MOSFET

Metal Oxide Semiconductor Field Effect Transistor

OptiMOS™

OptiMOS™ Power-MOSFET, 25 V
BSB012NE2LXI

Data Sheet

Rev. 2.1
Final

Power Management & Multimarket

1 Description

CanPAK M-size

Features

- Optimized SyncFET for high performance Buck converter
- Integrated monolithic Schottky like diode
- Low profile (<0.7 mm)
- 100% avalanche tested
- 100% R_G Tested
- Double-sided cooling
- Compatible with DirectFET® package MX footprint and outline [1)]
- Qualified according to JEDEC[2)] for target applications
- Pb-free lead plating; RoHS compliant

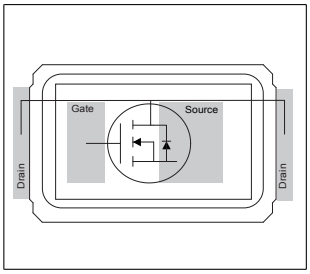


Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	25	V
$R_{DS(on),max}$	1.2	mΩ
I_D	170	A
Q_{oss}	39	nC
Q_g(0V..10V)	62	nC

Type / Ordering Code	Package	Marking	Related Links
BSB012NE2LXI	MG-WDSON-2	05E2	-

[1)] CanPAK™ uses DirectFET ® technology licensed from International Rectifier Corporation. DirectFET® is a registered trademark of International Rectifier Corporation.
[2)] J-STD20 and JESD22

Table of Contents

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	- - -	- - -	170 107 37	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)]	$I_{D,pulse}$	-	-	400	A	T_C=25 °C
Avalanche current, single pulse[3)]	I_{AS}	-	-	40	A	T_C=25 °C
Avalanche energy, single pulse	E_{AS}	-	-	130	mJ	I_D=40 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	- -	- -	57 2.8	W	T_C=25 °C T_A=25 °C, R_{thJA}=45 K/W
Operating and storage temperature	T_j, T_{stg}	-40	-	150	°C	IEC climatic category; DIN IEC 68-1: 40/150/56

3 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}	-	-	2.2	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 cm2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.
[2)] See figure 3 for more detailed information
[3)] See figure 13 for more detailed information

4 Electrical characteristics

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	25	-	-	V	V_{GS}=0 V, I_D=10 mA
Breakdown voltage temperature coefficient	$dV_{(BR)DSS}/dT_j$	-	15	-	mV/K	I_D=10 mA, referenced to 25 °C
Gate threshold voltage	$V_{GS(th)}$	1.2	-	2	V	V_{DS}=V_{GS}, I_D=250 µA
Zero gate voltage drain current, T_j=25 °C	I_{DSS}	-	25	500	µA	V_{DS}=20 V, V_{GS}=0 V
Zero gate voltage drain current, T_j=125 °C	I_{DSS}	-	4	-	mA	V_{DS}=20 V, V_{GS}=0 V
Gate-source leakage current	I_{GSS}	-	10	100	nA	V_{GS}=20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	- -	1.3 1.0	1.6 1.2	mΩ	V_{GS}=4.5 V, I_D=30 A V_{GS}=10 V, I_D=30 A
Gate resistance	R_G	0.3	0.6	1.2	Ω	-
Transconductance	g_{fs}	95	190	-	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}	-	4400	5900	pF	V_{GS}=0 V, V_{DS}=12 V, f=1 MHz
Output capacitance	C_{oss}	-	1900	2600	pF	V_{GS}=0 V, V_{DS}=12 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	190	-	pF	V_{GS}=0 V, V_{DS}=12 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	5.4	-	ns	V_{DD}=12 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r	-	6.4	-	ns	V_{DD}=12 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Turn-off delay time	$t_{d(off)}$	-	32	-	ns	V_{DD}=12 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
Fall time	t_f	-	4.8	-	ns	V_{DD}=12 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}	-	10.5	14	nC	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V
Gate charge at threshold	$Q_{g(th)}$	-	7.1	-	nC	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V
Gate to drain charge	Q_{gd}	-	7.3	11	nC	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V
Switching charge	Q_{sw}	-	10.7	-	nC	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V
Gate charge total	Q_g	-	30	40	nC	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V
Gate plateau voltage	$V_{plateau}$	-	2.4	-	V	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V
Gate charge total	Q_g	-	62	82	nC	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 10 V
Gate charge total, sync. FET	$Q_{g(sync)}$	-	26	-	nC	V_{DS}=0.1 V, V_{GS}=0 to 4.5 V
Output charge	Q_{oss}	-	39	52	nC	V_{DD}=12 V, V_{GS}=0 V

