BUK9Y40-55B

N-channel TrenchMOS logic level FET

Rev. 03 — 22 February 2008 Product data sheet

1. Product profile

1.1 General description

Logic level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using Nexperia High-Performance Automotive (HPA) TrenchMOS technology. This product has been designed and qualified to the appropriate AEC standard for use in automotive critical applications.

1.2 Features

- 175 °C rated
- Q101 compliant
- Logic level compatible
- Very low on-state resistance

1.3 Applications

- 12 V and 24 V loads
- General purpose power switching
- Automotive systems
- Motors, lamps and solenoids

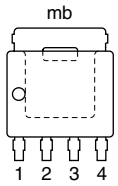
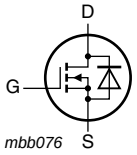
1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_D	drain current	V_{GS} = 5 V; T_{mb} = 25 °C; see Figure 1 and 4	-	-	26	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; see Figure 2	-	-	59	W
Static characteristics						
R_{DSon}	drain-source on-state resistance	V_{GS} = 5 V; I_D = 15 A; T_j = 25 °C; see Figure 12 and 13	-	34	40	mΩ
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 26 A; $V_{sup} \leq$ 55 V; R_{GS} = 50 Ω; V_{GS} = 5 V; $T_{j(init)}$ = 25 °C; unclamped	-	-	36	mJ

2. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source		
2	S	source		
3	S	source		
4	G	gate		
mb	D	mounting base; connected to drain		

SOT669 (LFPAK)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK9Y40-55B	LFPAK	plastic single-ended surface-mounted package (LFPAK); 4 leads	SOT669

4. Limiting values

Table 4. Limiting values

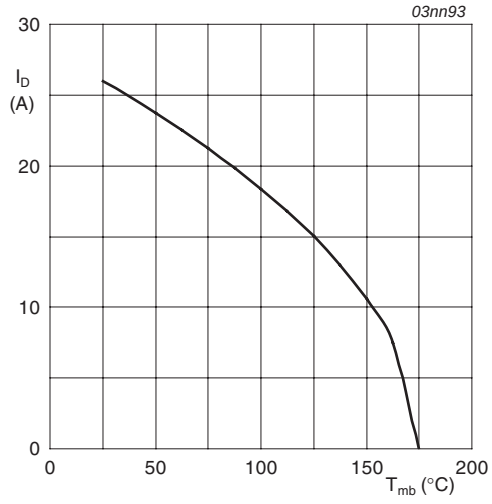
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 175$ °C		-	55	V
V_{DGR}	drain-gate voltage	R_{GS} = 20 kΩ		-	55	V
V_{GS}	gate-source voltage			-15	15	V
I_D	drain current	T_{mb} = 100 °C; V_{GS} = 5 V; see Figure 1		-	18	A
		T_{mb} = 25 °C; V_{GS} = 5 V; see Figure 1 and 4		-	26	A
I_{DM}	peak drain current	T_{mb} = 25 °C; $t_p \leq 10$ μs; pulsed; see Figure 4		-	106	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; see Figure 2		-	59	W
T_{stg}	storage temperature			-55	175	°C
T_j	junction temperature			-55	175	°C
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 26 A; $V_{sup} \leq 55$ V; R_{GS} = 50 Ω; V_{GS} = 5 V; $T_{j(init)}$ = 25 °C; unclamped		-	36	mJ
$E_{DS(AL)R}$	repetitive drain-source avalanche energy	see Figure 3	[1][2] [3]	-	-	J
Source-drain diode						
I_S	source current	T_{mb} = 25 °C		-	26	A
I_{SM}	peak source current	$t_p \leq 10$ μs; pulsed; T_{mb} = 25 °C		-	106	A

[1] Single-pulse avalanche rating limited by maximum junction temperature of 175 °C.

