

# n-Channel Power MOSFET

OptiMOS™  
BSB056N10NN3 G

## Data Sheet

2.5, 2011-05-27  
Final

Industrial & Multimarket

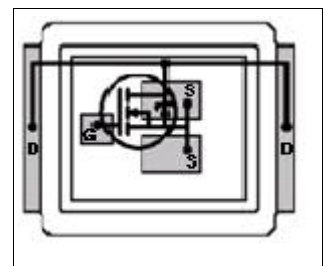
## 1 Description

OptiMOS™100V 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™ 100V 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
- Excellent  $Q_g \times R_{DS(on)}$  product (FOM)
- Very low on-resistance  $R_{DS(on)}$
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- Double sided cooling
- Compatible with DirectFET® package MN footprint and outline
- Low parasitic inductance
- Low profile (<0.7 mm)



### Applications

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



**Table 1 Key Performance Parameters**

Parameter	Value	Unit	Related Links
$V_{DS}$	100	V	<a href="#">IFX OptiMOS webpage</a> <a href="#">IFX OptiMOS product brief</a> <a href="#">IFX OptiMOS spice models</a> <a href="#">IFX Design tools</a>
$R_{DS(on),max}$	5.6	mΩ	
$I_D$	83	A	
$Q_{OSS}$	73	nC	
$Q_{g,typ}$	56		

Type	Package	Marking
BSB056N10NN3 G	MG-WDSO-2	0110

## 2 Maximum ratings

at  $T_j = 25\text{ °C}$ , unless otherwise specified.

**Table 2 Maximum ratings**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	$I_D$	-	-	83	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C}$
				52		$V_{GS}=10\text{ V}, T_C=100\text{ °C}$
				9		$V_{GS}=10\text{ V}, T_A=25\text{ °C}, R_{thJA}=45\text{ K/W})^{1)}$
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	-	-	332		$T_C=25\text{ °C}$
Avalanche energy, single pulse	$E_{AS}$	-	-	450	mJ	$I_D=30\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	$V_{GS}$	-20	-	20	V	
Power dissipation	$P_{tot}$	-	-	78	W	$T_C=25\text{ °C}$
				2.8		$T_A=25\text{ °C}, R_{thJA}=45^{1)})\text{ K/W}$
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 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  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	$R_{thJC}$	-	-	1.6	K/W	top
		-	1	-		bottom
Device on PCB	$R_{thJA}$	-	-	45		6 cm <sup>2</sup> cooling area <sup>1)</sup>

1) 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.

## 4 Electrical characteristics

Electrical characteristics, at  $T_J=25\text{ °C}$ , unless otherwise specified.

**Table 4 Static characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	$V_{GS}=0\text{ V}$ , $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2	2.7	3.5		$V_{DS}=V_{GS}$ , $I_D=100\text{ }\mu\text{A}$
Zero gate voltage drain current	$I_{DSS}$	-	0.1	10	$\mu\text{A}$	$V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_J=25\text{ °C}$
		-	10	100		$V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_J=125\text{ °C}$
Gate-source leakage current	$I_{GSS}$	-	10	100	nA	$V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	5	5.6	m $\Omega$	$V_{GS}=10\text{ V}$ , $I_D=30\text{ A}$
		-	6.2	8.1		$V_{GS}=6\text{ V}$ , $I_D=15\text{ A}$
Gate resistance	$R_G$	-	0.5	-	$\Omega$	
Transconductance	$g_{fs}$	34	69		S	$ V_{DS}  > 2 I_D R_{DS(on)max}$ , $I_D=30\text{ A}$

**Table 5 Dynamic characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	$C_{iss}$	-	4100	5500	pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , $f=1\text{ MHz}$
Output capacitance	$C_{oss}$	-	750	1000		
Reverse transfer capacitance	$C_{rSS}$	-	27	-		
Turn-on delay time	$t_{d(on)}$	-	15	-	ns	$V_{DD}=50\text{ V}$ , $V_{GS}=10\text{ V}$ , $I_D=30\text{ A}$ , $R_G=1.6\text{ }\Omega$
Rise time	$t_r$	-	9	-		
Turn-off delay time	$t_{d(off)}$	-	25	-		
Fall time	$t_f$	-	8	-		