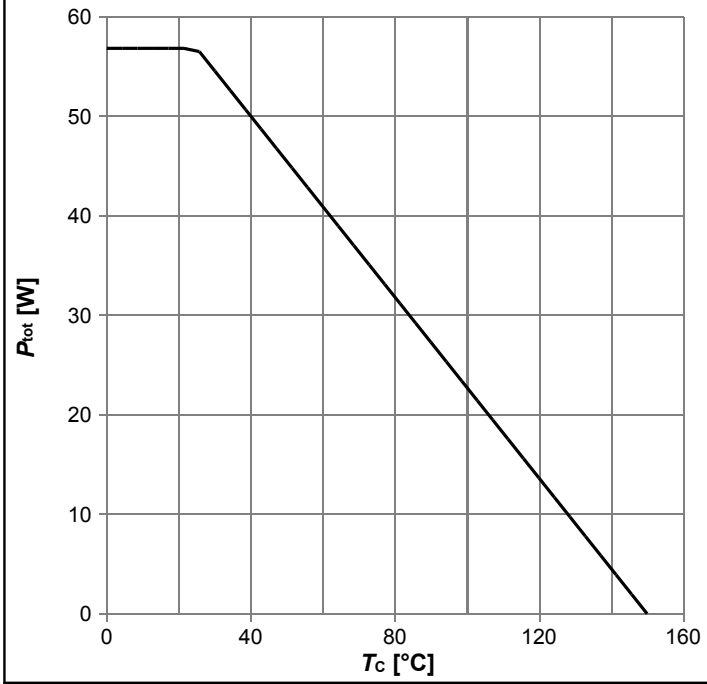
Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	57	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	227	A	T_C=25 °C
Diode forward voltage	V_{SD}	-	0.56	-	V	V_{GS}=0 V, I_F=12 A, T_j=25 °C
Reverse recovery charge	Q_{rr}	-	5	-	nC	V_R=15 V, I_F=I_S, di_F/dt=400 A/µs

