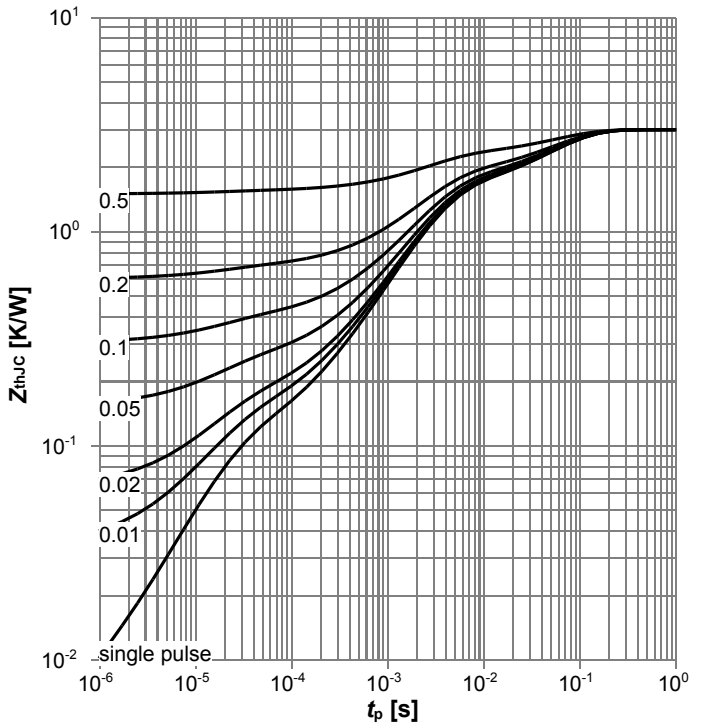
$I_D=f(T_C)$; $V_{GS}\geq 10$ V

Diagram 3: Safe operating area



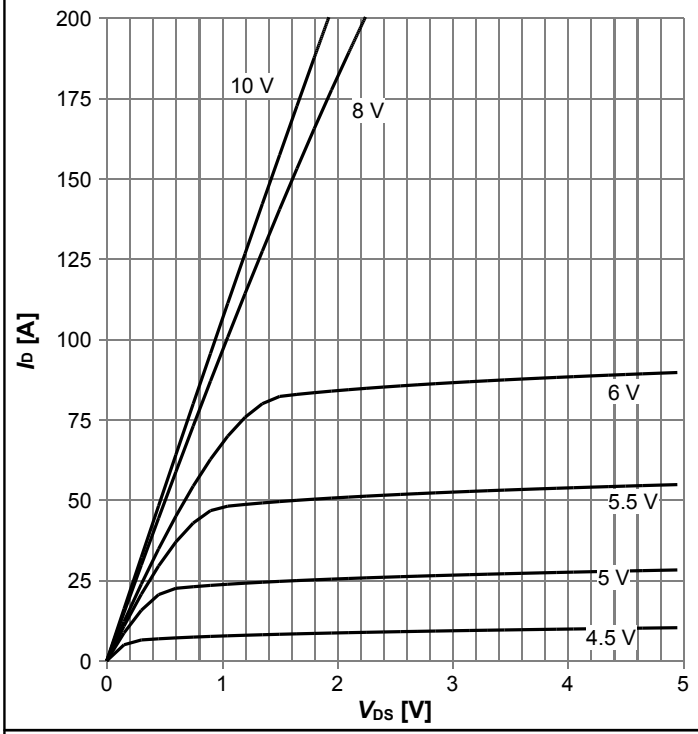
$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$; parameter: t_p