**Table 6 Gate charge characteristics<sup>1)</sup>**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	$Q_{gs}$	-	17	-	nC	$V_{DD}=50\text{ V}$ , $I_D=30\text{ A}$ , $V_{GS}=0\text{ to }10\text{ V}$
	$Q_{gd}$		9.7			
Gate to drain charge	$Q_{sw}$	-	20	-		
Switching charge	$Q_g$	-	56	74		
Gate charge total	$V_{plateau}$	-	4.2	-		
Output charge	$Q_{oss}$		73	97	nC	$V_{DD}=50\text{ V}$ , $V_{GS}=0\text{ V}$

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	$I_s$			65	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$			316		
Diode forward voltage	$V_{SD}$	-	0.9	1.2	V	$V_{GS}=0\text{ V}$ , $I_F=I_S$ , $T_j=25\text{ °C}$
Reverse recovery charge	$Q_{rr}$	-	174	-	nC	$V_R=50\text{ V}$ , $I_F=30\text{ A}$ , $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery time	$t_{rr}$	-	64	-	ns	

## 5 Electrical characteristics diagrams

Table 8

1 Power dissipation	2 Drain current
$P_{\text{tot}} = f(T_c)$	$I_D = f(T_c)$ ; parameter: $V_{GS}$

Table 9

3 Safe operating area $T_c = 25^\circ\text{C}$	4 Max. transient thermal impedance
$I_D = f(V_{DS})$ ; $T_J = 25^\circ\text{C}$ ; $D = 0$ ; parameter: $T_p$	$Z_{\text{thJC}} = f(t_p)$ ; parameter: $D = t_p / T$