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

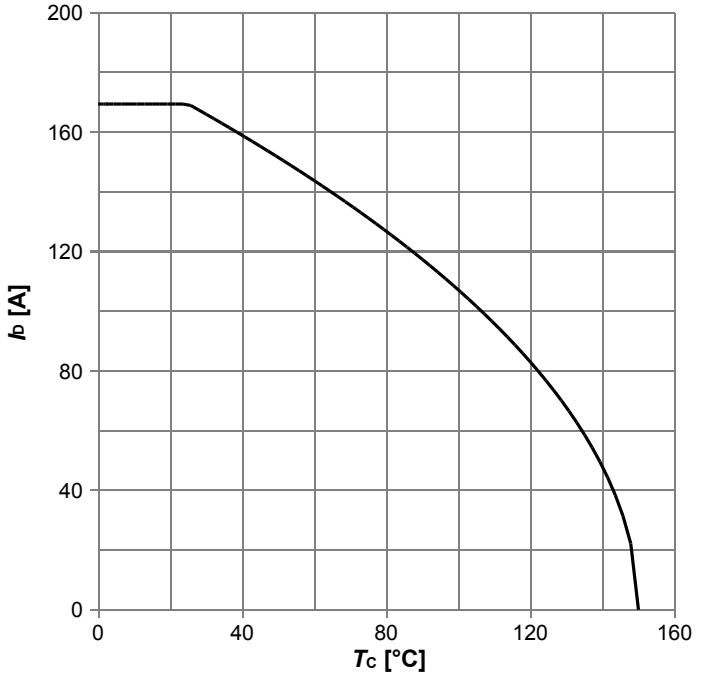
5 Electrical characteristics diagrams

Diagram 1: Power dissipation



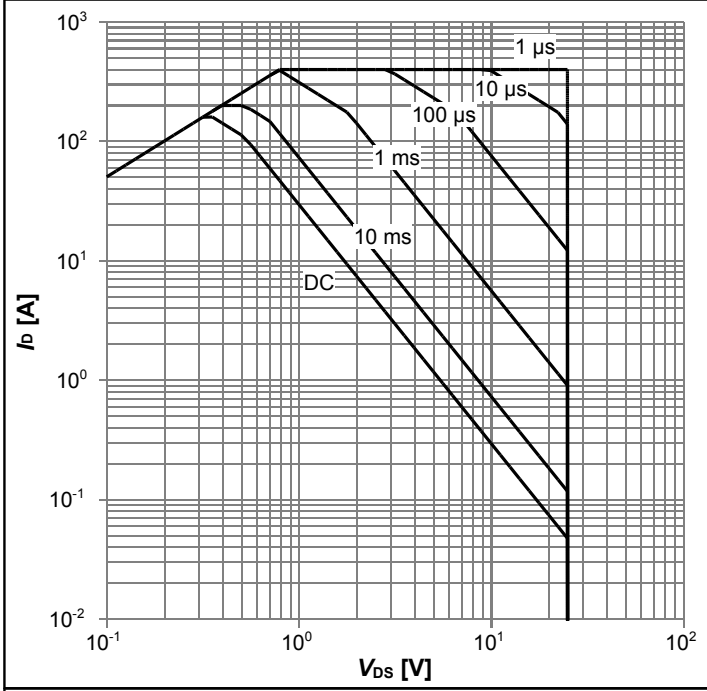
$P_{tot}=f(T_C)$

Diagram 2: Drain current



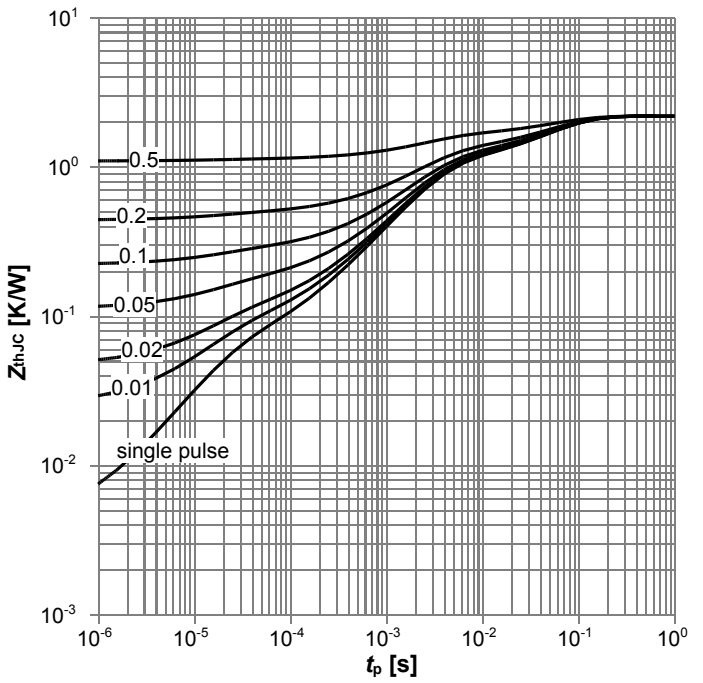
$I_D=f(T_C)$; $V_{GS}\geq 10$ V

Diagram 3: Safe operating area



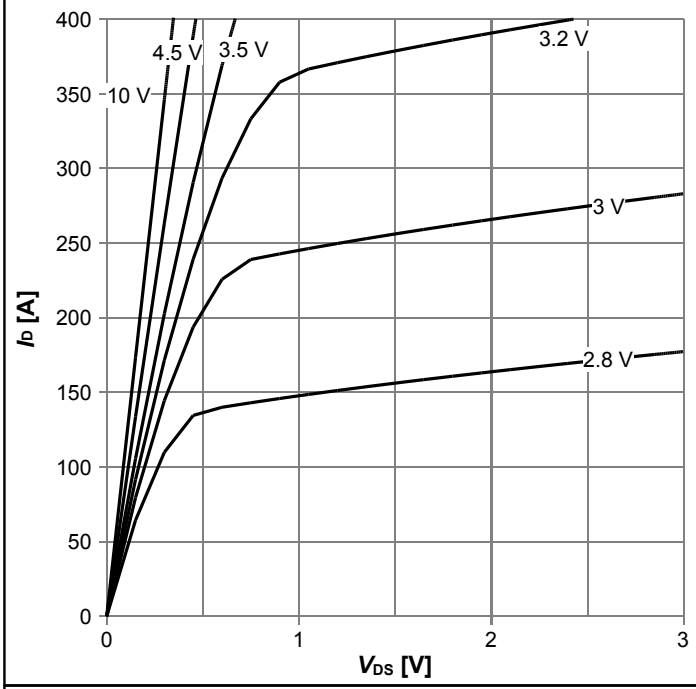
$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$; parameter: t_p

