

20V N-CHANNEL ENHANCEMENT MODE MOSFET**SUMMARY** **$V_{(BR)DSS}=20V$; $R_{DS(ON)}=0.18\Omega$; $I_D=1.7A$** **DESCRIPTION**

This new generation of high density MOSFETs from Zetex utilises a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- SOT23 package

APPLICATIONS

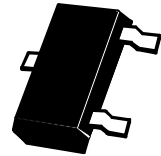
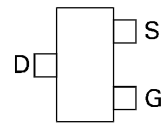
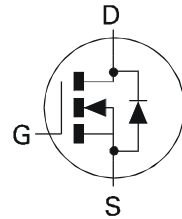
- DC - DC Converters
- Power Management Functions
- Disconnect switches
- Motor control

ORDERING INFORMATION

DEVICE	REEL SIZE (inches)	TAPE WIDTH (mm)	QUANTITY PER REEL
ZXM61N02FTA	7	8mm embossed	3000 units
ZXM61N02FTC	13	8mm embossed	10000 units

DEVICE MARKING

- N02

**SOT23**

Top View

ZXM61N02F

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DSS}	20	V
Gate Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ($V_{GS}=4.5V$; $T_A=25^\circ C$)(b) ($V_{GS}=4.5V$; $T_A=70^\circ C$)(b)	I_D	1.7 1.3	A
Pulsed Drain Current (c)	I_{DM}	7.4	A
Continuous Source Current (Body Diode) (b)	I_S	0.8	A
Pulsed Source Current (Body Diode)	I_{SM}	7.4	A
Power Dissipation at $T_A=25^\circ C$ (a) Linear Derating Factor	P_D	625 5	mW mW/ $^\circ C$
Power Dissipation at $T_A=25^\circ C$ (b) Linear Derating Factor	P_D	806 6.4	mW mW/ $^\circ C$
Operating and Storage Temperature Range	$T_j; T_{stg}$	-55 to +150	$^\circ C$

THERMAL RESISTANCE

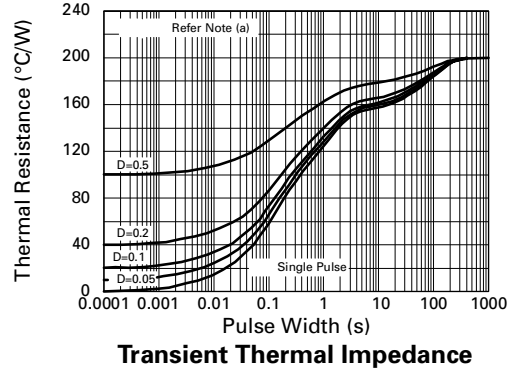
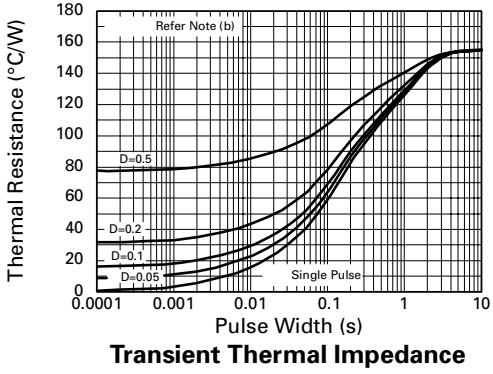
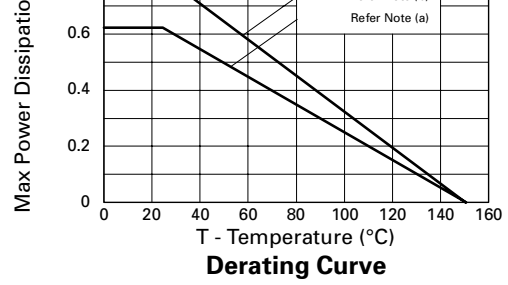
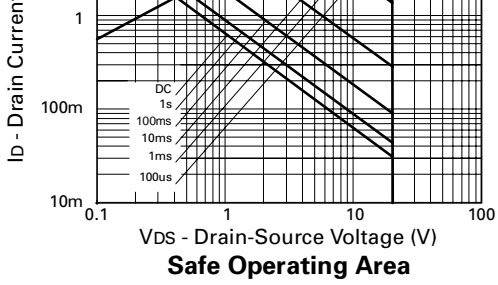
PARAMETER	SYMBOL	VALUE	UNIT
Junction to Ambient (a)	$R_{\theta JA}$	200	$^\circ C/W$
Junction to Ambient (b)	$R_{\theta JA}$	155	$^\circ C/W$

NOTES

(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

(b) For a device surface mounted on FR4 PCB measured at $t \leq 5$ secs.

