n-Channel Power MOSFET

OptiMOS™
BSB280N15NZ3 G

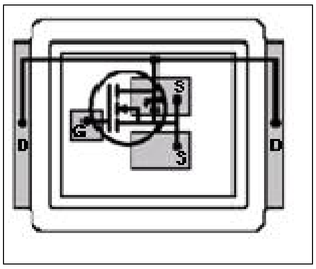
Data Sheet

2.5, 2011-09-16
Final

Industrial & Multimarket

1 Description

OptiMOS™150V products are class leading power MOSFETs for highest power density and energy efficient solutions. Ultra low gate- and output charges together with lowest on state resistance in small footprint packages make OptiMOS™ 150V the best choice for the demanding requirements of voltage regulator solutions in Solar, Drives, Datacom and Telecom applications. Super fast switching Control FETs together with low EMI Sync FETs provide solutions that are easy to design in. OptiMOS™ products are available in high performance packages to tackle your most challenging applications giving full flexibility in optimizing space- efficiency and cost.



Features

- Optimized for high switching frequency DC/DC converter
- Very low on-resistance $R_{DS(on)}$
- Qualified according to JEDEC[1] for target applications
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- Double sided cooling
- Compatible with DirectFET® package MZ footprint and outline
- Low parasitic inductance
- Low profile (<0.7 mm)

Applications

- Synchronous rectification
- Primary side switches
- Power managment for high performance computing
- High power density point of load converters

Table 1 Key Performance Parameters

Parameter	Value	Unit		Related Links
V_{DS}	150	V		IFX OptiMOS webpage
$R_{DS(on),max}$	28	mΩ		IFX OptiMOS product brief
I_D	30	A		IFX OptiMOS spice models
Q_{OSS}	38	nC		IFX Design tools
$Q_{g\cdot typ}$	15			

Type	Package	Marking
BSB280N15NZ3 G	MG-WDSON-2	0215

1) J-STD20 and JESD22

2 Maximum ratings

at T_j = 25 °C, unless otherwise specified.

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	-	-	30	A	V_{GS}=10 V, T_C=25 °C
				19		V_{GS}=10 V, T_C=100 °C
				9		V_{GS}=10 V, T_A=25 °C, R_{thJA}=45 K/W)[1)]
Pulsed drain current[2)]	$I_{D,pulse}$	-	-	120		T_C=25 °C
Avalanche energy, single pulse	E_{AS}	-	-	120	mJ	I_D=30 A,R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	
Power dissipation	P_{tot}	-	-	57	W	T_C=25 °C
				2.8		T_A=25 °C, R_{thJA}=45 K/W[1)]
Operating and storage temperature	T_j,T_{stg}	-40	-	150	°C	
IEC climatic category; DIN IEC 68-1		55/150/56				

1) Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm2 (one layer, 70µm thick) copper area for drain connection. PCB is vertical in still air.

2) See figure 3 for more detailed information

3 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	2.2	K/W	top
			1	-		bottom
Device on PCB	R_{thJA}	-	-	45		6 cm^2 cooling area[1)]

1) Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm2 (one layer, 70µ, thick) copper area for drain conneciton. PCB is vertical in still air.

4 Electrical characteristics

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	$V_{(BR)DSS}$	150	-	-	V	V_{GS}=0 V, I_D=1.0 mA
Gate threshold voltage	$V_{GS(th)}$	2	3	4		V_{DS}=V_{GS}, I_D=60 µA
Zero gate voltage drain current	I_{DSS}	-	0.1	10	µA	V_{DS}=120 V, V_{GS}=0 V, T_j=25 °C
		-	10	100		V_{DS}=120 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	$R_{DS(on)}$	-	24	28	mΩ	V_{GS}=10 V, I_D=30A
			24	32		V_{GS}=8 V, I_D=15A
Gate resistance	R_G	-	0.6	-	Ω	
Transconductance	g_{fs}	18	37		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}	-	1200	1600	pF	V_{GS}=0 V, V_{DS}=75V, f=1 MHz
Output capacitance	C_{oss}	-	180	240		
Reverse transfer capacitance	C_{rss}	-	4	-		
Turn-on delay time	$t_{d(on)}$	-	9	-	ns	V_{DD}=75V, V_{GS}=10 V, I_D=30 A, R_G= 1.6 Ω
Rise time	t_r	-	6	-		
Turn-off delay time	$t_{d(off)}$	-	16	-		
Fall time	t_f	-	3	-		

Table 6 Gate charge characteristics[1)]

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	7	-	nC	V_{DD}=75 V, I_D=30 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	2.6	-		
Switching charge	Q_{sw}	-	7	-		
Gate charge total	Q_g	-	15	21		
Gate plateau voltage	$V_{plateau}$	-	5.6	-	V	
Output charge	Q_{oss}		41	55		V_{DD}=75 V, V_{GS}=0 V