Diagram 4: Max. transient thermal impedance



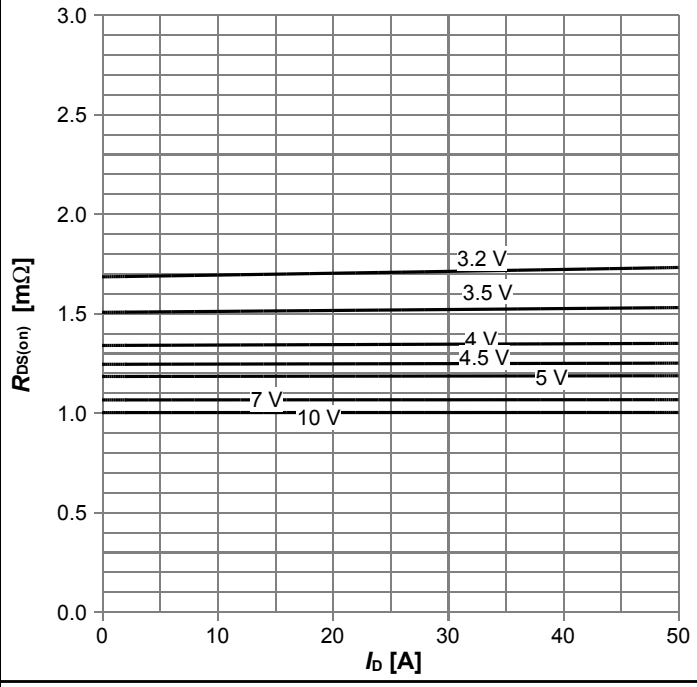
$Z_{thJC}=f(t_p)$; parameter: $D=t_p/T$

Diagram 5: Typ. output characteristics



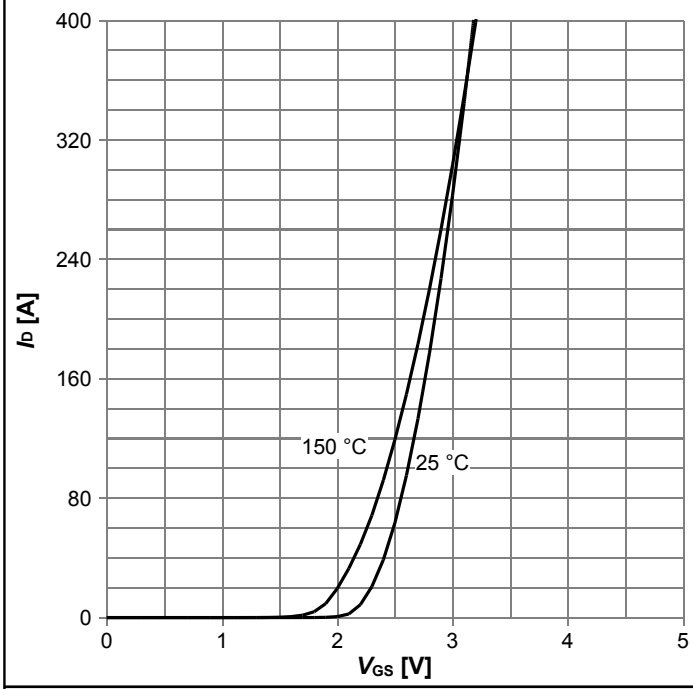
I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



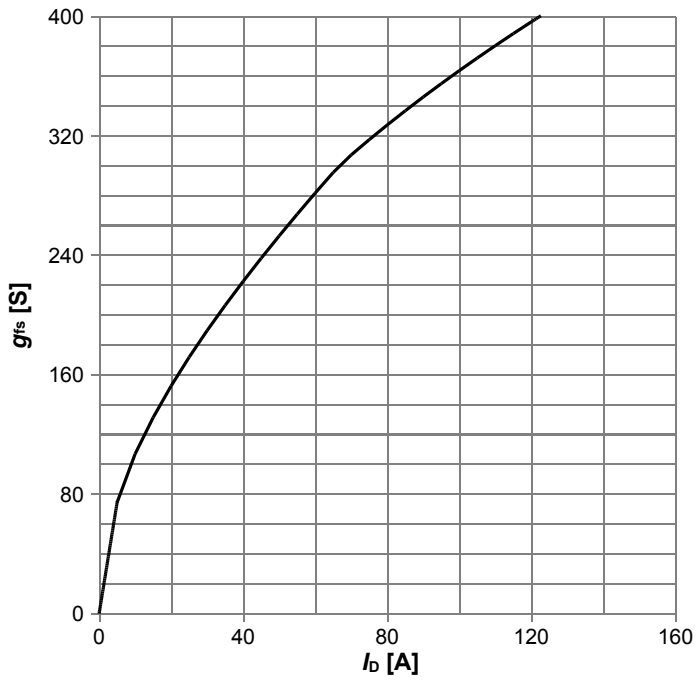
$R_{DS(on)}$=f(I_D); T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



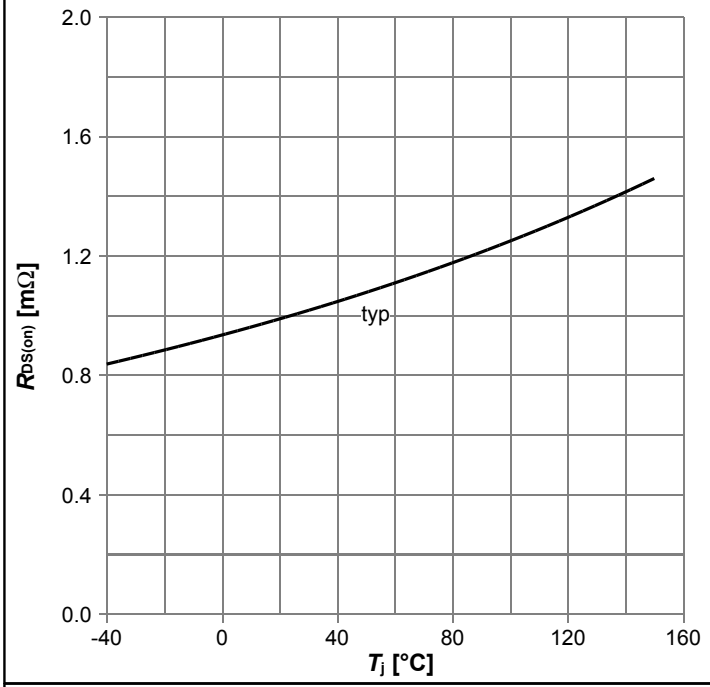
I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