Diagram 4: Max. transient thermal impedance



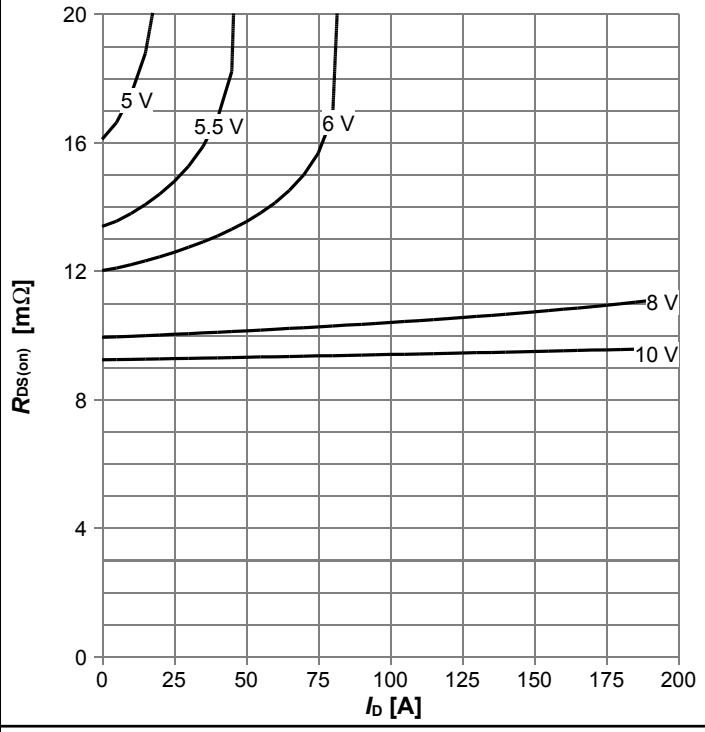
$Z_{thJC}=f(t_p)$; parameter: $D=t_p/T$

Diagram 5: Typ. output characteristics



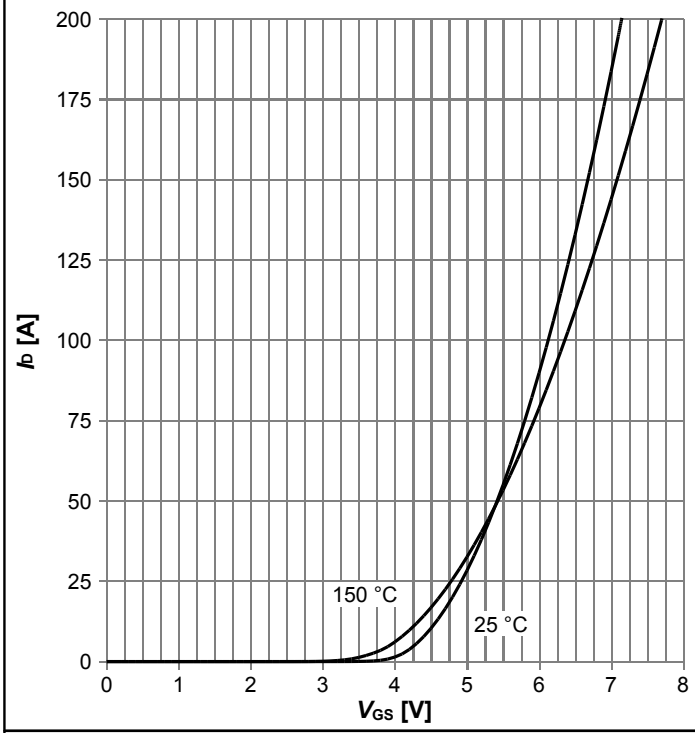
$I_D=f(V_{DS})$, $T_j=25$ °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



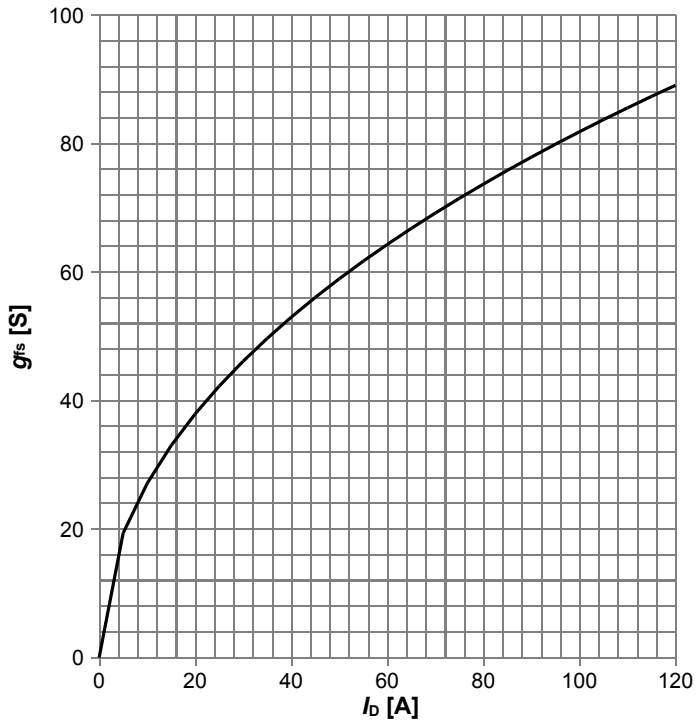
$R_{DS(on)}=f(I_D)$, $T_j=25$ °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