Table 10

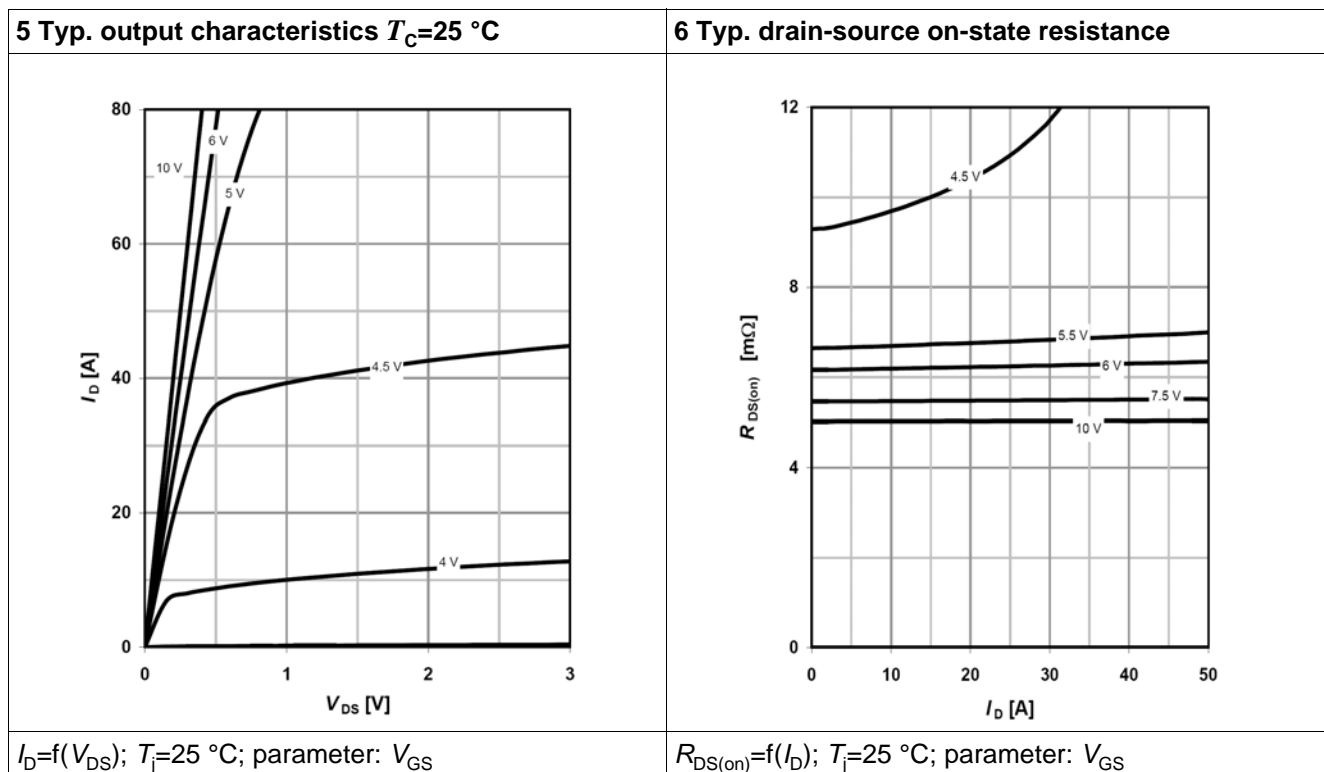


Table 11

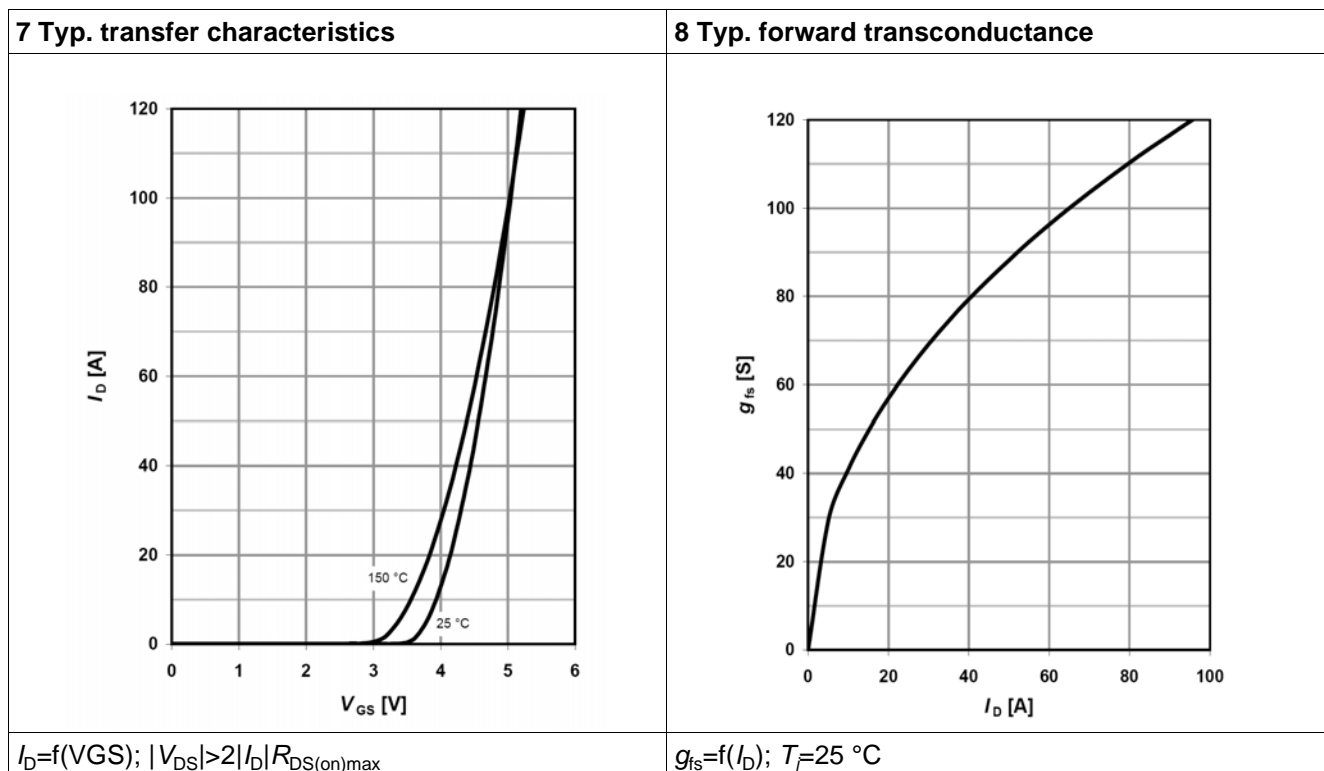


Table 12

<p><b>9 Drain-source on-state resistance</b></p> <p><math>R_{DS(on)} = f(T_j); I_D = 30 \text{ A}; V_{GS} = 10 \text{ V}</math></p>	<p><b>10 Typ. gate threshold voltage</b></p> <p><math>V_{GS(th)} = f(T_j); V_{GS} = V_{DS};</math></p>
---	--