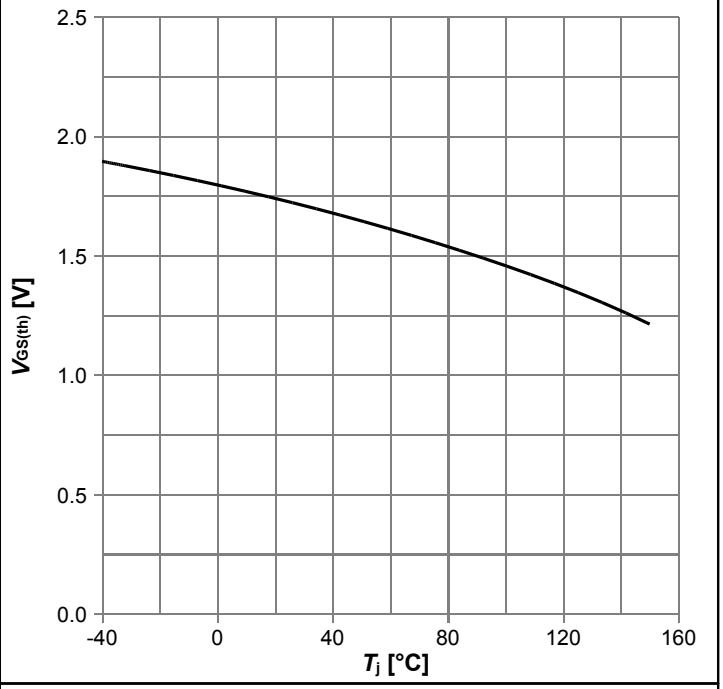
g_{fs}=f(I_D); T_j=25 °C

Diagram 9: Drain-source on-state resistance



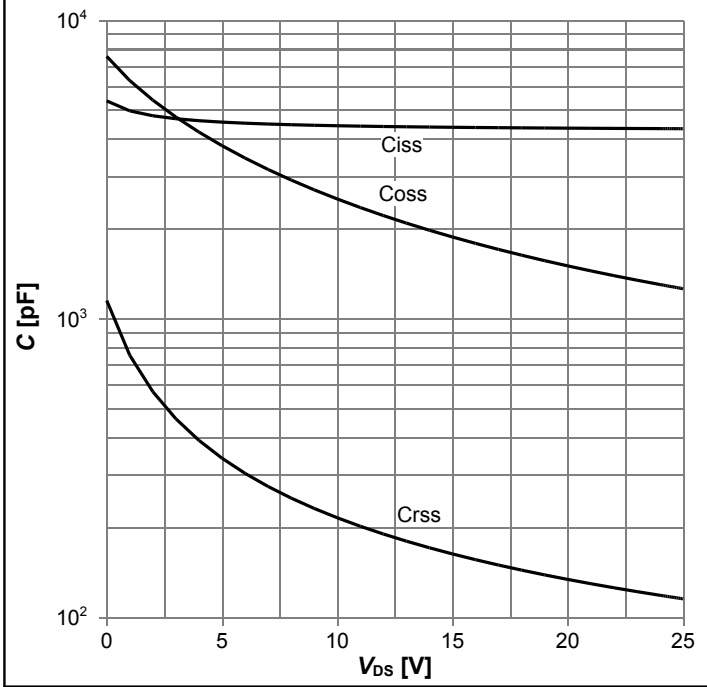
$R_{DS(on)}$=f(T_j); I_D=30 A; V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



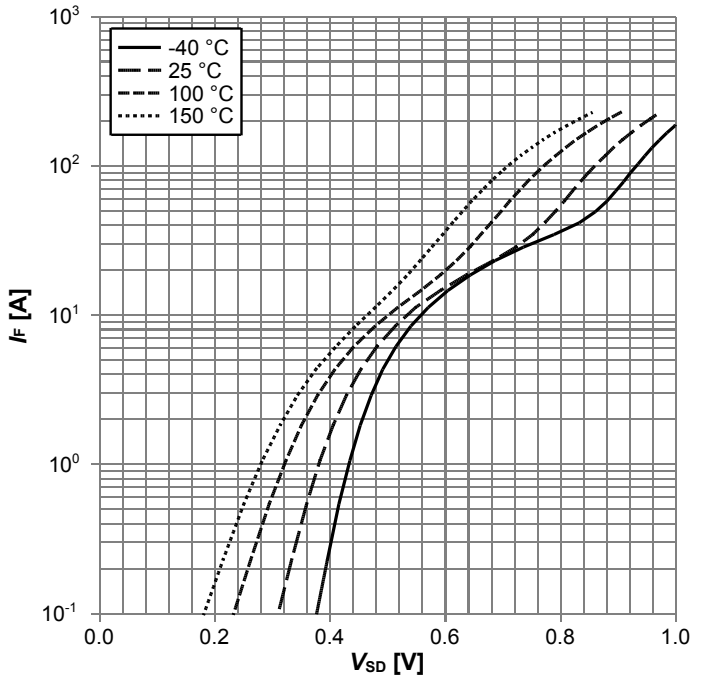
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=10 mA