(c) Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.



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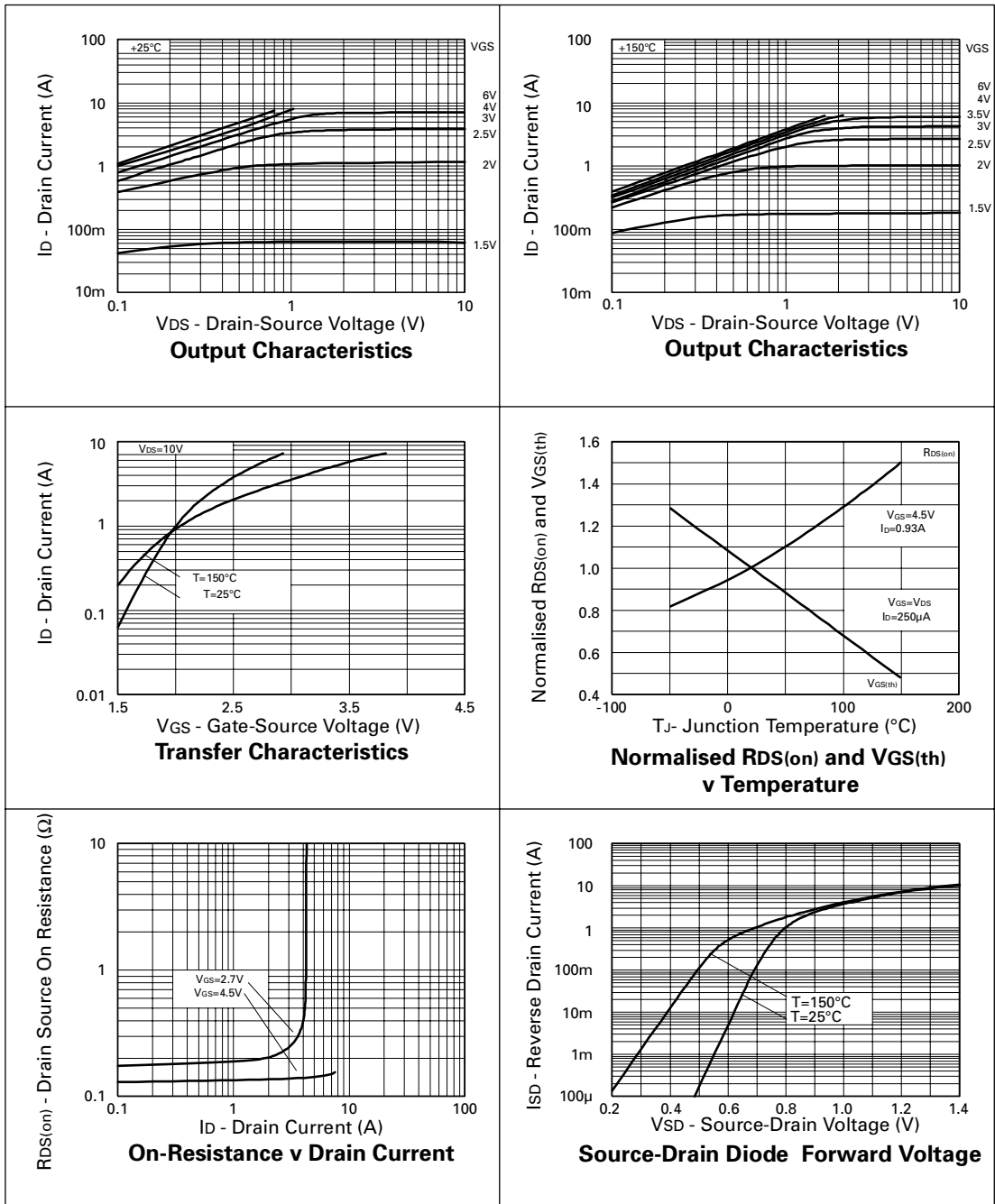
ELECTRICAL CHARACTERISTICS (at $T_A = 25^\circ\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.(3)	MAX.	UNIT	CONDITIONS.
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	20			V	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}			1	μA	$V_{DS}=20\text{V}, V_{GS}=0\text{V}$
Gate-Body Leakage	I_{GSS}			100	nA	$V_{GS}=\pm 12\text{V}, V_{DS}=0\text{V}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	0.7			V	$I_D=250\mu\text{A}, V_{DS}=V_{GS}$
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$			0.18 0.24	Ω Ω	$V_{GS}=4.5\text{V}, I_D=0.93\text{A}$ $V_{GS}=2.7\text{V}, I_D=0.47\text{A}$
Forward Transconductance (3)	g_{fs}	1.3			S	$V_{DS}=10\text{V}, I_D=0.47\text{A}$
DYNAMIC (3)						
Input Capacitance	C_{iss}		160		pF	$V_{DS}=15\text{V}, V_{GS}=0\text{V},$ $f=1\text{MHz}$
Output Capacitance	C_{oss}		50		pF	
Reverse Transfer Capacitance	C_{rss}		30		pF	
SWITCHING(2) (3)						
Turn-On Delay Time	$t_{d(on)}$		2.4		ns	$V_{DD}=10\text{V}, I_D=0.93\text{A}$ $R_G=6.2\Omega, R_D=11\Omega$ (refer to test circuit)
Rise Time	t_r		4.2		ns	
Turn-Off Delay Time	$t_{d(off)}$		7.8		ns	
Fall Time	t_f		4.2		ns	
Total Gate Charge	Q_g			3.4	nC	$V_{DS}=16\text{V}, V_{GS}=4.5\text{V},$ $I_D=0.93\text{A}$ (refer to test circuit)
Gate-Source Charge	Q_{gs}			0.41	nC	
Gate-Drain Charge	Q_{gd}			0.8	nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (1)	V_{SD}			0.95	V	$T_J=25^\circ\text{C}, I_S=0.93\text{A},$ $V_{GS}=0\text{V}$
Reverse Recovery Time (3)	t_{rr}		12.9		ns	$T_J=25^\circ\text{C}, I_F=0.93\text{A},$ $di/dt=100\text{A}/\mu\text{s}$
Reverse Recovery Charge (3)	Q_{rr}		5.2		nC	