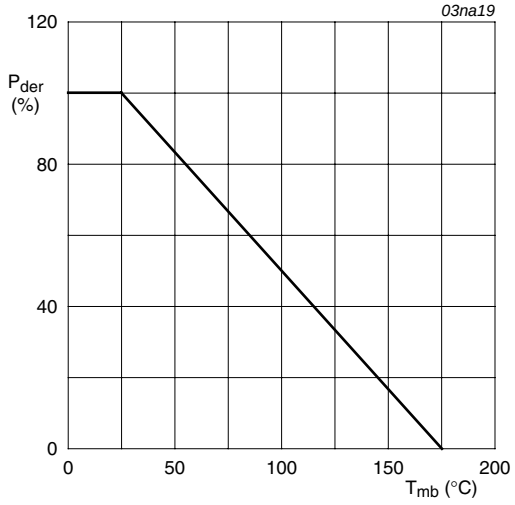
[2] Repetitive avalanche rating limited by average junction temperature of 170 °C.

[3] Refer to application note AN10273 for further information.



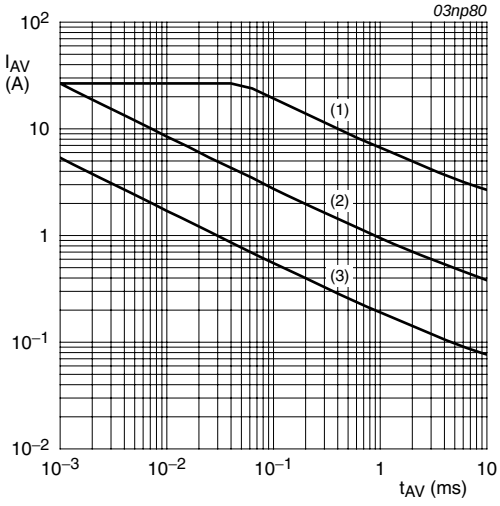
$V_{GS} \geq 5V$

Fig 1. Continuous drain current as a function of mounting base temperature



$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\ \%$$

Fig 2. Normalized total power dissipation as a function of mounting base temperature

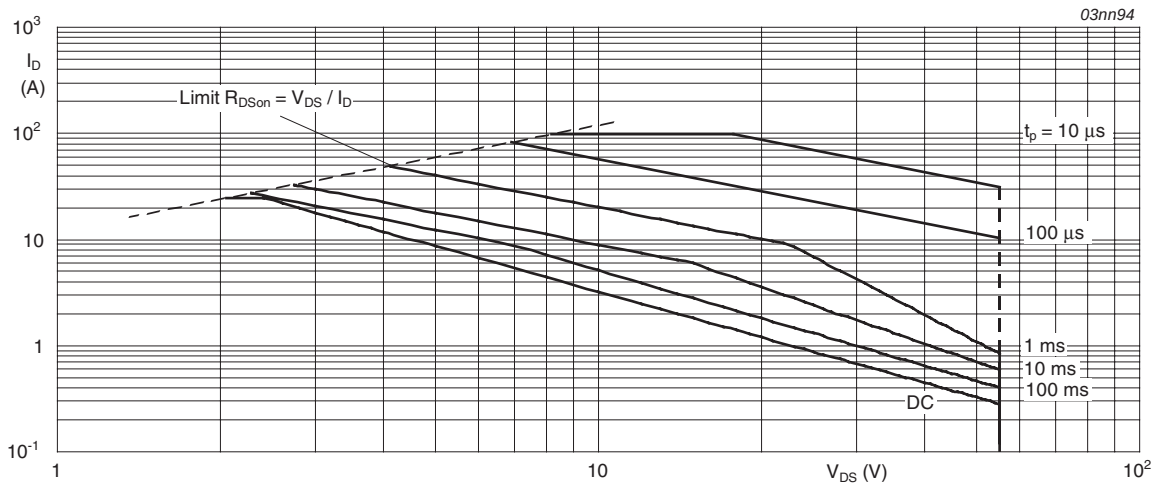


(1) Single−pulse; T_j = 25 °C.

(2) Single−pulse; T_j = 150 °C.

(3) Repetitive.