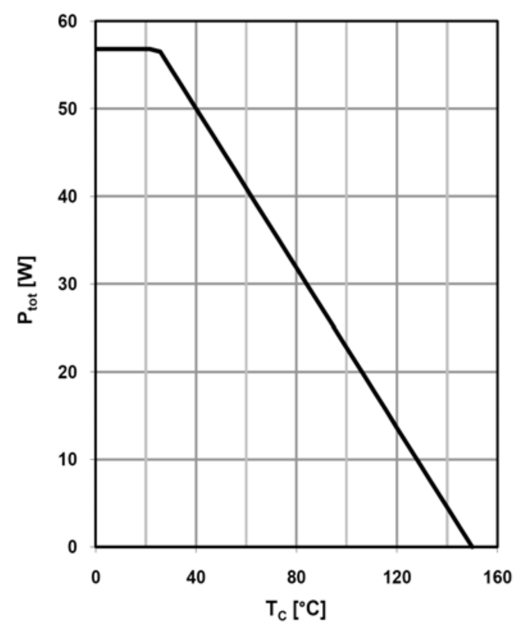
1) See figure 16 for gate charge parameter definition

Table 7 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_s			47	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$			120		
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=47 A, T_j=25 °C
Reverse recovery time	t_{rr}	-	100	-	nC	V_R=75 V, I_F=*30A*, di_F/dt=100 A/µs
Reverse recovery charge	Q_{rr}		314			

5 Electrical characteristics diagrams

Table 8

<table>
<tr><th>1 Power dissipation</th><th>2 Drain current</th></tr>
<tr><td>


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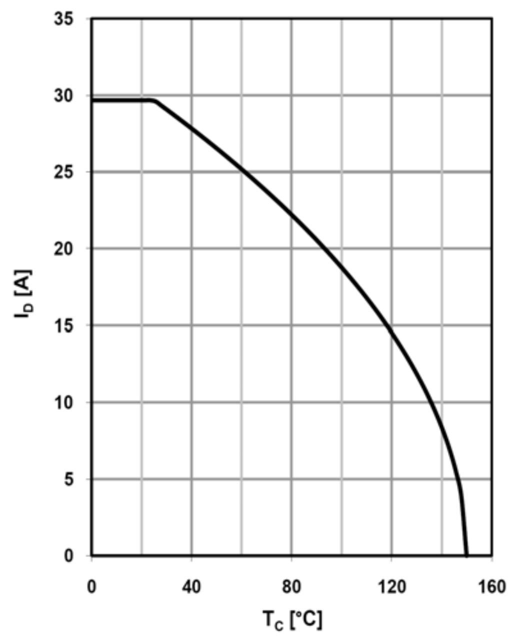
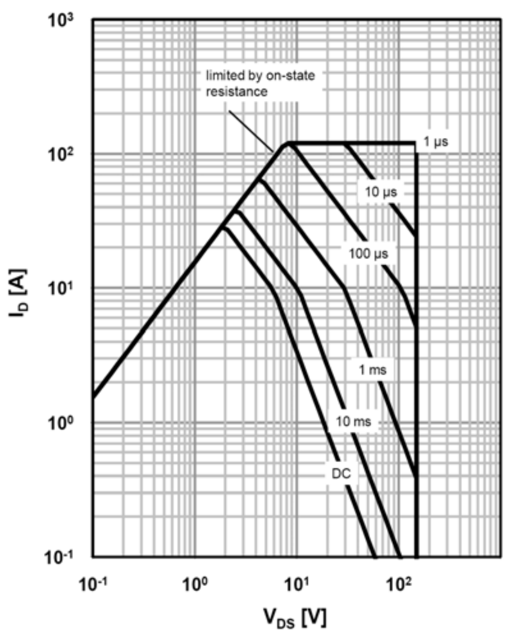


</td></tr>
<tr><td>$P_{tot} = f(T_C)$</td><td>$I_D=f(T_C)$; parameter: V_{GS}</td></tr>
</table>

Table 9

<table>
<tr><th>3 Safe operating area T_C=25 °C</th><th>4 Max. transient thermal impedance</th></tr>
<tr><td>


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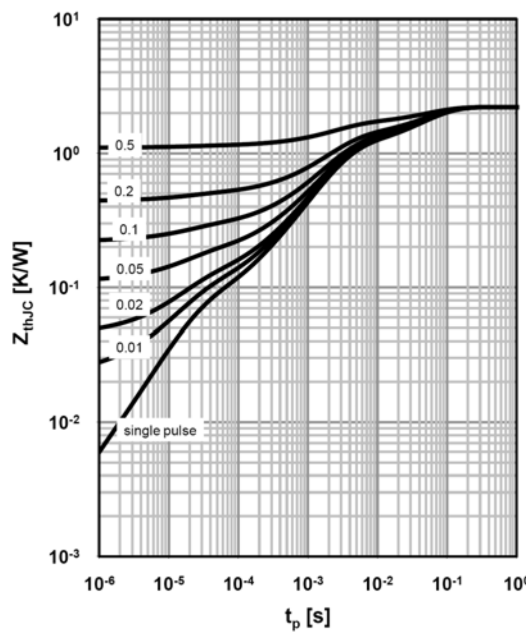


