



ZVN4424A/C

**N-CHANNEL ENHANCEMENT
MODE VERTICAL DMOS FET**

ISSUE 3 - August 1994

ZVN4424A/C

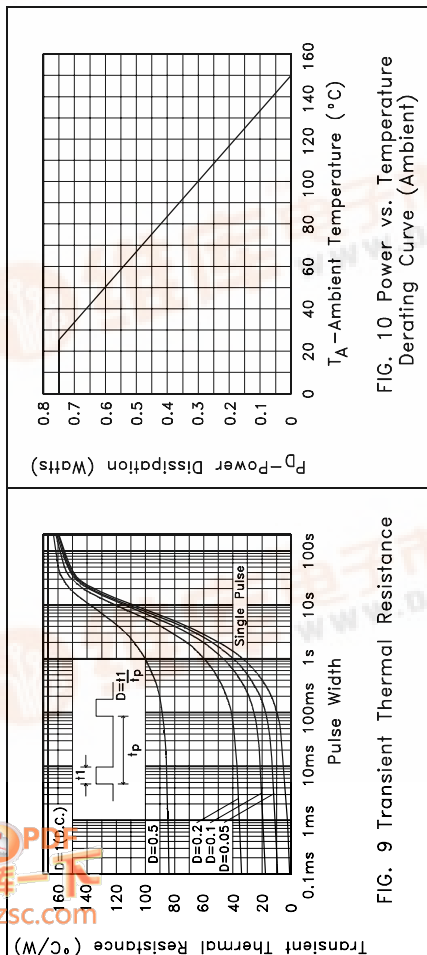


FIG. 9 Transient Thermal Resistance Derating Curve

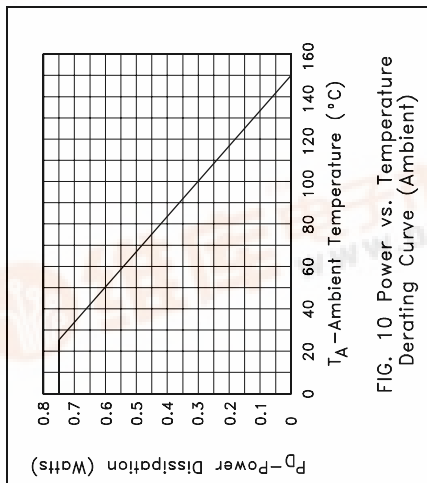
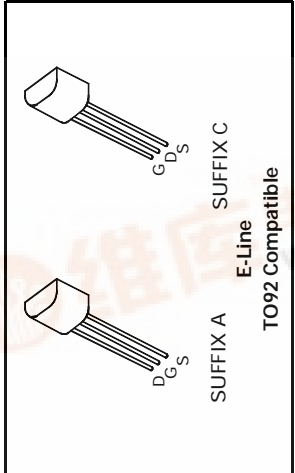


FIG. 10 Power vs. Temperature Derating Curve

- FEATURES**
- * Compact E-LINE (TO92 style) package
 - * 240 Volt BV_{DS}
 - * R_{DS(on)}=4.3Ω Typical at V_{GS}=2.5V
 - * Low threshold
 - * Fast switching
- APPLICATIONS**
- * Earth recall and dialling switches
 - * Electronic hook switches
 - * Battery powered equipment
 - * Telecoms and high voltage dc-dc converters