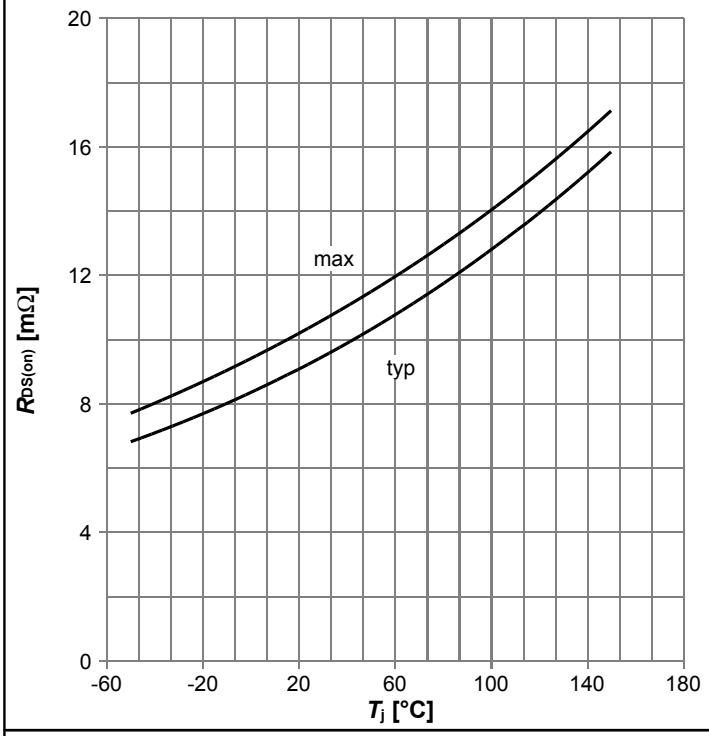
$I_D=f(V_{GS})$, $|V_{DS}|>2|I_D|R_{DS(on)max}$, $T_j=25$ °C

Diagram 8: Typ. forward transconductance



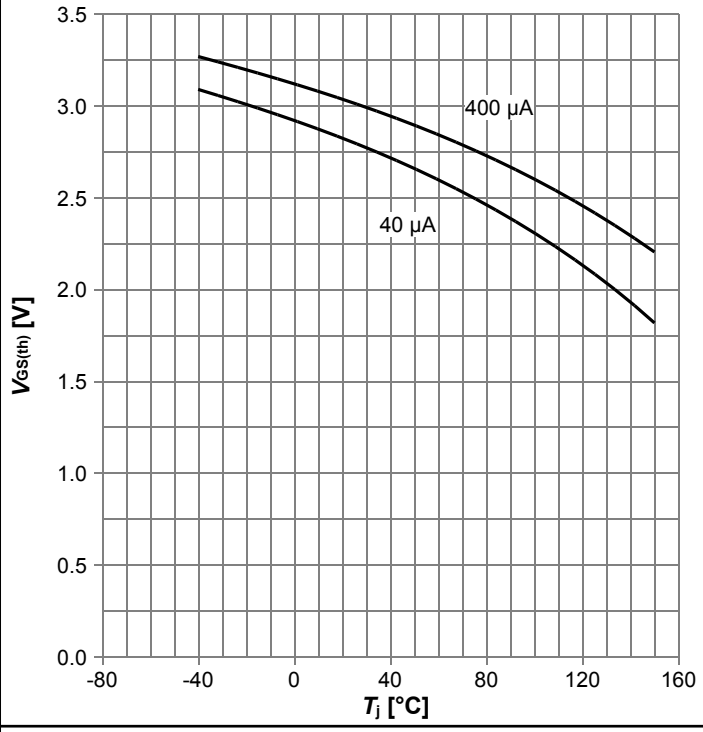
$g_{fs}=f(I_D)$, $V_{DS}=3$ V, $T_j=25$ °C