</td></tr>
<tr><td>$I_D=f(V_{DS})$; T_j=25 °C; D=0; parameter: T_p</td><td>$Z_{(thJC)}=f(t_p)$; parameter: D=t_p/T</td></tr>
</table>

Table 10

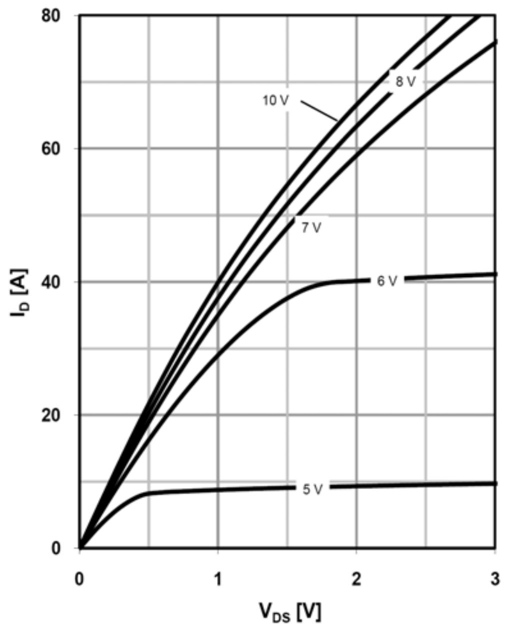
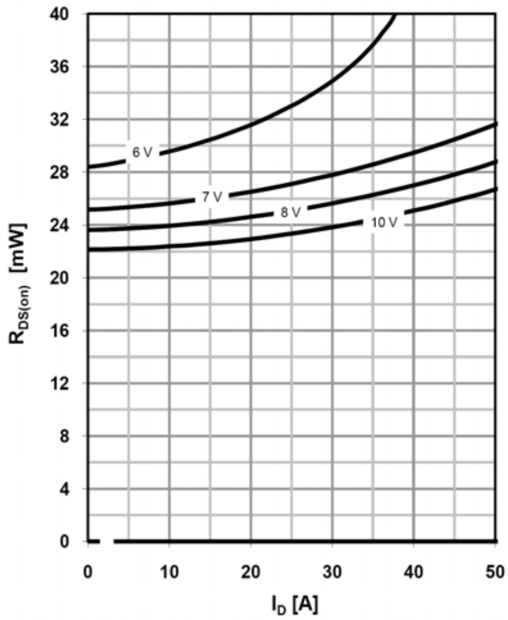
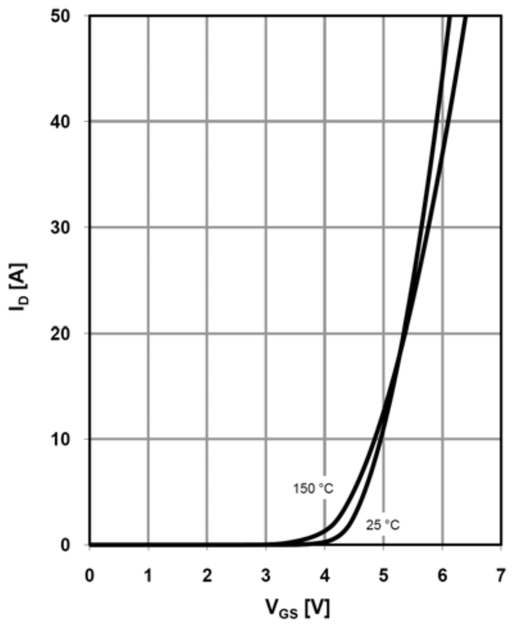
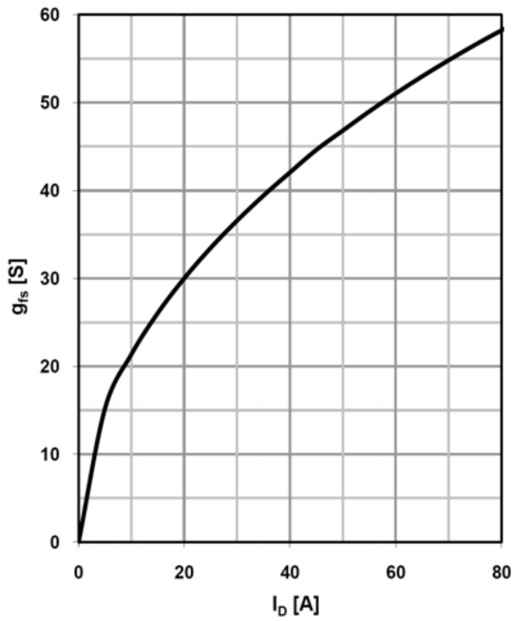
<table>
<tr><th>5 Typ. output characteristics T_C=25 °C</th><th>6 Typ. drain-source on-state resistance</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}</td><td>$R_{DS(on)}$=f(I_D); T_j=25 °C; parameter: V_{GS}</td></tr>
</table>