PACKAGE PARAMETERS

ZVN4424 MODEL LAST REVISION 1/94

SUBCKT ZVN4424 30 40 50

NODES: DRAIN GATE SOURCE

1 1 30 20 50 50 MOD1 L=1 W=1

CG 40 20 200

RL 30 50 240E6

1 1 50 30 DIODE1

MODEL MOD1 NMOS VTO=1.25 RS=2.34 RD=1.634 IS=1E-15 KP=5.319

CGS0=101P CGD0=4P CBD=66.2P PB=1

MODEL DIODE1 D IS=5.516E-13 RS=0.2084 N=1.0078

ENDS ZVN4424

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TYPICAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Drain-Source Breakdown Voltage	BV _{DSS}	240			V	I _D =1mA, V _{GS} =0V
Gate-Source Threshold Voltage	V _{GS(th)}	0.8	1.3	1.8	V	I _D =1mA, V _{DS} =V _{GS}
Gate-Body Leakage	I _{GSS}		100		nA	V _{GS} =±40V, V _{DS} =0V
Zero Gate Voltage Drain Current	I _{DSS}		10 100		μA μA	V _{DS} =240V, V _{GS} =0 V _{DS} =190V, V _{GS} =0V, T=125°C
On-State Drain Current	I _{D(on)}	0.8	1.4		A	V _{DS} =10V, V _{GS} =10V
Static Drain-Source On-State Resistance	R _{DS(on)}	4 4.3	5.5 6		Ω Ω	V _{GS} =10V, I _D =500mA V _{GS} =2.5V, I _D =100mA
Forward Transconductance (1) (2)	g _{fs}	0.4	0.75		S	V _{DS} =10V, I _D =0.5A
Input Capacitance (2)	C _{iss}	110	200		pF	
Common Source Output Capacitance (2)	C _{oss}	15	25		pF	V _{DS} =25V, V _{GS} =0V, f=1MHz
Reverse Transfer Capacitance (2)	C _{rss}	3.5	15		pF	
Turn-On Delay Time (2)(3)	t _{d(on)}	2.5	5		ns	
Rise Time (2)(3)	t _r	5	8		ns	V _{DD} =50V, I _D =0.25A, V _{GEN} =10V
Turn-Off Delay Time (2)(3)	t _{d(off)}	40	60		ns	
Fall Time (2)(3)	t _f	16	25		ns	

*) Measured under pulsed conditions. Pulse width=300μs. Duty cycle ≤2% (2) Sample Test
 3) Switching times measured with 50Ω source impedance and >5ns rise time on pulse generator