Fig 3. Single-shot and repetitive avalanche rating; avalanche current as a function of avalanche period



T_{mb} = 25 °C; I_{DM} is single pulse

Fig 4. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	see Figure 5	-	-	2.5	K/W

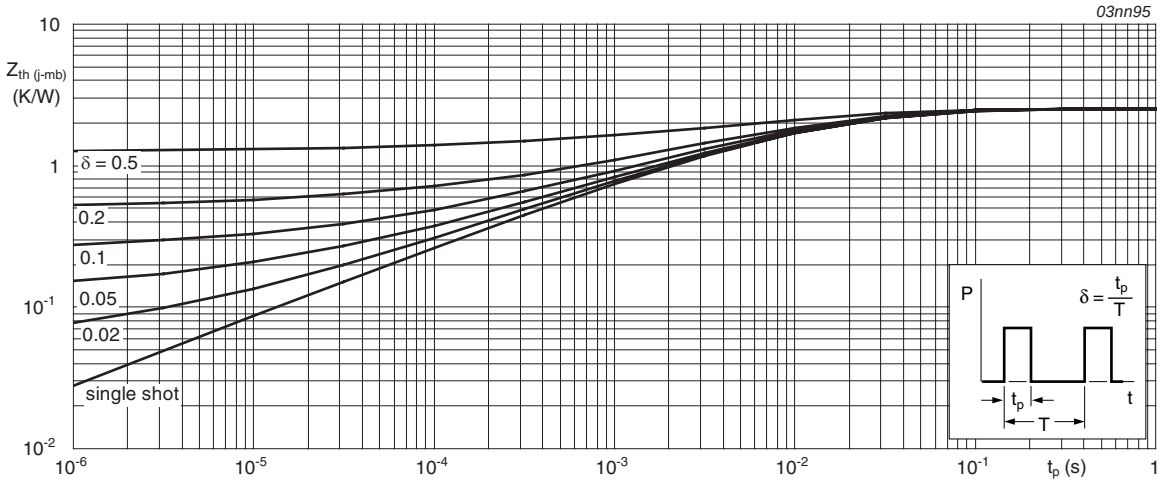
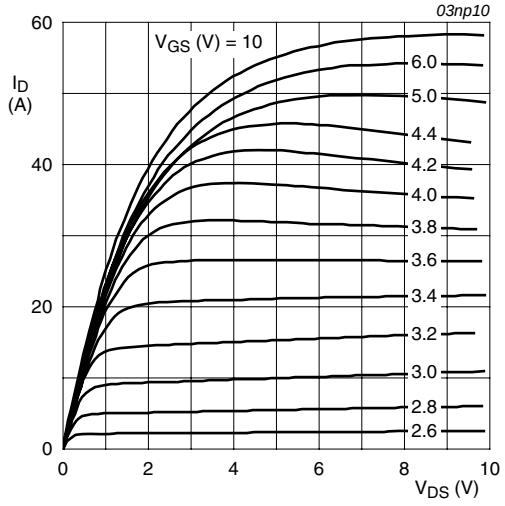