Table 13

<p><b>11 Typ. capacitances</b></p> <p><math>C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}</math></p>	<p><b>12 Forward characteristics of reverse diode</b></p> <p><math>I_F = f(V_{SD}); \text{parameter: } T_j</math></p>
---	---



Table 14

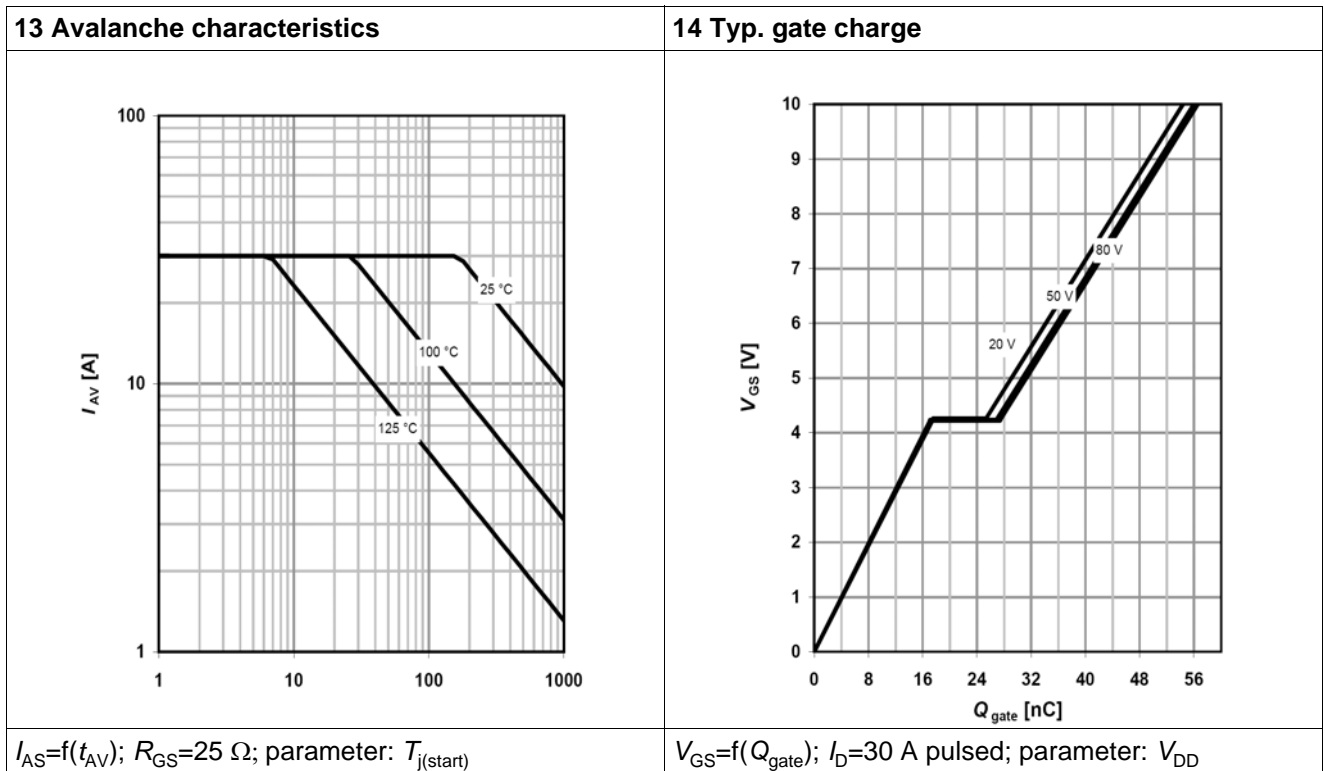
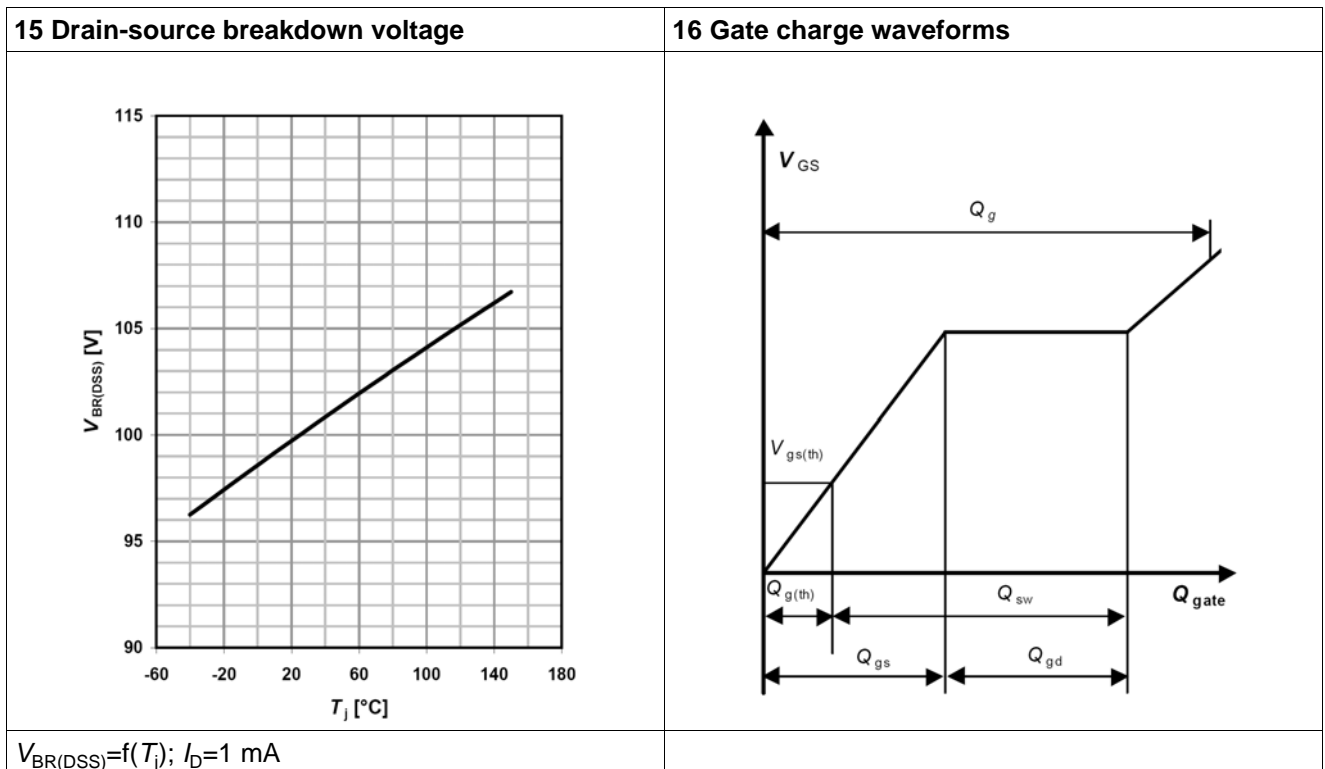