NOTES

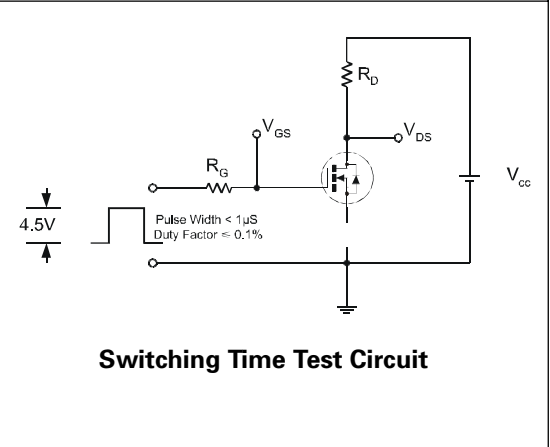
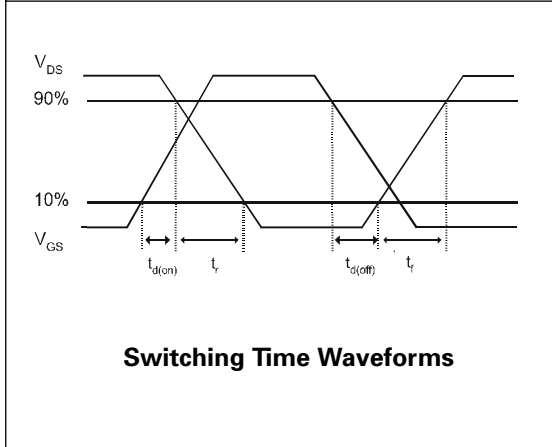
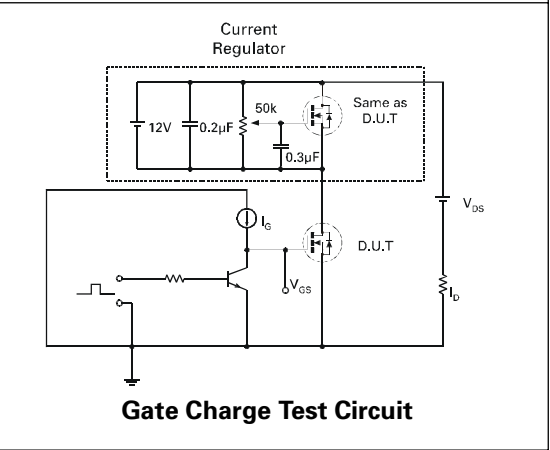
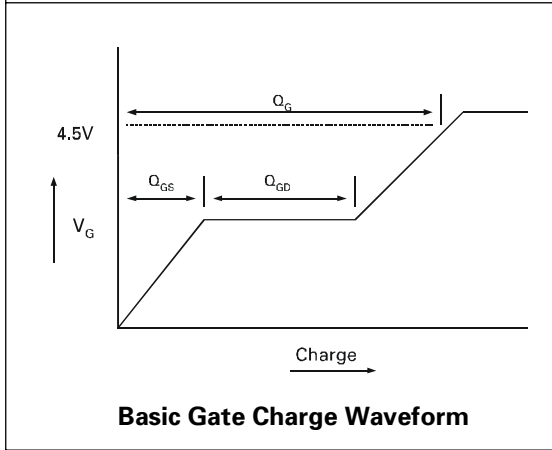
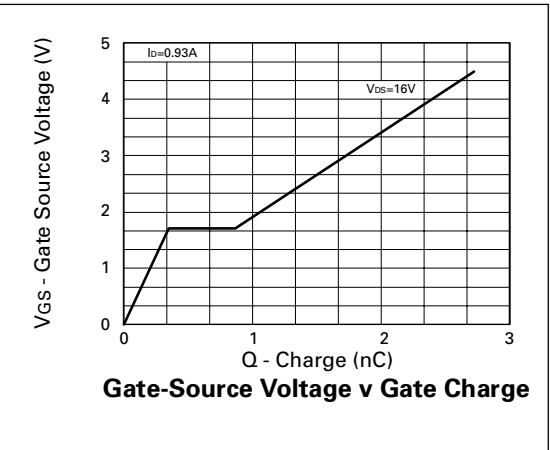
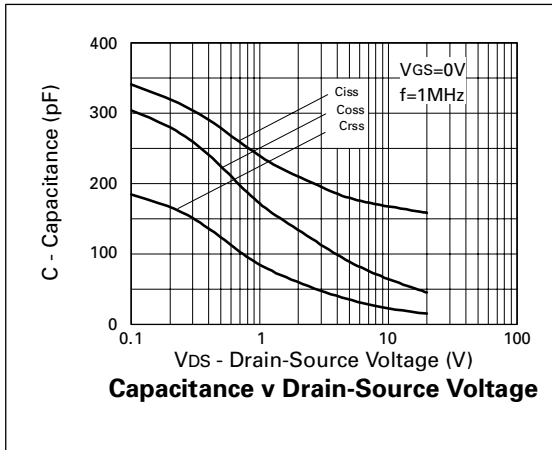
- (1) Measured under pulsed conditions. Width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.