Diagram 9: Drain-source on-state resistance



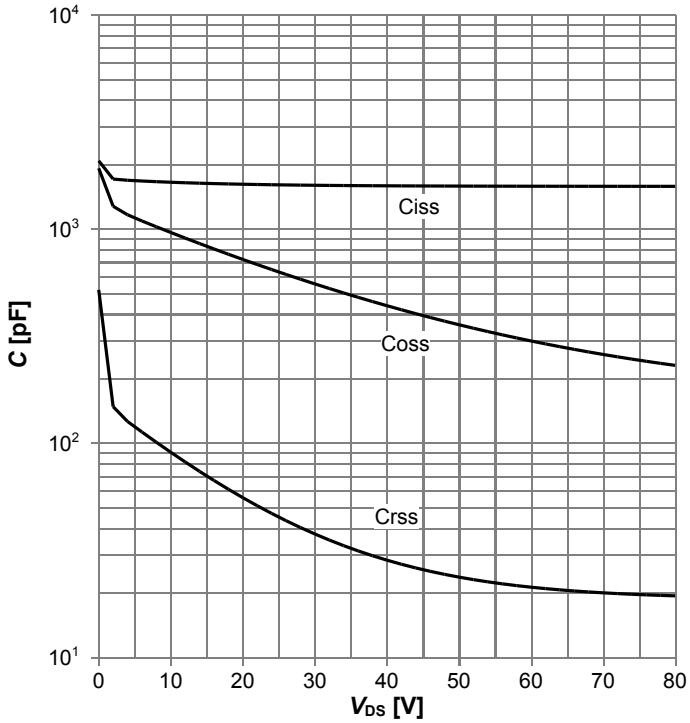
$R_{DS(on)}$=f(T_j), I_D=20 A, V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



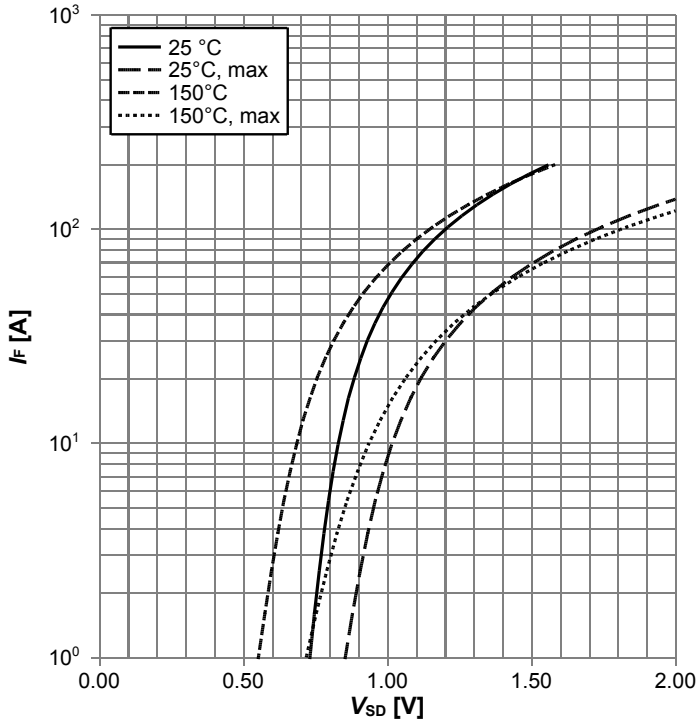
$V_{GS(th}$=f(T_j), V_{GS}=V_{DS}; parameter: I_D