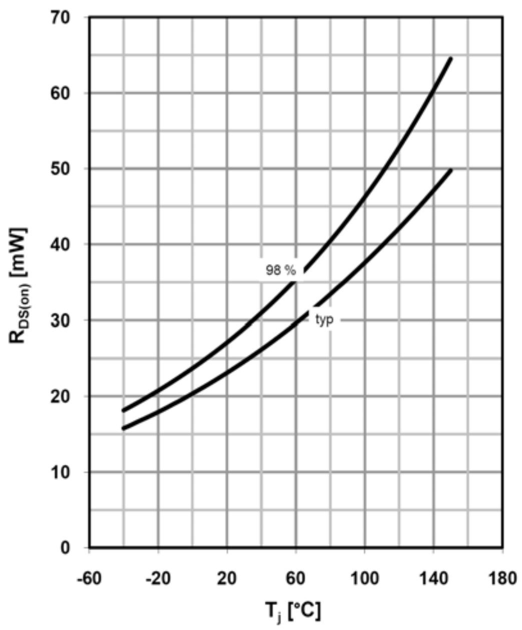
Table 11

<table>
<tr><th>7 Typ. transfer characteristics</th><th>8 Typ. forward transconductance</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>I_D=f(VGS); $|V_{DS}|$>2$|I_D|R_{DS(on)max}$</td><td>g_{fs}=f(I_D); T_j=25 °C</td></tr>
</table>