Diagram 11: Typ. capacitances



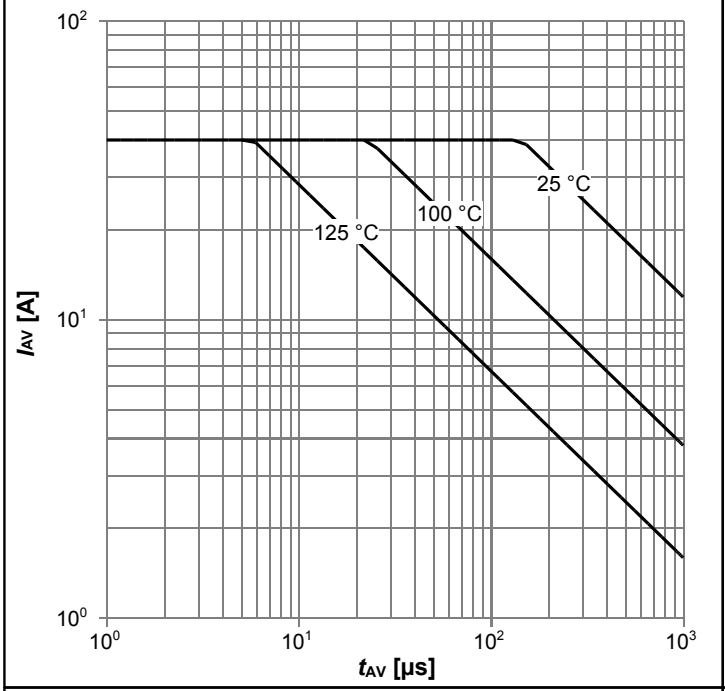
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 12: Forward characteristics of reverse diode



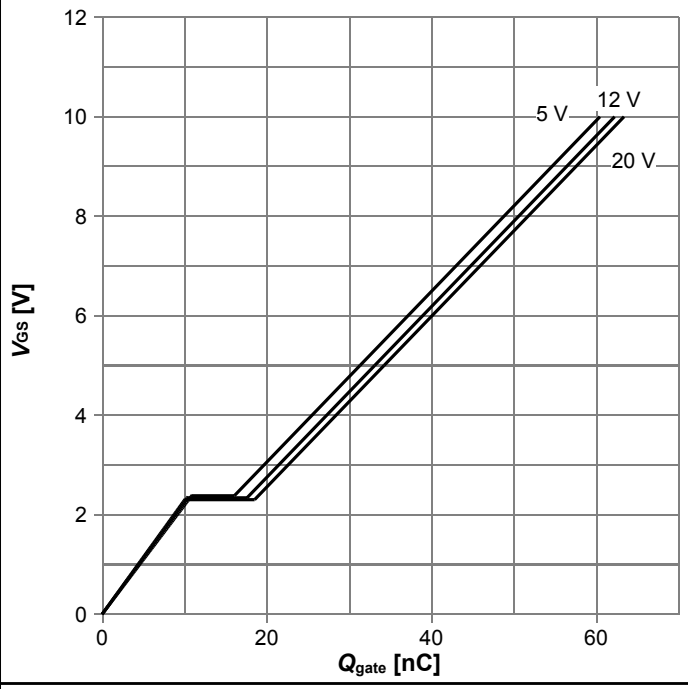
I_F=f(V_{SD}); parameter: T_j

Diagram 13: Avalanche characteristics



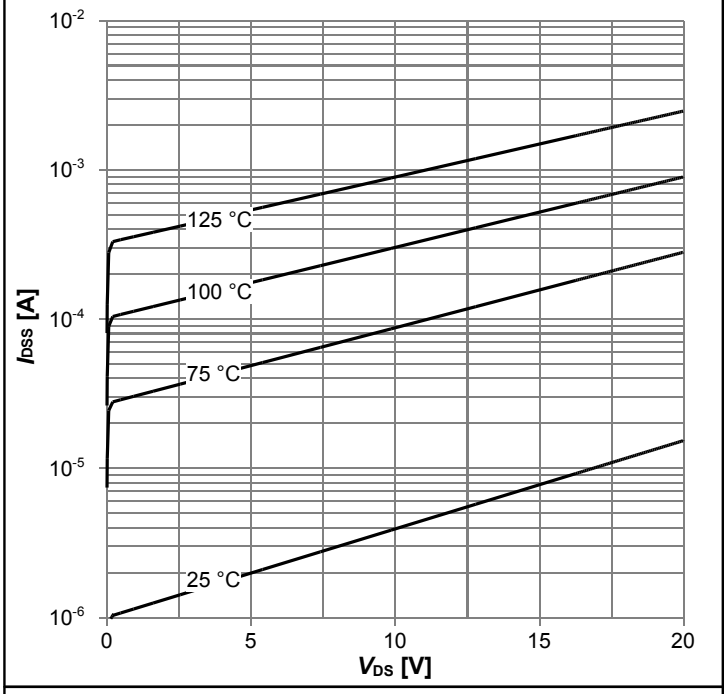
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



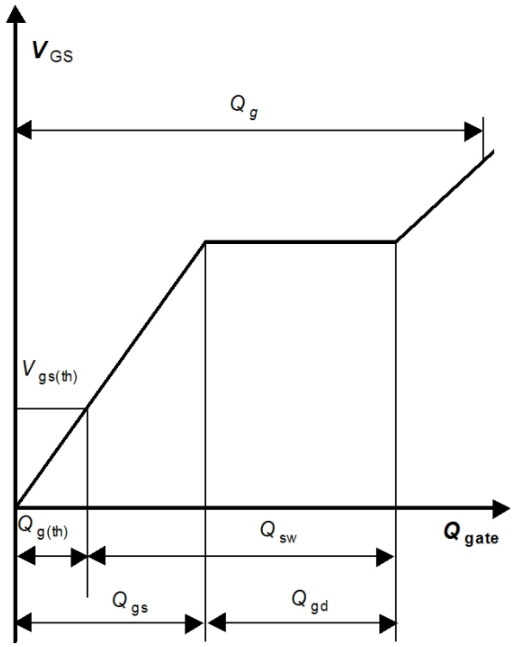
V_{GS}=f(Q_{gate}); I_D=30 A pulsed; parameter: V_{DD}