 (2) Switching characteristics are independent of operating junction temperature.
 (3) For design aid only, not subject to production testing.

TYPICAL CHARACTERISTICS



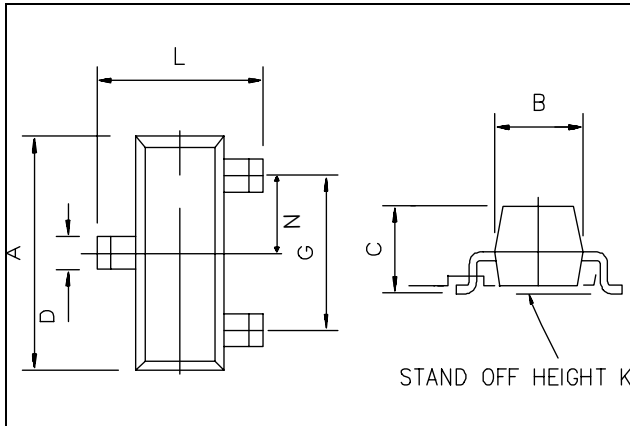
ZXM61N02F

TYPICAL CHARACTERISTICS



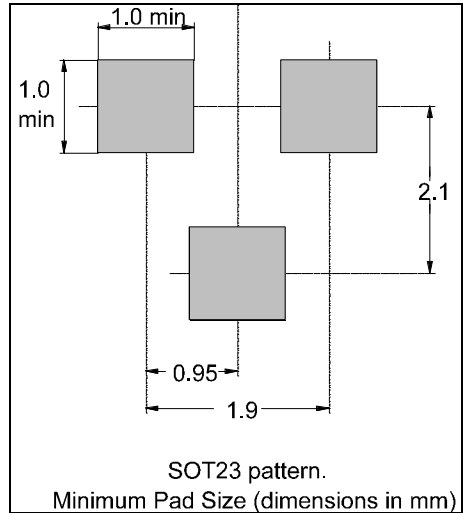
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PACKAGE DIMENSIONS