Electrical characteristics diagrams

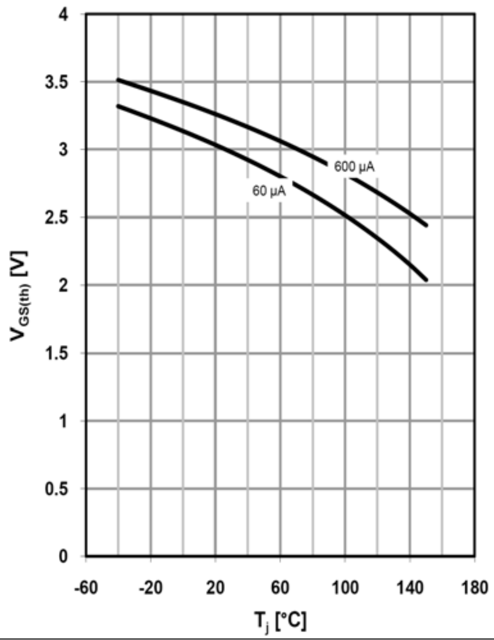
Table 12

9 Drain-source on-state resistance



$R_{DS(on)}$=f(T_j); I_D=30 A; V_{GS}=10 V

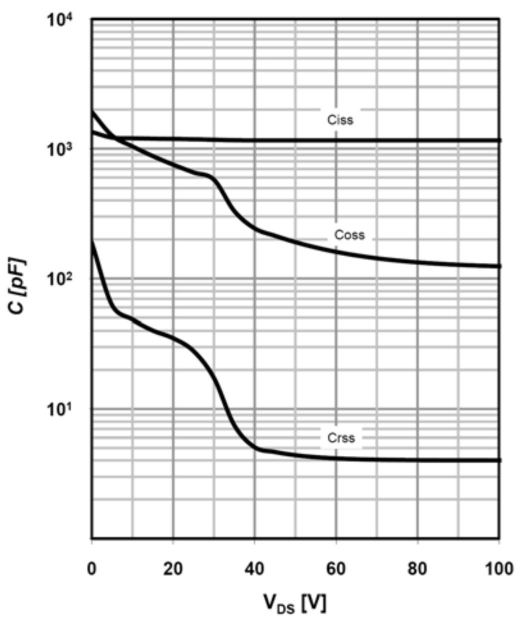
10 Typ. gate threshold voltage



$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=250 µA

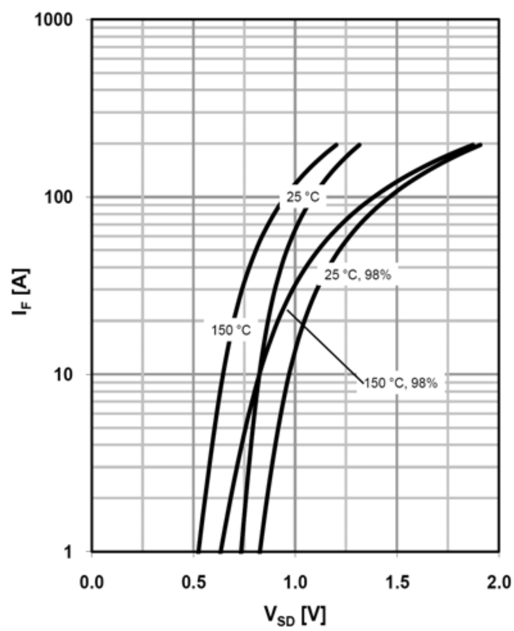
Table 13

11 Typ. capacitances