Diagram 11: Typ. capacitances



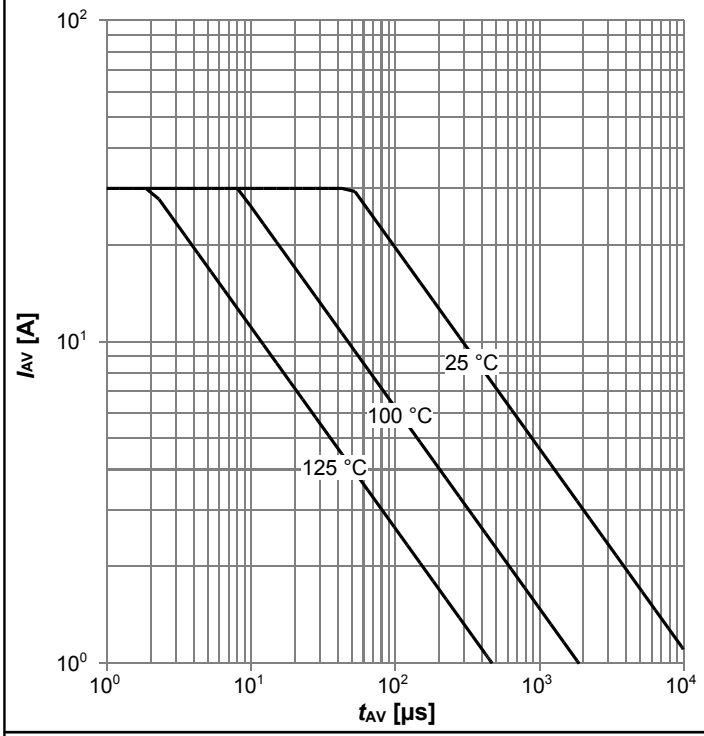
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 12: Forward characteristics of reverse diode



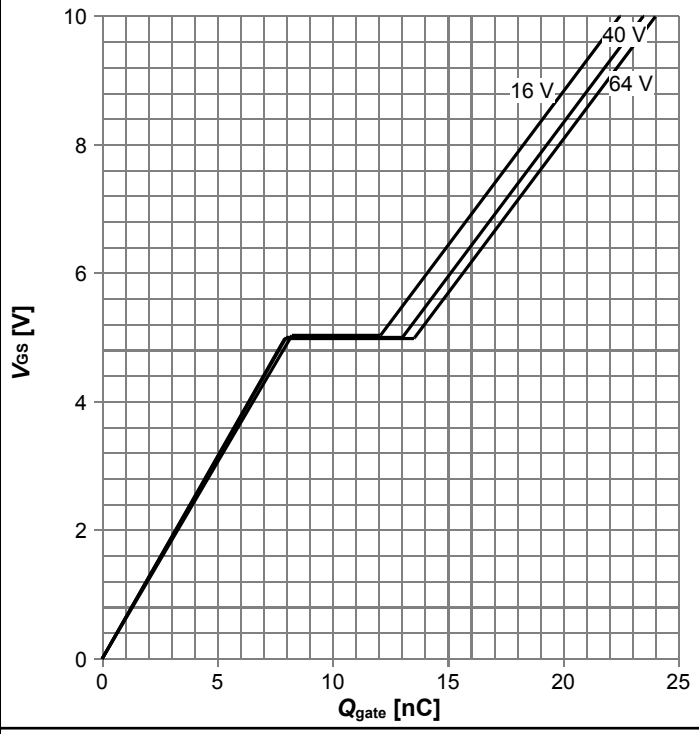
I_F=f(V_{SD}); parameter: T_j

Diagram 13: Avalanche characteristics



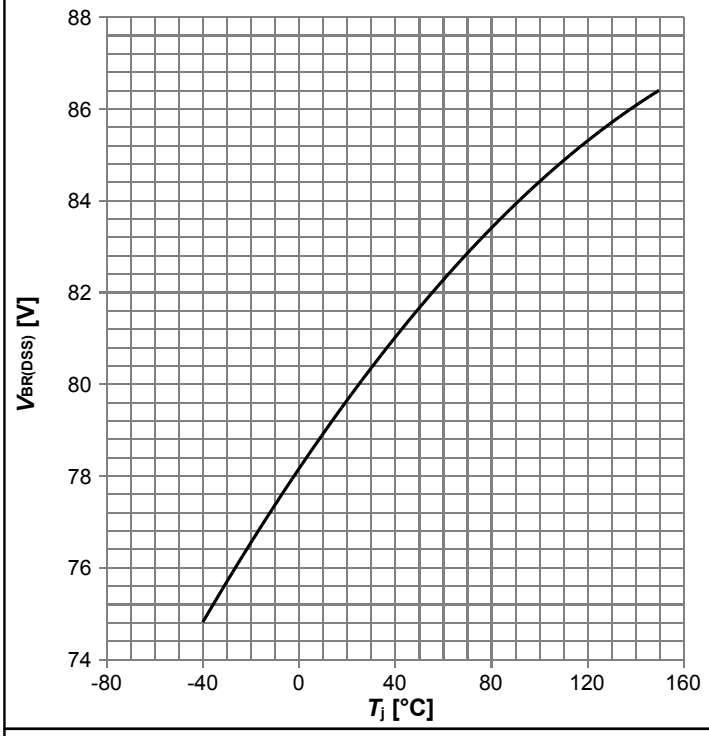
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