DIM	Millimetres		Inches	
	Min	Max	Min	Max
A	2.67	3.05	0.105	0.120
B	1.20	1.40	0.047	0.055
C	-	1.10	-	0.043
D	0.37	0.53	0.0145	0.021
F	0.085	0.15	0.0033	0.0059
G	NOM 1.9		NOM 0.075	
K	0.01	0.10	0.0004	0.004
L	2.10	2.50	0.0825	0.0985
N	NOM 0.95		NOM 0.037	

PAD LAYOUT DETAILS



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N-Ch Enhancement mode MOSFET

Red-G Green-D Blue-S

$V_{gs(on)}=1,637V$ at $I_d=5,02mA$ and $I_g=0\mu A$

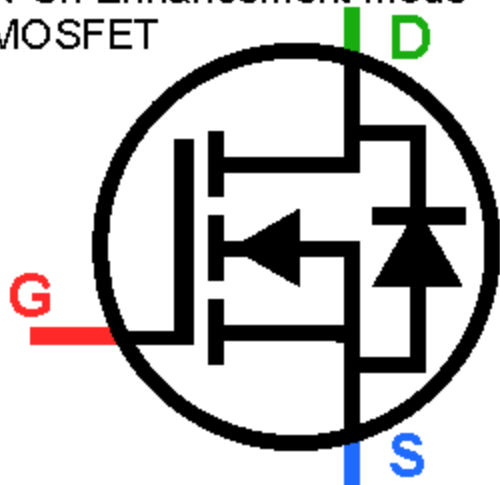
$V_{gs(off)}=1,159V$ at $I_d=5,2\mu A$

$g_m=55,7mA/V$ at $I_d=3,0mA$ to $5,0mA$

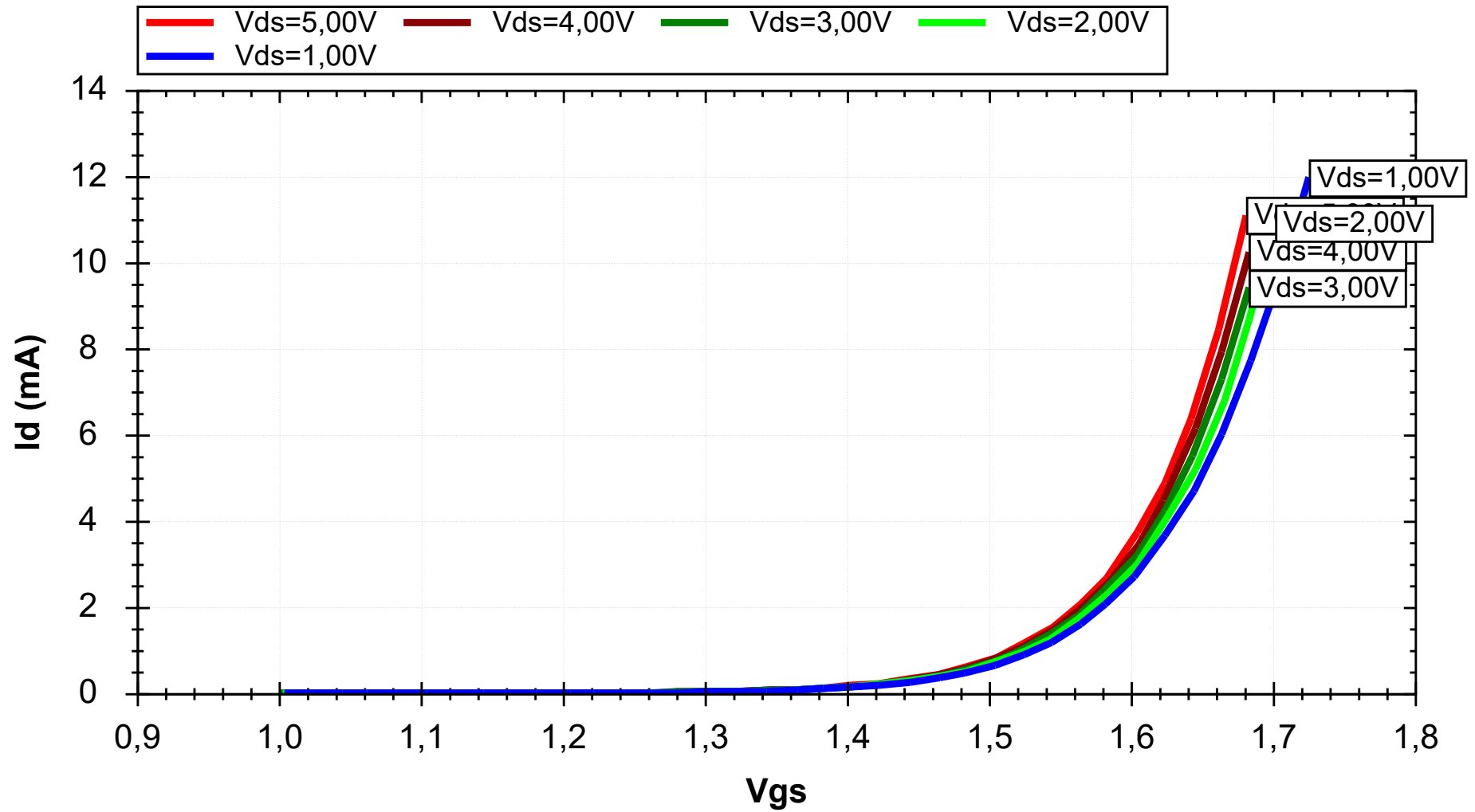
$R_{ds(on)}<1.0\Omega$ at $I_d=5,0mA$ and $V_{gs}=8,0V$
with body diode