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

12 Forward characteristics of reverse diode



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

Table 14

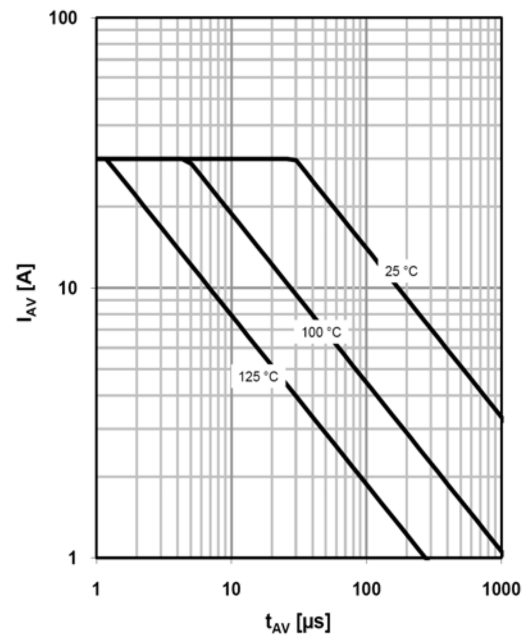
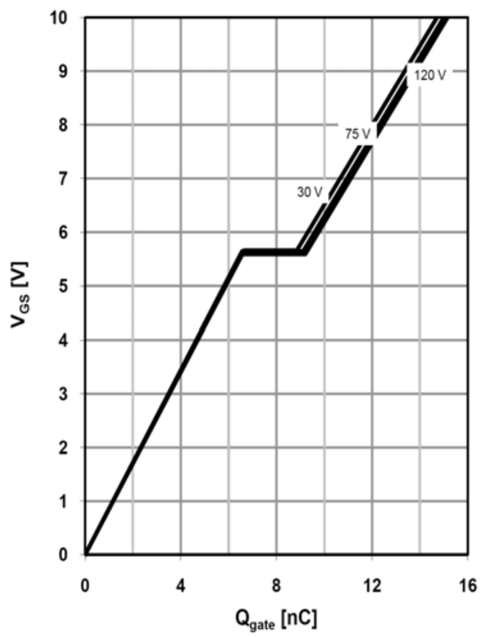
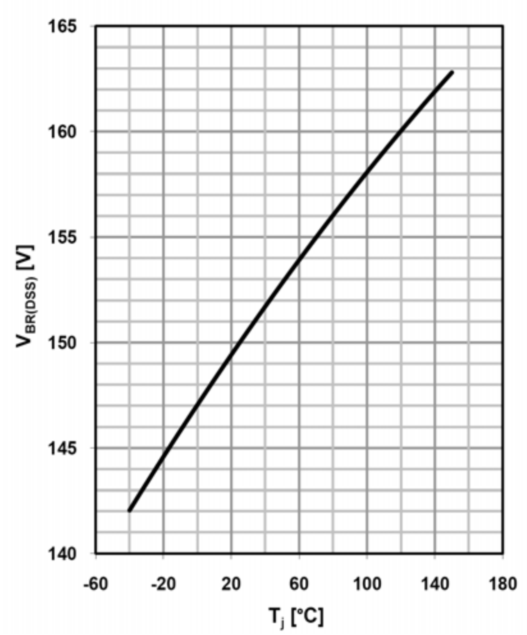
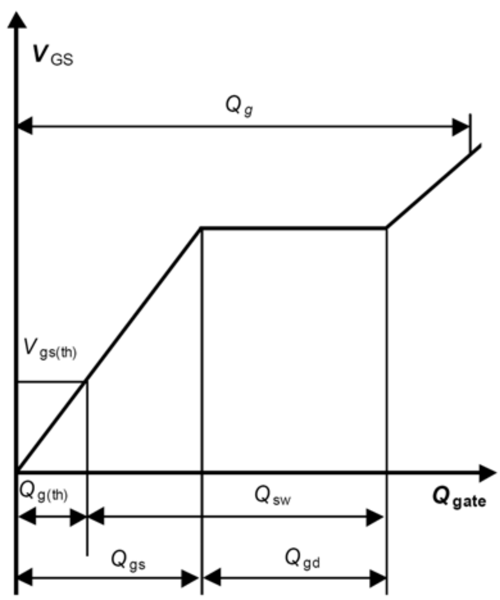
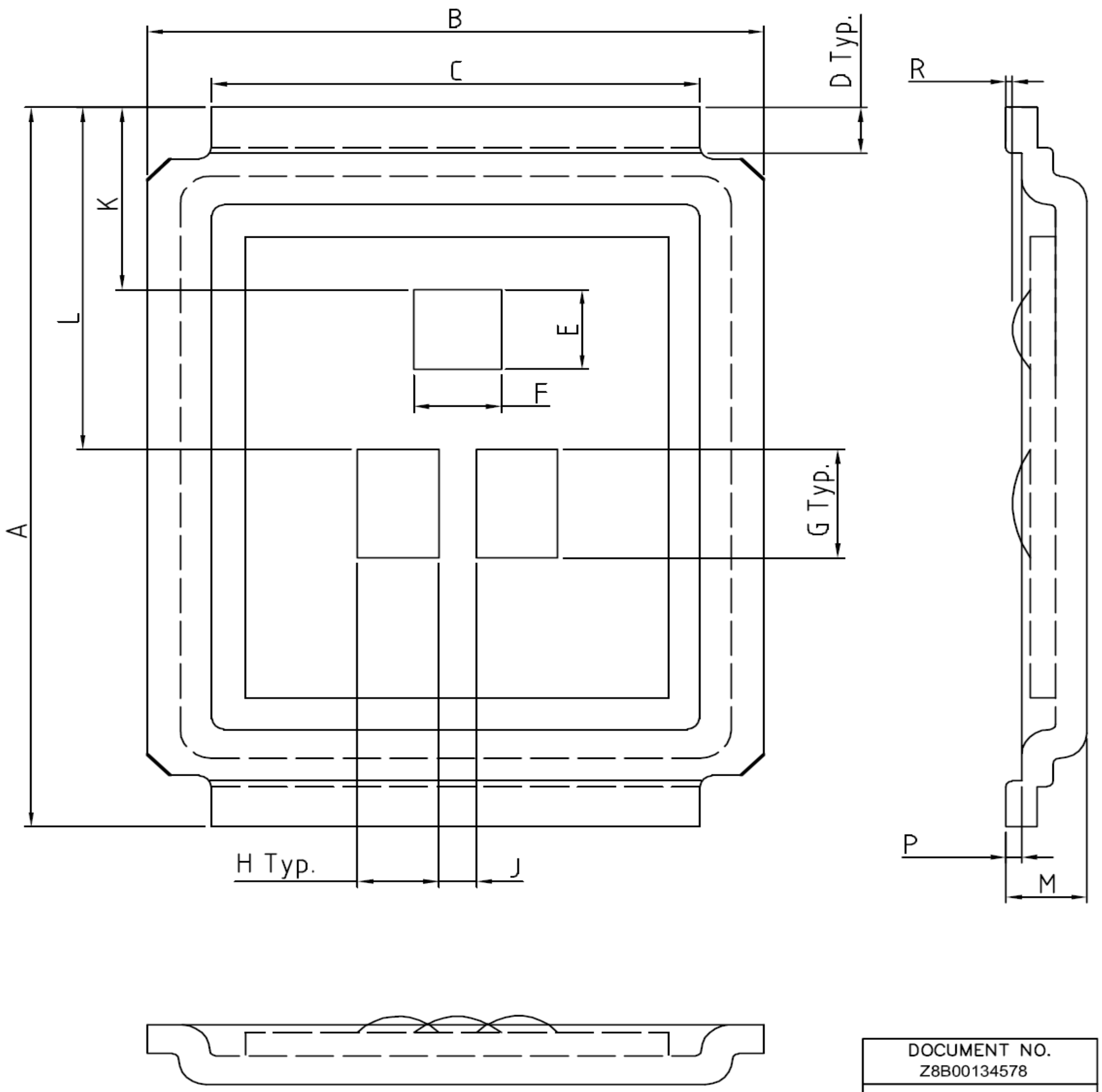
13 Avalanche characteristics	14 Typ. gate charge
	