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration

6. Characteristics

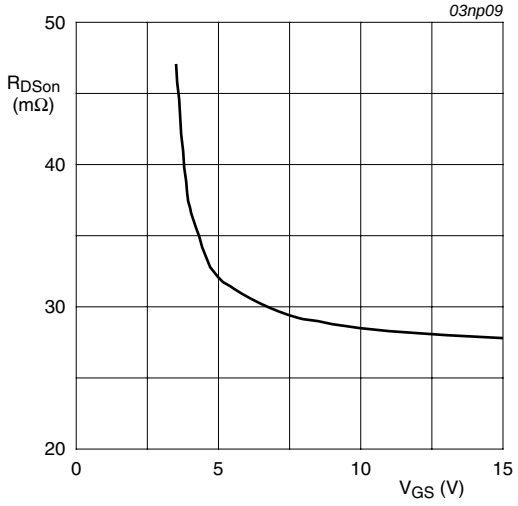
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 0.25 mA; V_{GS} = 0 V; T_j = 25 °C	55	-	-	V
		I_D = 0.25 mA; V_{GS} = 0 V; T_j = -55 °C	50	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 175 °C; see Figure 11	0.5	-	-	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 °C; see Figure 11	1.1	1.5	2	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 °C; see Figure 11	-	-	2.3	V
I_{DSS}	drain leakage current	V_{DS} = 55 V; V_{GS} = 0 V; T_j = 25 °C	-	0.02	1	µA
		V_{DS} = 55 V; V_{GS} = 0 V; T_j = 175 °C	-	-	500	µA
I_{GSS}	gate leakage current	V_{DS} = 0 V; V_{GS} = 15 V; T_j = 25 °C	-	2	100	nA
		V_{DS} = 0 V; V_{GS} = -15 V; T_j = 25 °C	-	2	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 5 V; I_D = 15 A; T_j = 175 °C; see Figure 12 and 13	-	-	84	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 25 °C	-	32	36	mΩ
		V_{GS} = 4.5 V; I_D = 15 A; T_j = 25 °C	-	-	45	mΩ
		V_{GS} = 5 V; I_D = 15 A; T_j = 25 °C; see Figure 12 and 13	-	34	40	mΩ
Source-drain diode						
V_{SD}	source-drain voltage	I_S = 20 A; V_{GS} = 0 V; T_j = 25 °C; see Figure 16	-	0.85	1.2	V
t_{rr}	reverse recovery time	I_S = 20 A; dI_S/dt = -100 A/µs; V_{GS} = -10 V; V_{DS} = 30 V; T_j = 25 °C	-	45	-	ns
Q_r	recovered charge		-	25	-	nC
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	I_D = 15 A; V_{DS} = 44 V; V_{GS} = 5 V; T_j = 25 °C; see Figure 14	-	11	-	nC
Q_{GS}	gate-source charge		-	2	-	nC
Q_{GD}	gate-drain charge		-	5	-	nC
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz; T_j = 25 °C; see Figure 15	-	765	1020	pF
C_{oss}	output capacitance		-	123	148	pF
C_{rss}	reverse transfer capacitance		-	71	97	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 30 V; R_L = 2.2 Ω; V_{GS} = 5 V; $R_{G(ext)}$ = 10 Ω; T_j = 25 °C	-	17	-	ns
t_r	rise time		-	93	-	ns
$t_{d(off)}$	turn-off delay time		-	35	-	ns
t_f	fall time		-	72	-	ns



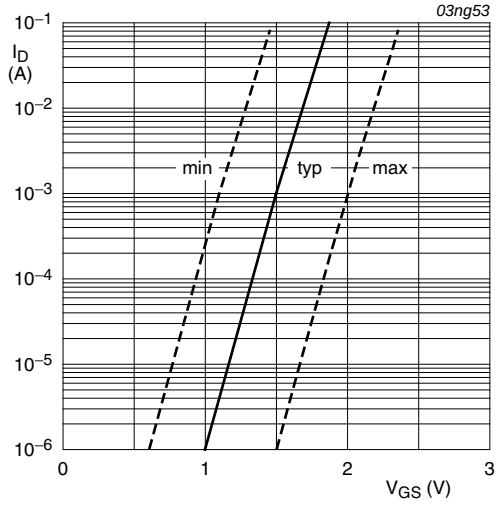
$T_j = 25\,°C; t_p = 300\,\mu s$

Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values



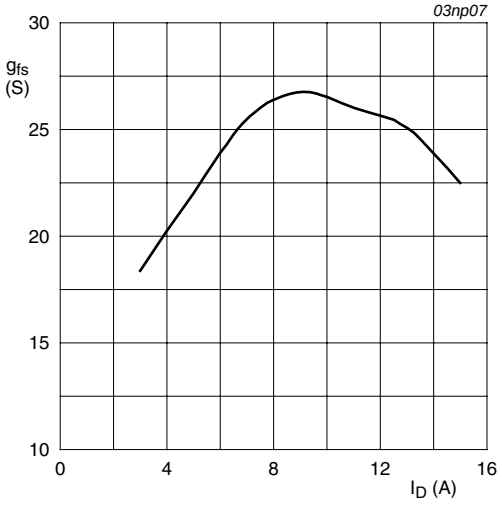
$T_j = 25\,°C; I_D = 15\,A$

Fig 7. Drain-source on-state resistance as a function of gate-source voltage; typical values