Diagram 15: Typ. Drain-source leakage current

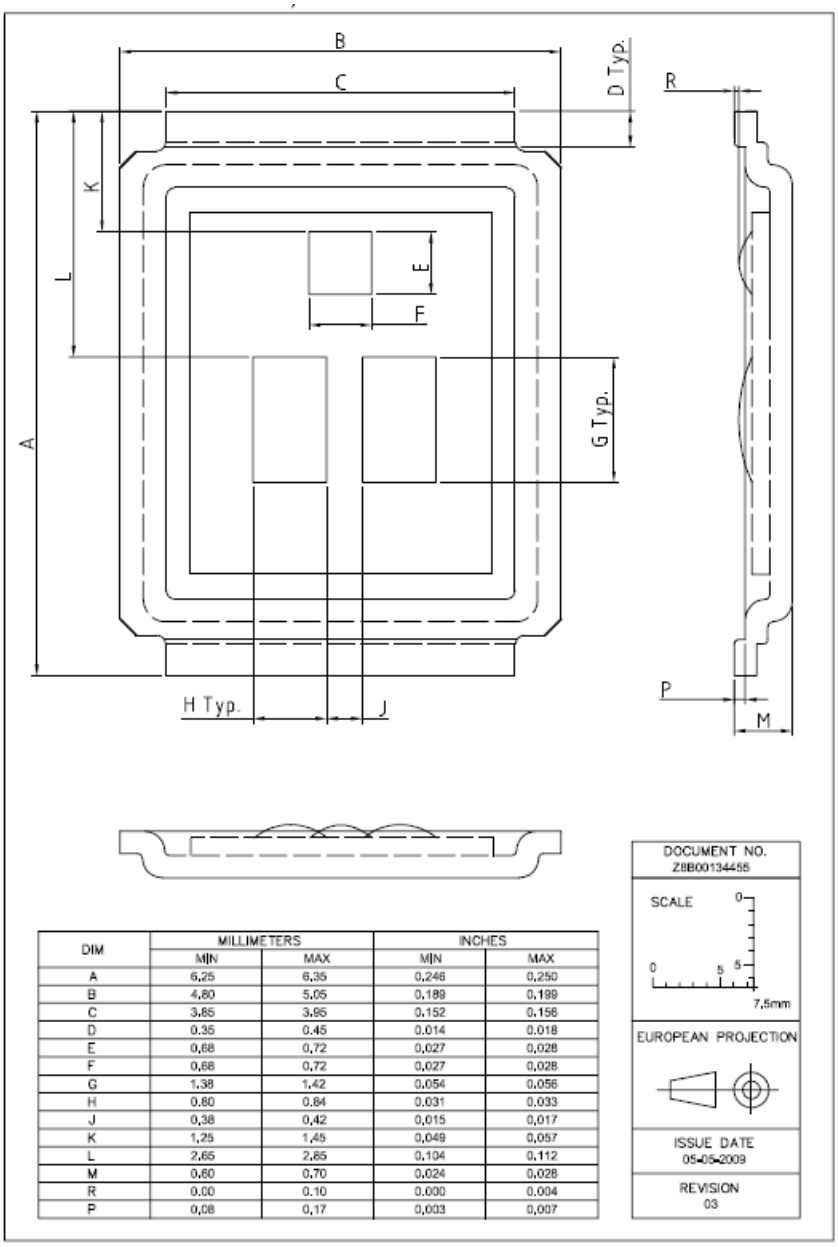


I_{DSS}=f(V_{DS}); V_{GS}=0 V; parameter: T_j

Gate charge waveforms



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	1,38	1,42	0,054	0,056
H	0,80	0,84	0,031	0,033
J	0,38	0,42	0,015	0,017
K	1,25	1,45	0,049	0,057
L	2,65	2,85	0,104	0,112
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