Gate Source Drain

N-Ch Enhancement mode
MOSFET



ZXM61N02F MOSFET Id / Vgs



SPICE MODEL FÜR ZXM61N02F

[ZXM61N02F]

*ZETEX ZXM61N02F Spice Model v1.0 Last Revised 24/2/04

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*
.SUBCKT ZXM61N02F 3 4 5
*----connections----D-G-S
*
M1 6 20 8 8 MOSMOD
M2 6 20 8 8 MOSMODS
RG 4 2 6
RIN 2 8 200E6
RD 3 6 RMOD1 0.03
RS 8 5 RMOD1 0.0225
RL 3 5 35E6
C1 2 8 158E-12
C3 15 14 175E-12
C4 16 8 183E-12
D1 5 3 DMOD1
D2 17 3 DMOD2
S1 2 15 14 13 SMOD1a
S2 13 15 14 13 SMOD1b
S3 16 13 13 8 SMOD2a
S4 16 2 13 8 SMOD2b
Egs1 2 17 2 8 1
Egs2 13 8 2 8 1
Eds1 14 8 3 8 1
Egt1 2 20 21 8 -1
Vgt1 8 22 1
Igt1 8 21 1
Rgt 21 22 RMOD2 1
.MODEL MOSMOD NMOS VTO=1.35 IS=1E-15 KP=5.5 CBD=90E-12 LAMBDA=4.9E-3
.MODEL MOSMODS NMOS VTO=0.95 IS=1E-15 KP=0.055
.MODEL DMOD1 D IS=1E-13 RS=0.15 BV=24 IBV=1E-6 TT=9e-9
.MODEL DMOD2 D CJO=190e-12 IS=1e-30 N=10
.MODEL SMOD1a VSWITCH RON=1e-2 ROFF=1e4 VON=-1.75 VOFF=2.75
.MODEL SMOD1b VSWITCH RON=1e-2 ROFF=1e4 VON=2.75 VOFF=-1.75
.MODEL SMOD2a VSWITCH RON=1e2 ROFF=1e4 VON=-1.5 VOFF=-3.5
.MODEL SMOD2b VSWITCH RON=1e-2 ROFF=1e4 VON=-3.5 VOFF=-1.5
.MODEL RMOD1 RES (TC1=2.5E-3 TC2=1.8E-5)
.MODEL RMOD2 RES (TC1=3.3E-3 TC2=1.5E-6)
.ENDS ZXM61N02F
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*$
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