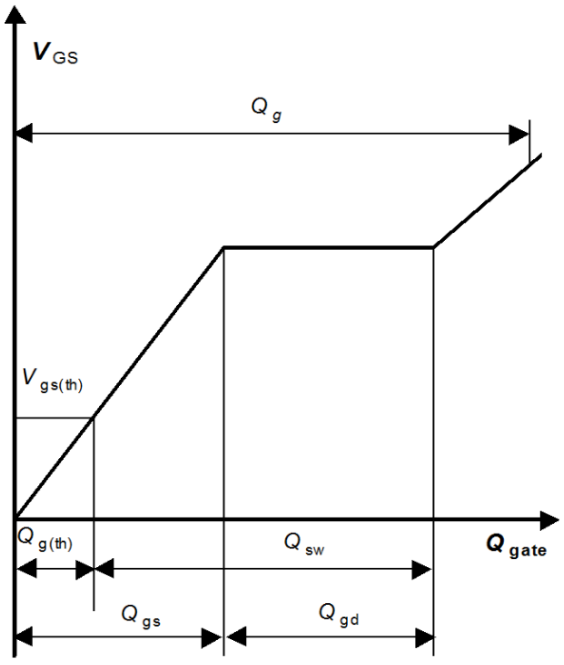
V_{GS}=f(Q_{gate}), I_D=30 A pulsed, T_j=25 °C; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage



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

Diagram Gate charge waveforms



5 Package Outlines

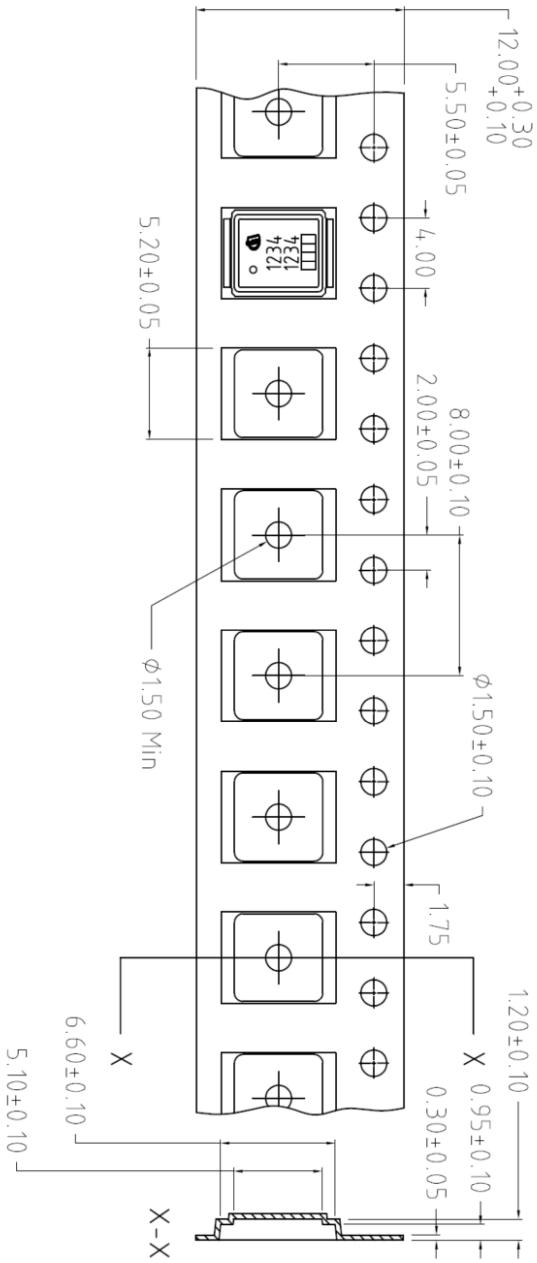


Figure 1 Outline Tape (CanPAK M)