Table 15



## 6 Package outlines

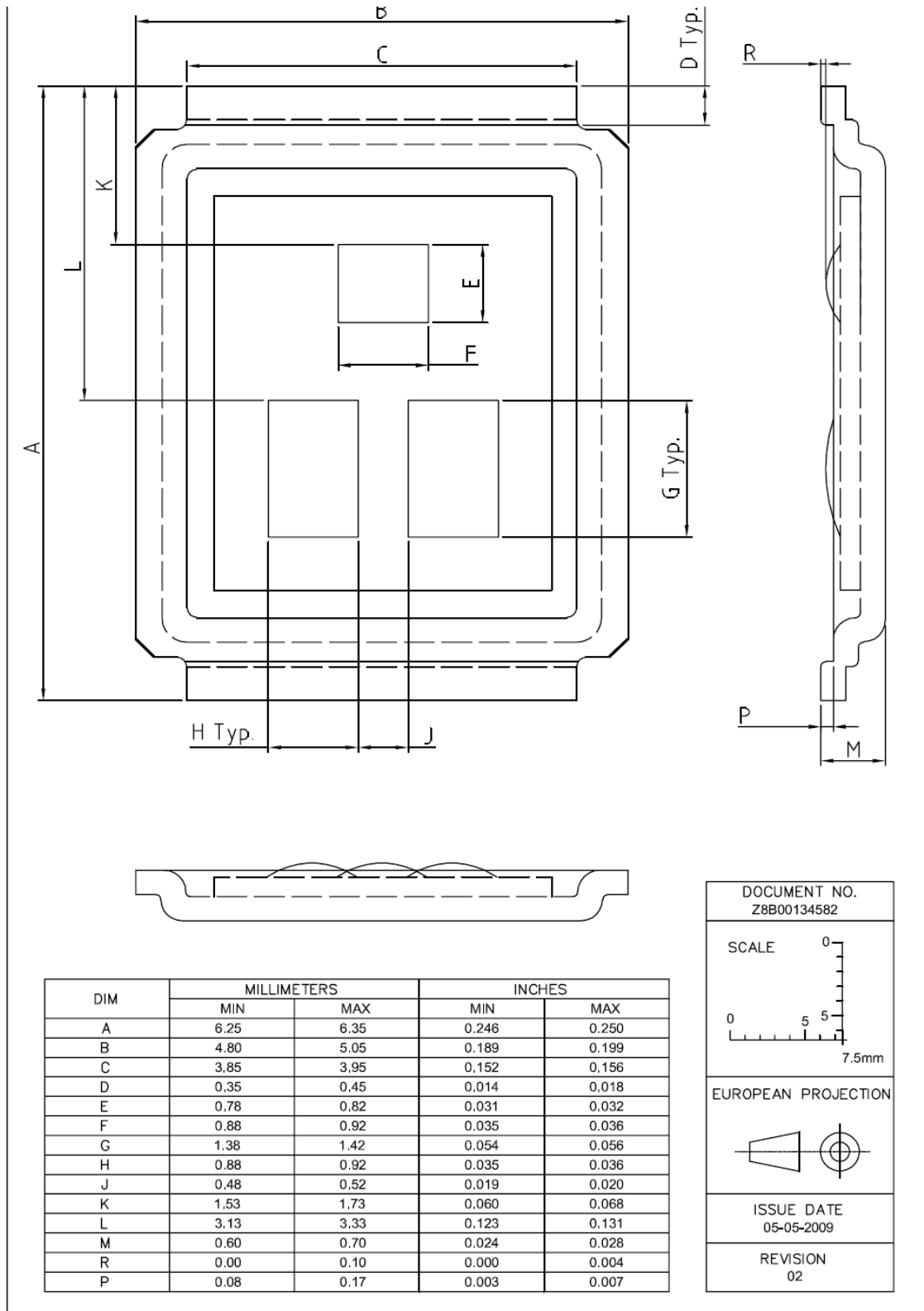


Figure 1 Outlines MG-WDSO-2, dimensions in mm/inches

7 Package outlines

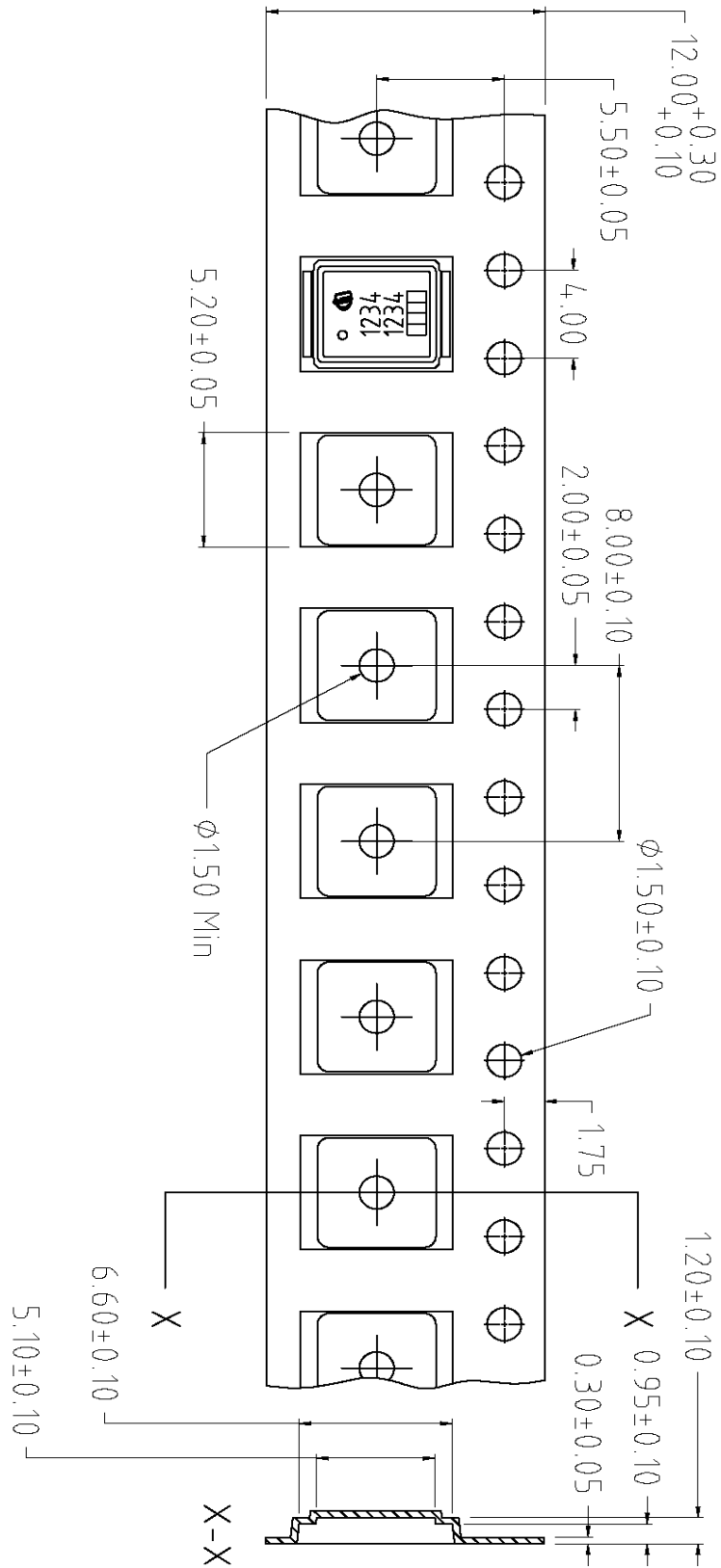
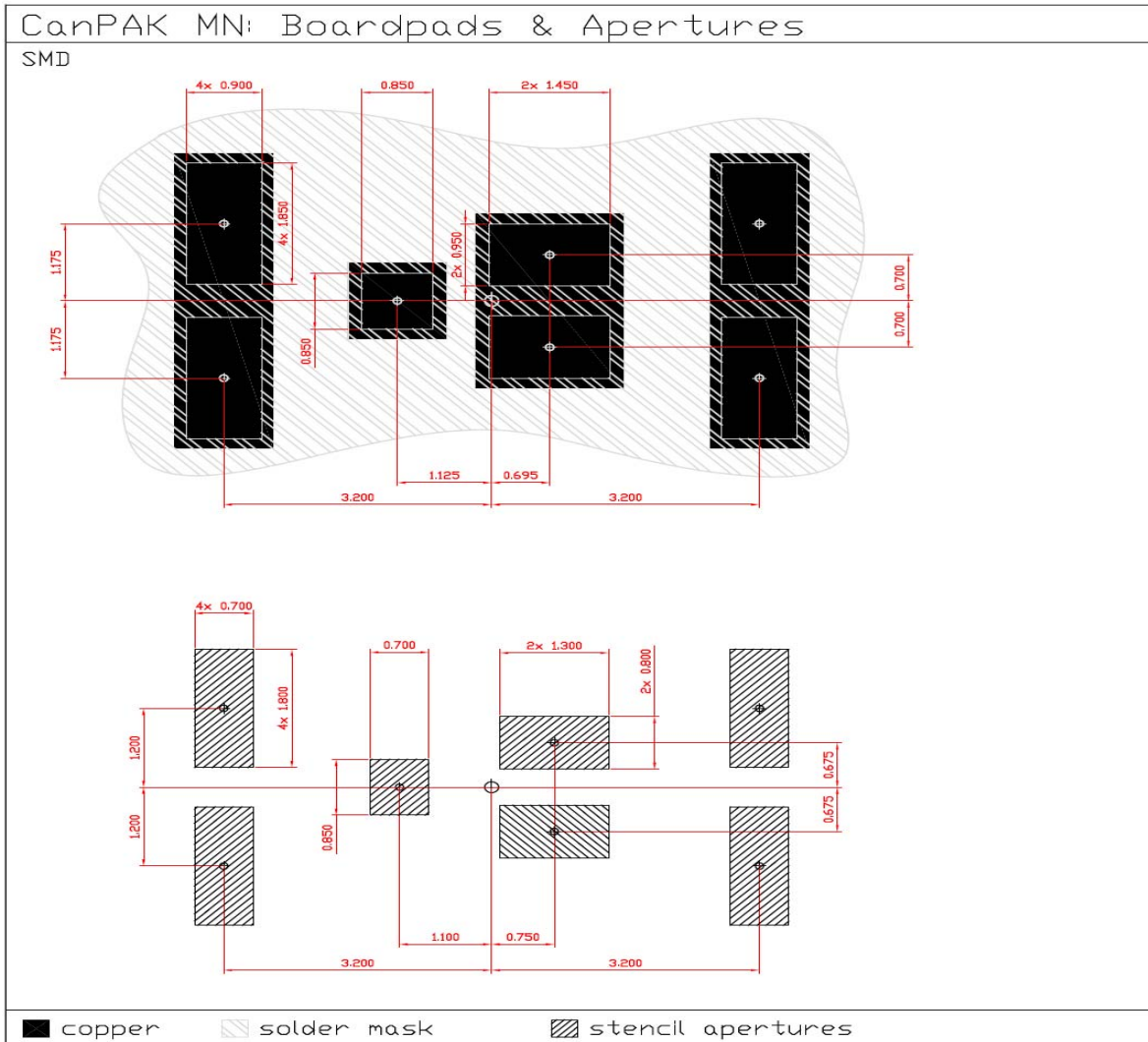
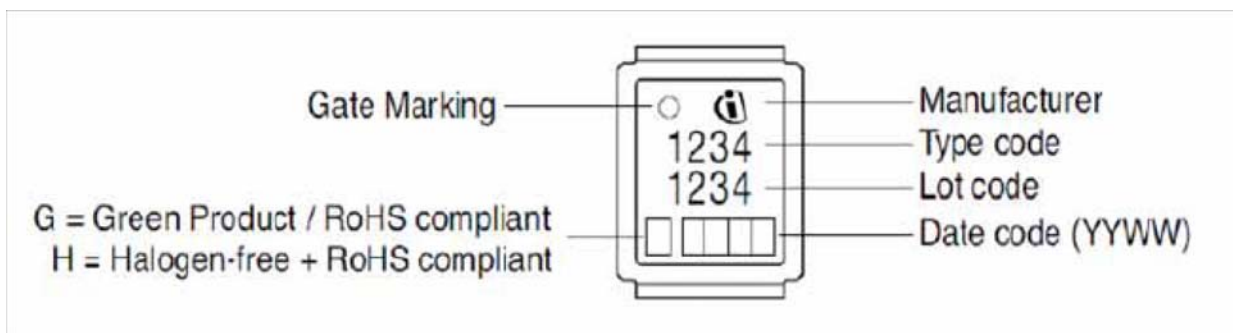


Figure 2 Outlines MG-WDSO-2, dimensions in mm/inches

## 8 Package outlines



## 9 Package outlines



## 9 Revision History

Revision History: 2011-05-27, 2.5

Previous Revision:

Revision	Subjects (major changes since last revision)
0.1	Release of target data sheet
2.0	Release of Final data sheet
2.3	Package outlines errata corrections
2.4	DirectFET Disclaimer expired

### We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all?

Your feedback will help us to continuously improve the quality of this document.

Please send your proposal (including a reference to this document) to: [erratum@infineon.com](mailto:erratum@infineon.com)



Edition 2011-05-27

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2011 Infineon Technologies AG

All Rights Reserved.

### Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

### Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

### Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support, automotive, aviation and aerospace device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered..

单击下面可查看定价，库存，交付和生命周期等信息

[>>Infineon Technologies\(英飞凌\)](#)

[>>点击查看相关商品](#)