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j(start)}$	V_{GS}=f(Q_{gate}); I_D=30 A pulsed; parameter: V_{DD}

Table 15

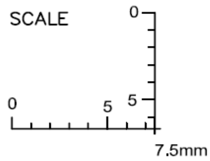
15 Drain-source breakdown voltage	16 Gate charge waveforms
	
$V_{BR(DSS)}$=f(T_j); I_D=1 mA	

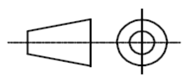
6 Package outlines



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	0.68	0.72	0.027	0.028
F	0.68	0.72	0.027	0.028
G	0.93	0.97	0.037	0.038
H	0.63	0.67	0.025	0.026
J	0.28	0.32	0.011	0.013
K	1.50	1.70	0.059	0.067
L	2.90	3.10	0.114	0.122
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.
Z8B00134578

SCALE


EUROPEAN PROJECTION


ISSUE DATE
05-05-2009

REVISION
03

Figure 1 Outlines MG-WDSON-2, dimensions in mm/inches

7 Package outlines

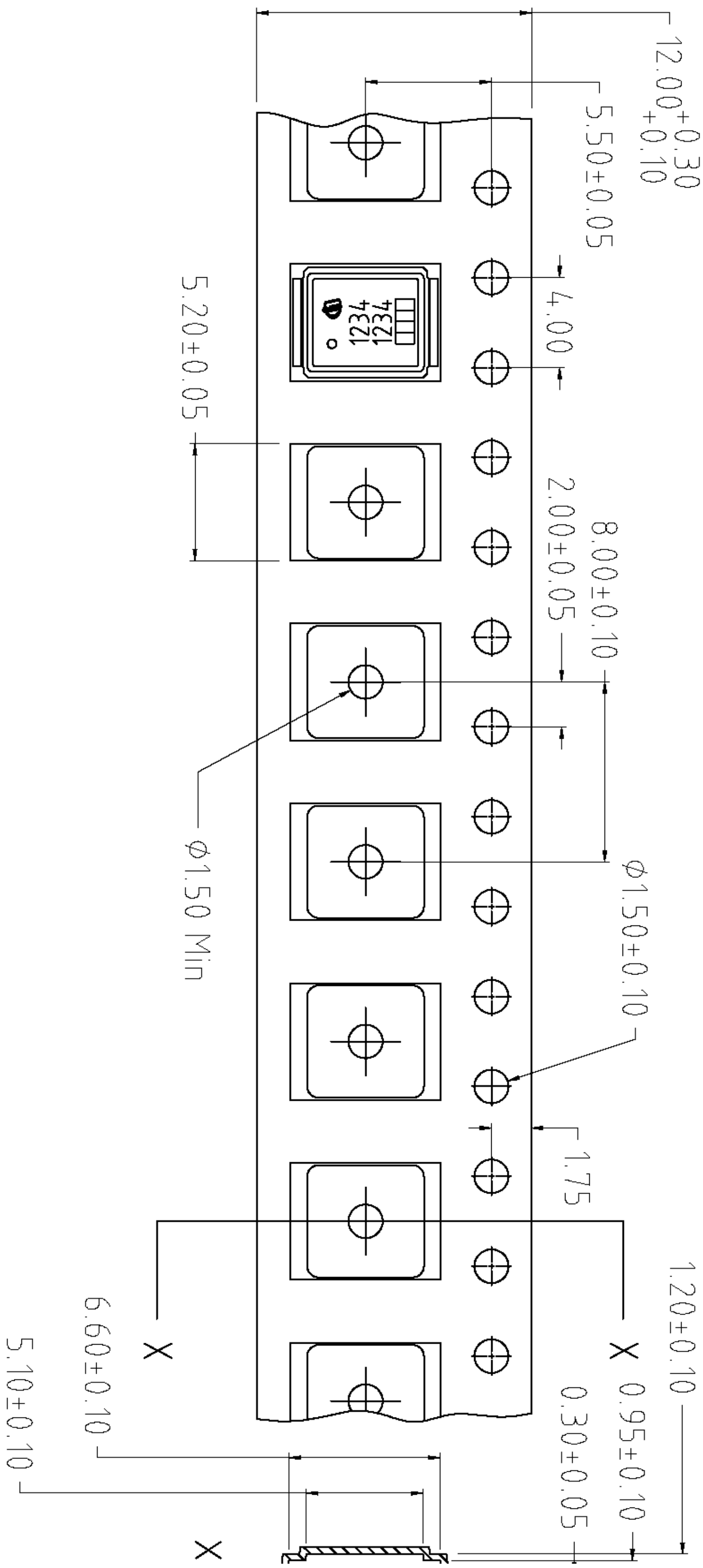


Figure 2 Outlines MG-WDSON-2, dimensions in mm/inches

8 Package outlines

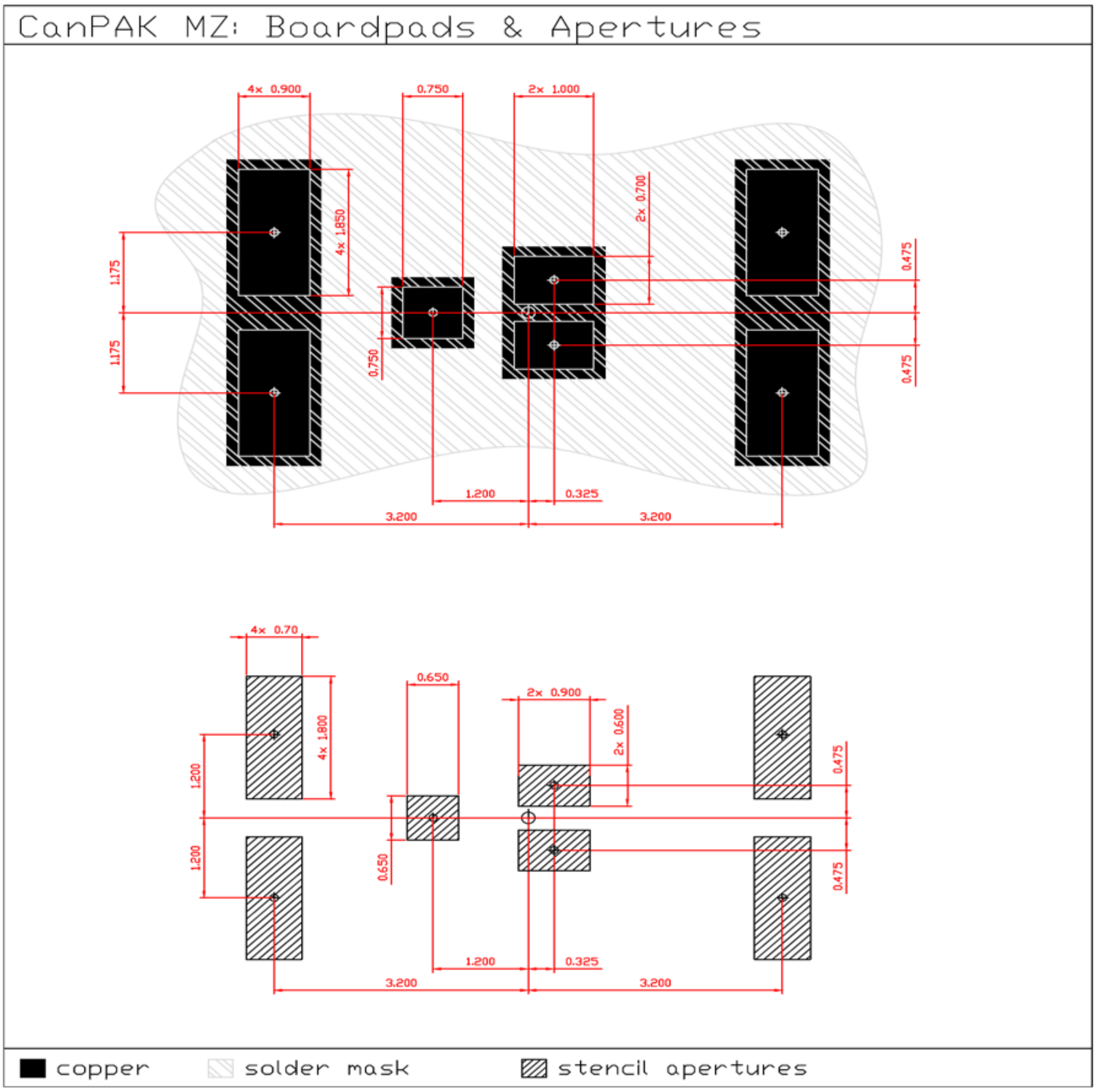
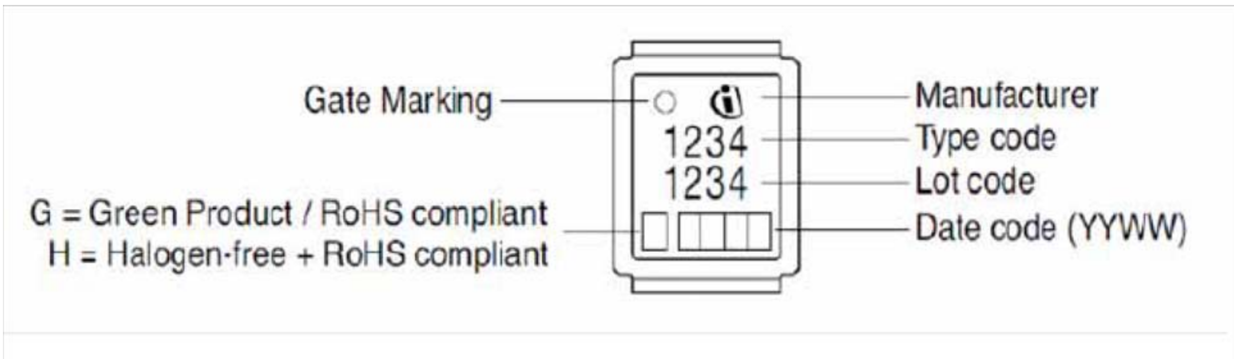


Figure 3 Outlines MG-WDSON-2, dimensions in mm/inches

9 Marking layout



9 Revision History

Revision History: 2011-09-16, 2.5

Previous Revision:

Revision	Subjects (major changes since last revision)
0.1	Release of target data sheet
2.2	Release Final version
2.3	Formating
2.4	DirectFET Disclaimer expired

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