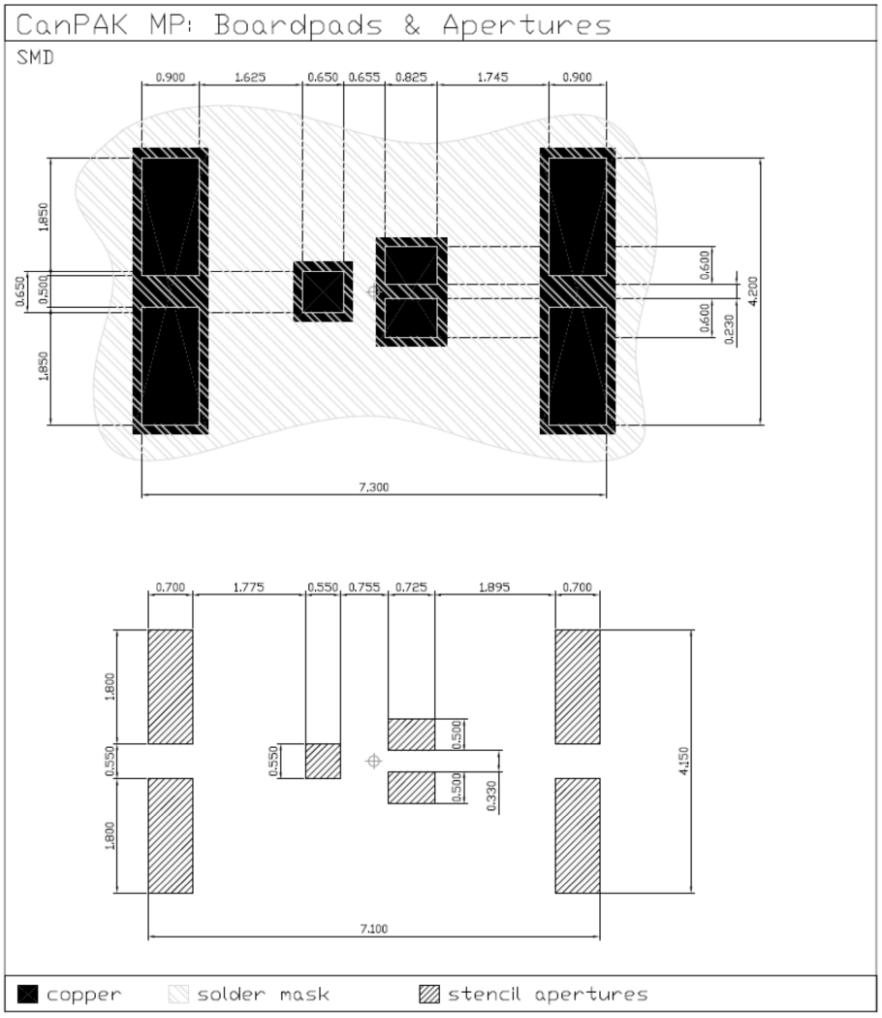
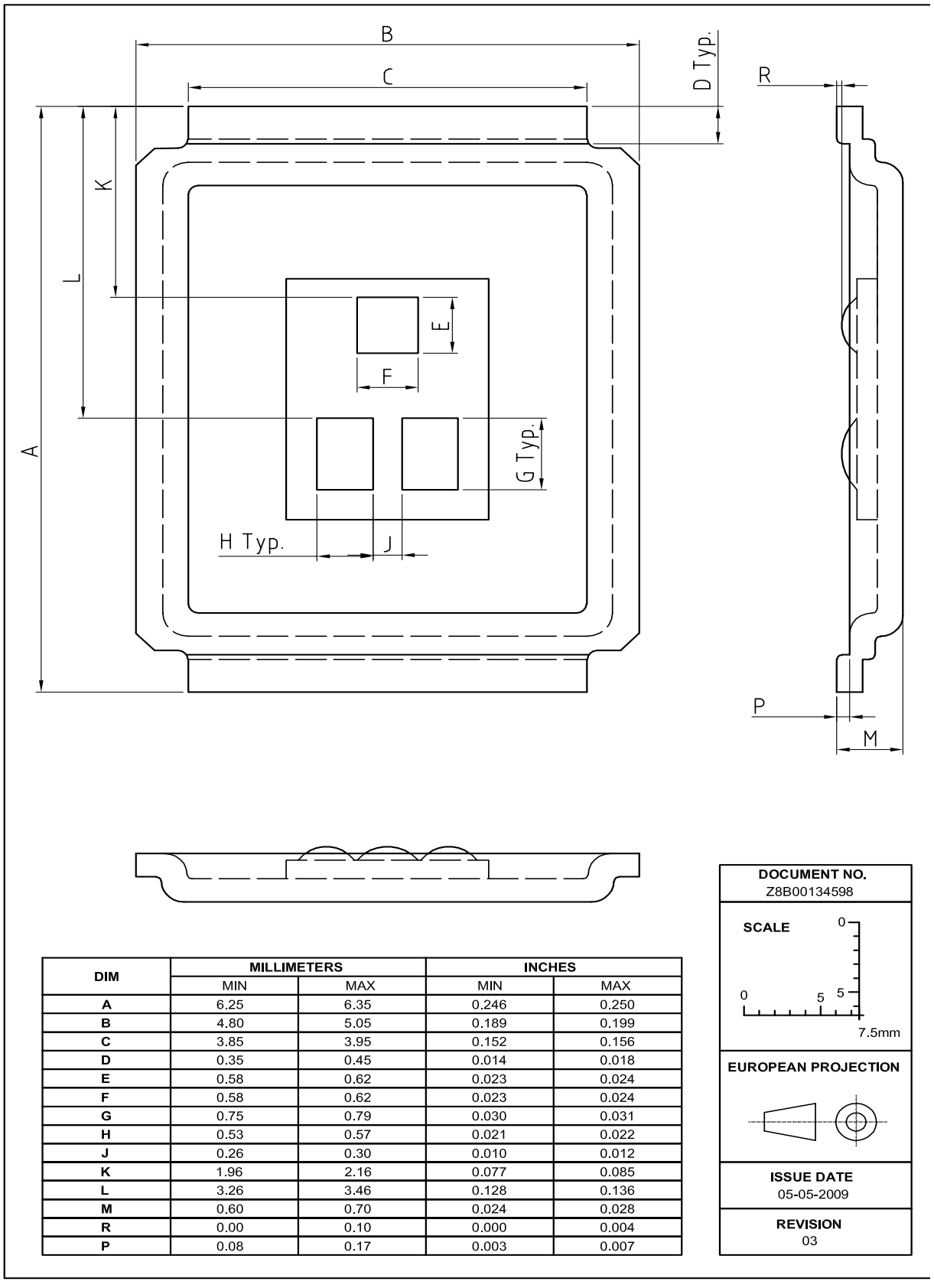


Figure 2 Outline Boardpads (CanPAK M)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.25	6.35	0.246	0.250
B	4.80	5.05	0.189	0.199
C	3.85	3.95	0.152	0.156
D	0.35	0.45	0.014	0.018
E	0.58	0.62	0.023	0.024
F	0.58	0.62	0.023	0.024
G	0.75	0.79	0.030	0.031
H	0.53	0.57	0.021	0.022
J	0.26	0.30	0.010	0.012
K	1.96	2.16	0.077	0.085
L	3.26	3.46	0.128	0.136
M	0.60	0.70	0.024	0.028
R	0.00	0.10	0.000	0.004
P	0.08	0.17	0.003	0.007

DOCUMENT NO.
Z8B00134598

SCALE
0 5 5
7.5mm

EUROPEAN PROJECTION

ISSUE DATE
05-05-2009

REVISION
03

Figure 3 Outline MG-WDSON-2, dimensions in mm/inches

Revision History

BSB104N08NP3 G

Revision: 2018-11-15, Rev. 2.2

Previous Revision		
Revision	Date	Subjects (major changes since last revision)
2.2	2018-11-15	Update model

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