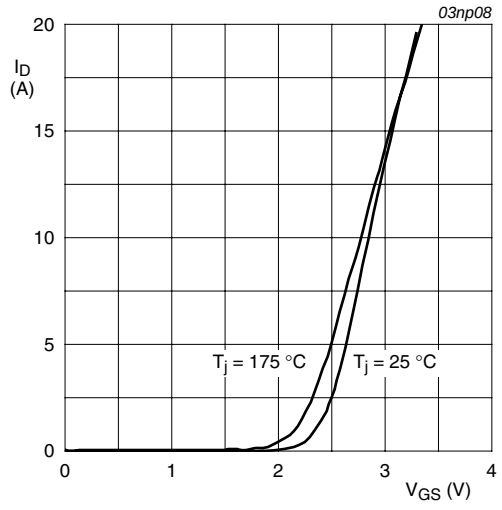
$T_j = 25\,°C; V_{DS} = V_{GS}$

Fig 8. Sub-threshold drain current as a function of gate-source voltage



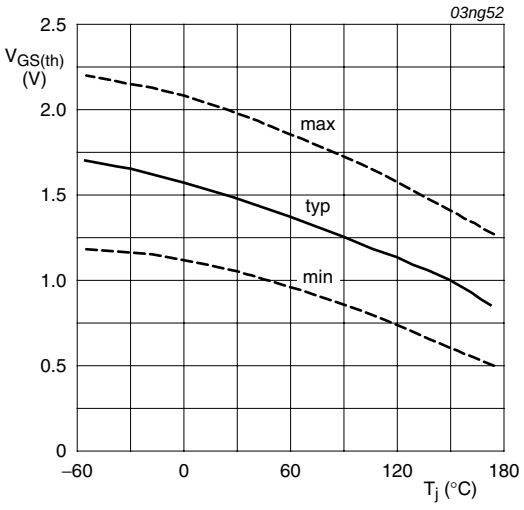
$T_j = 25\,°C; V_{DS} = 25\,V$

Fig 9. Forward transconductance as a function of drain current; typical values



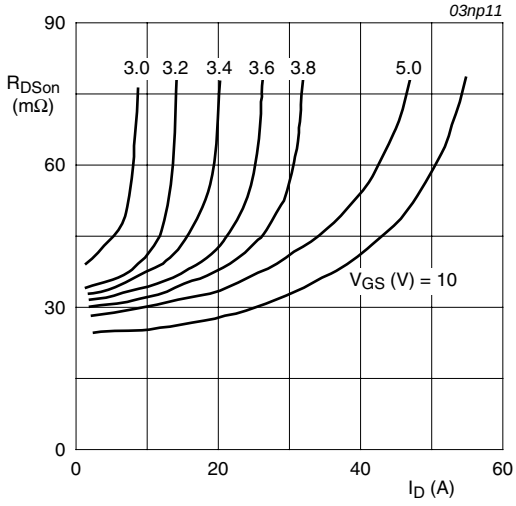
$V_{DS} = 25V$

Fig 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values



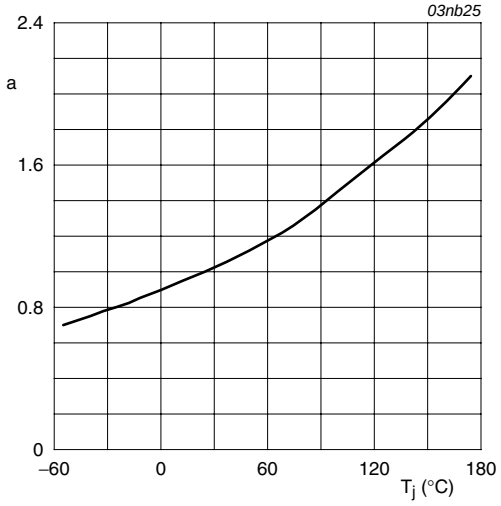
$I_D = 1\,mA; V_{DS} = V_{GS}$

Fig 11. Gate-source threshold voltage as a function of junction temperature



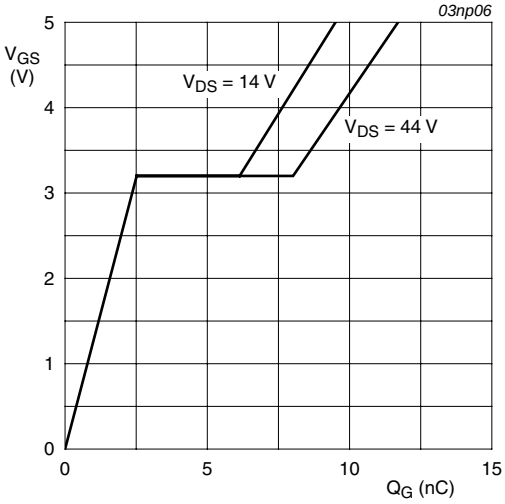
$T_j = 25\,°C$

Fig 12. Drain-source on-state resistance as a function of drain current; typical values