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

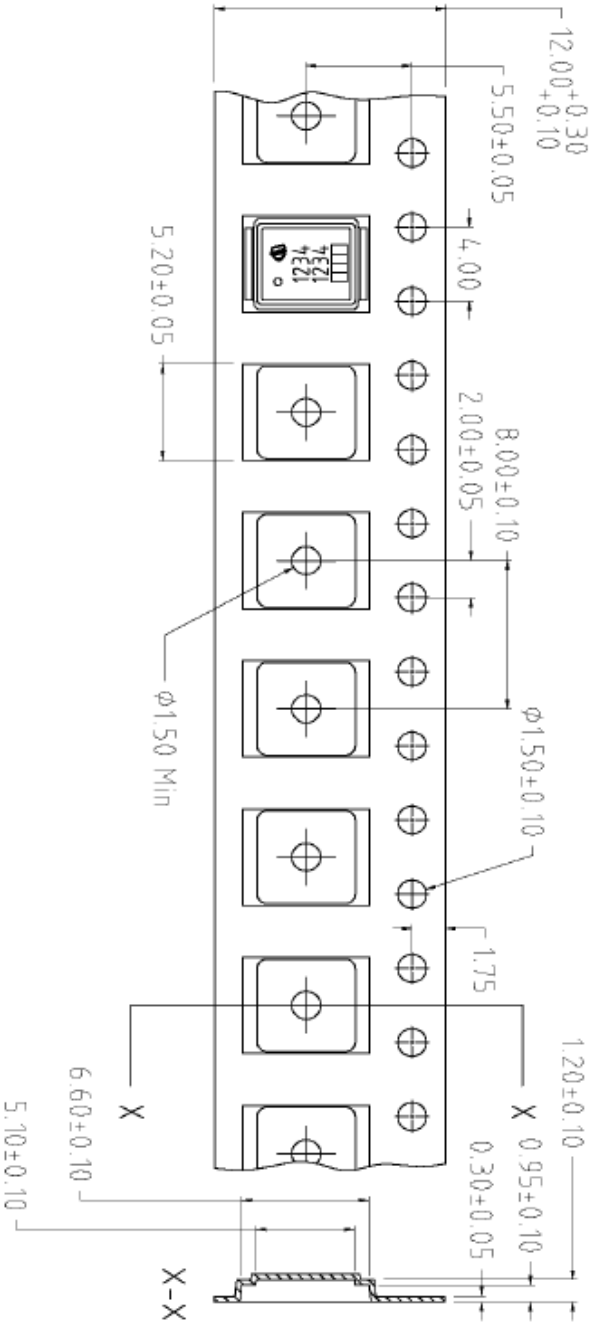
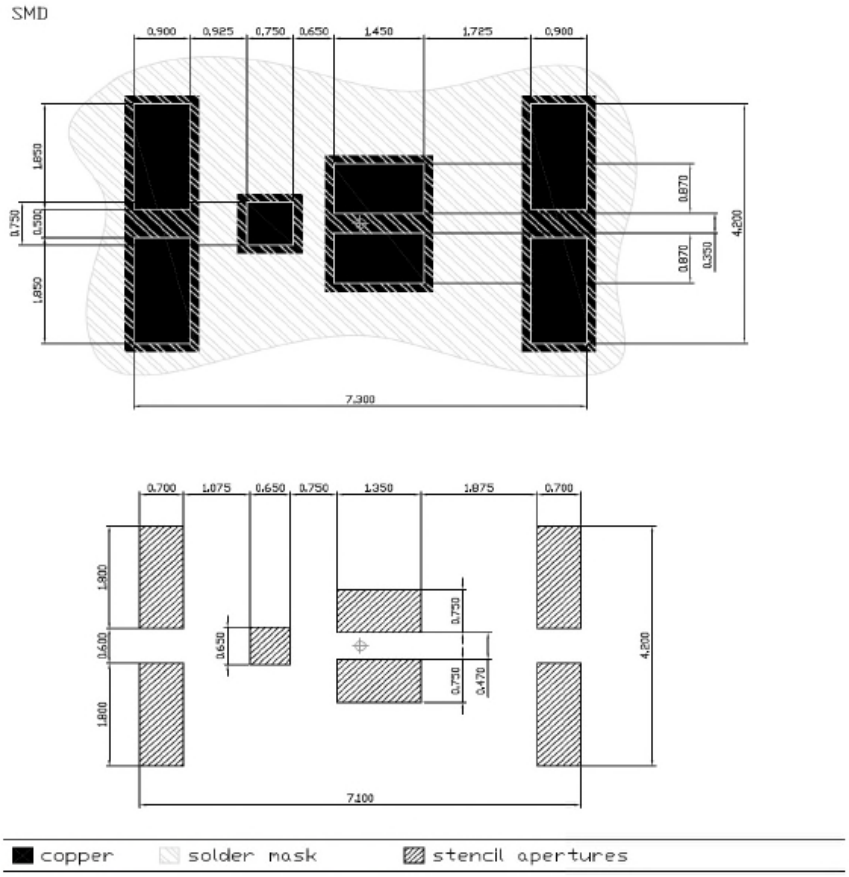


Figure 2 Outline Tape CanPAK MX, dimensions in mm



Dimensions in mm

Recommended stencil thickness 150 µm

Marking Layout

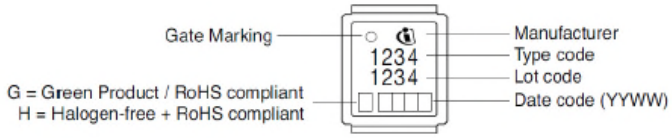


Figure 3 Outline Boardpads and apertures CanPAK MX, dimensions in mm

Revision History

BSB012NE2LXI

Revision: 2015-09-09, Rev. 2.1

Previous Revision		
Revision	Date	Subjects (major changes since last revision)
2.0	2015-01-20	Release of final version
2.1	2015-09-09	Rev. 2.0

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

Published by
Infineon Technologies AG
81726 München, Germany

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 your nearest Infineon Technologies Office (**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.

LifeElectronics
Живое партнерство

ООО «ЛайфЭлектроникс» **“LifeElectronics” LLC**

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru

www.lifeelectronics.ru