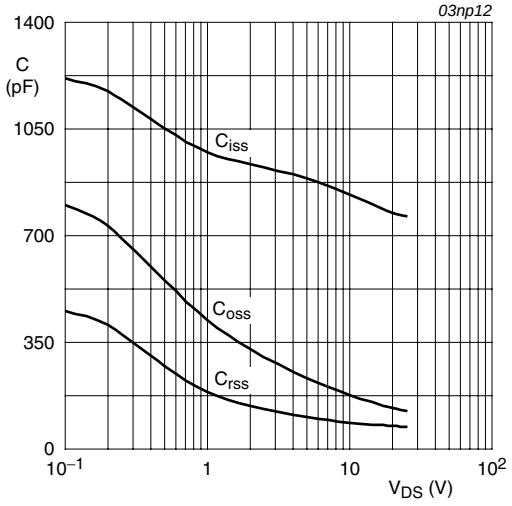
$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

Fig 13. Normalized drain-source on-state resistance factor as a function of junction temperature



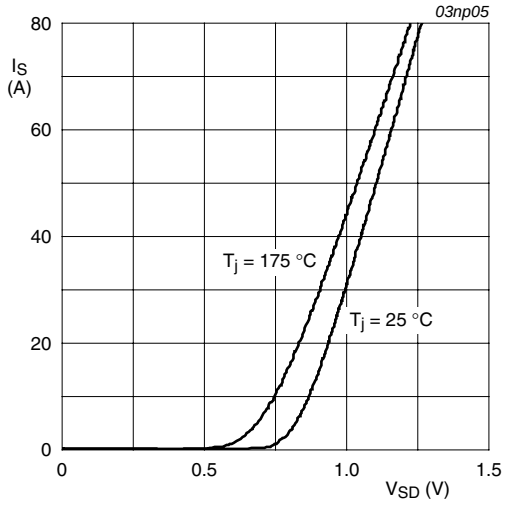
$T_j = 25\,°C; I_D = 15\,A$

Fig 14. Gate-source voltage as a function of gate charge; typical values



$V_{GS} = 0\,V; f = 1\,MHz$

Fig 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

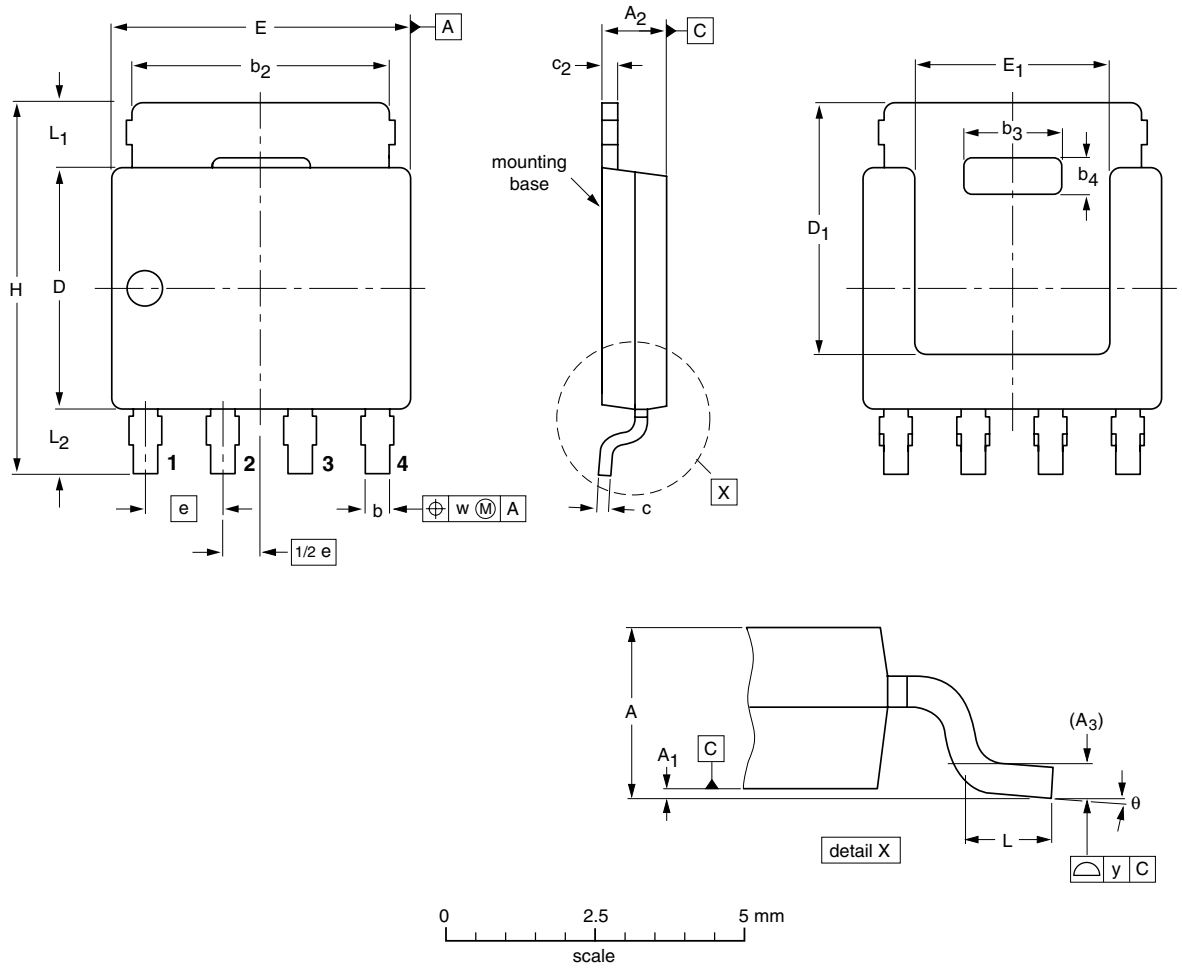


$V_{GS} = 0\,V$

Fig 16. Source current as a function of source-drain voltage; typical values

7. Package outline

Plastic single-ended surface-mounted package (LFPAK); 4 leads **SOT669**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	A_2	A_3	b	b_2	b_3	b_4	c	c_2	$D^{(1)}$	$D_1^{(1)}$ max	$E^{(1)}$	$E_1^{(1)}$	e	H	L	L_1	L_2	w	y	θ
mm	1.20 1.01	0.15 0.00	1.10 0.95	0.25	0.50 0.35	4.41 3.62	2.2 2.0	0.9 0.7	0.25 0.19	0.30 0.24	4.10 3.80	4.20	5.0 4.8	3.3 3.1	1.27	6.2 5.8	0.85 0.40	1.3 0.8	1.3 0.8	0.25	0.1	8° 0°

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT669		MO-235				~~04-10-13~~ 06-03-16

Fig 17. Package outline SOT669 (LFPAK)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK9Y40-55B_3	20080222	Product data sheet	-	BUK9Y40-55B_2
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
BUK9Y40-55B_2	20060411	Product data sheet	-	BUK9Y40_55B-01
BUK9Y40_55B-01	20040528	Product data sheet	-	-

9. Legal information

9.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

9.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

9.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — Nexperia products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia accepts no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nexperia.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by Nexperia. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

9.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

10. Contact information

For additional information, please visit: **http://www.nexperia.com**

For sales office addresses, send an email to: **salesaddresses@nexperia.com**

11. Contents

For more information, please visit: http://www.nexperia.com
For sales office addresses, please send an email to: salesaddresses@nexperia.com
Date of release: 22 February 2008

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET ***category:***

Click to view products by Nexperia ***manufacturer:***

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 2N7000 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C IPS70R2K0CEAKMA1 BUK954R8-60E DMN3404LQ-7 NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE455 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 US6M2GTR TK10A80W,S4X(S SSM6P69NU,LF