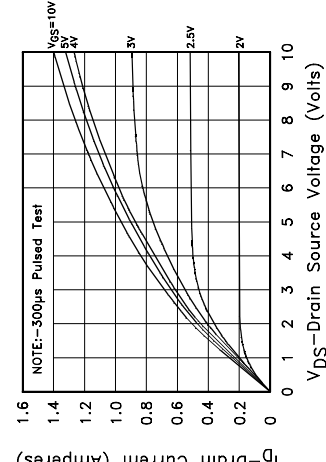


FIG. 1 Typical Saturation Characteristics

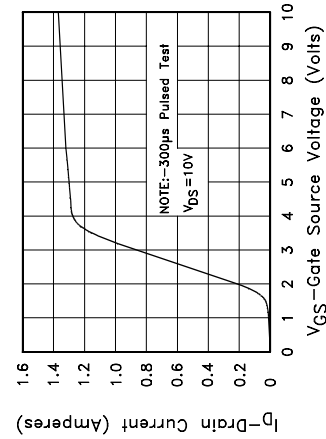


FIG. 2 Typical Transfer Characteristics

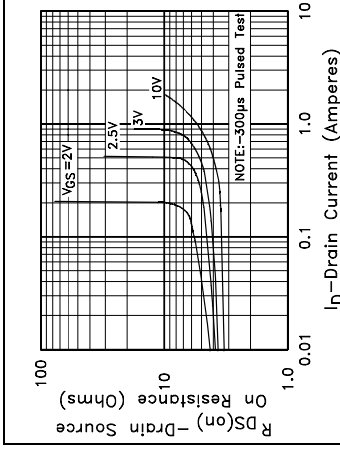


FIG. 3 Typical On Resistance vs. Drain Current

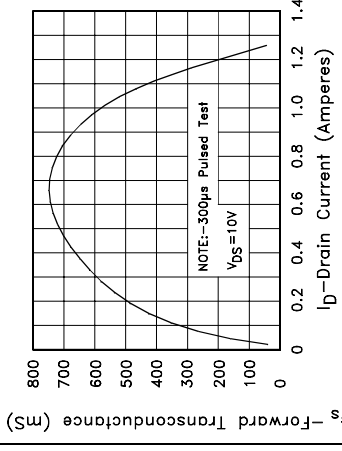


FIG. 5 Typical Transconductance vs. Drain Current

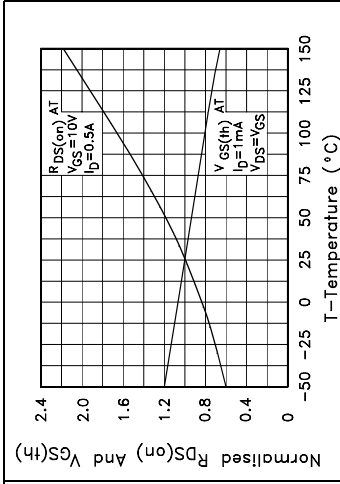


FIG. 4 Normalised R_{DS(on)} And V_{GS(th)} vs. Temperature

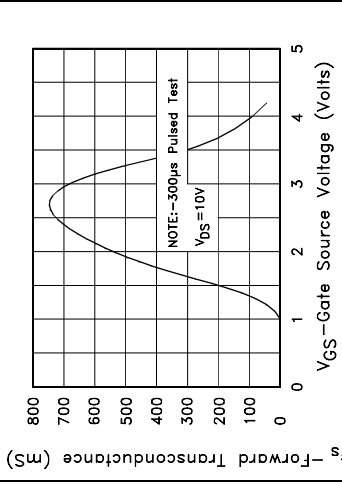


FIG. 6 Typical Transconductance vs. Gate-Source Voltage

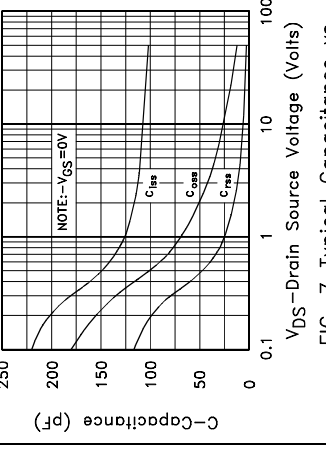


FIG. 7 Typical Capacitance vs. Drain-Source Voltage

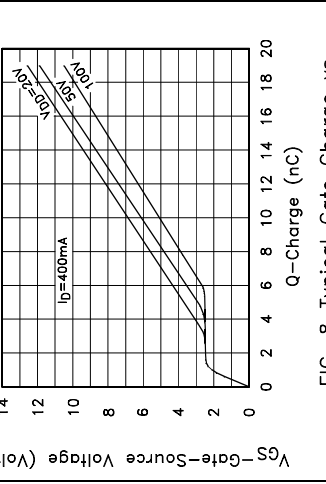


FIG. 8 Typical Gate Charge vs. Gate-Source Voltage

TYPICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Drain-Source Breakdown Voltage	BV_{DSS}	240			V	$I_D = 1\text{mA}$, $V_{GS} = 0\text{V}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	0.8	1.3	1.8	V	$I_D = 1\text{mA}$, $V_{DS} = V_{GS}$
Gate-Body Leakage	I_{GSS}		100		nA	$V_{GS} = \pm 40\text{V}$, $V_{DS} = 0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}		10 100		μA μA	$V_{DS} = 240\text{V}$, $V_{GS} = 0$ $V_{DS} = 190\text{V}$, $V_{GS} = 0\text{V}$, $T = 125^{\circ}\text{C}$
On-State Drain Current	$I_{D(on)}$	0.8	1.4		A	$V_{DS} = 10\text{V}$, $V_{GS} = 10\text{V}$
Static Drain-Source On-State Resistance	$R_{DS(on)}$	4 4.3	5.5 6		Ω Ω	$V_{GS} = 10\text{V}$, $I_D = 500\text{mA}$ $V_{GS} = 2.5\text{V}$, $I_D = 100\text{mA}$
Forward Transconductance (1) (2)	g_{fs}	0.4	0.75		S	$V_{DS} = 10\text{V}$, $I_D = 0.5\text{A}$
Input Capacitance (2)	C_{iss}		110	200	pF	
Common Source Output Capacitance (2)	C_{oss}		15	25	pF	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$
Reverse Transfer Capacitance (2)	C_{rss}		3.5	15	pF	
Turn-On Delay Time (2)(3)	$t_{d(on)}$		2.5	5	ns	
Rise Time (2)(3)	t_r		5	8	ns	$V_{DD} = 50\text{V}$, $I_D = 0.25\text{A}$, $V_{GEN} = 10\text{V}$
Turn-Off Delay Time (2)(3)	$t_{d(off)}$		40	60	ns	
Fall Time (2)(3)	t_f		16	25	ns	

*) Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$ (2) Sample Test
 3) Switching times measured with 50 Ω source impedance and >5ns rise time on pulse generator

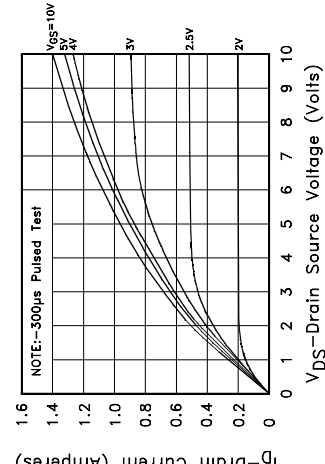


FIG. 1 Typical Saturation Characteristics

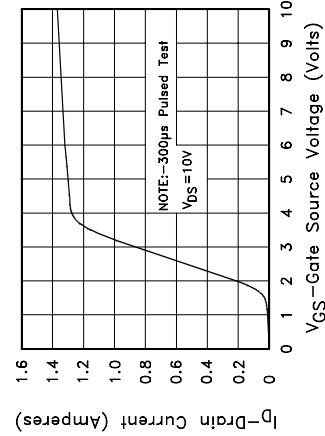


FIG. 2 Typical Transfer Characteristics

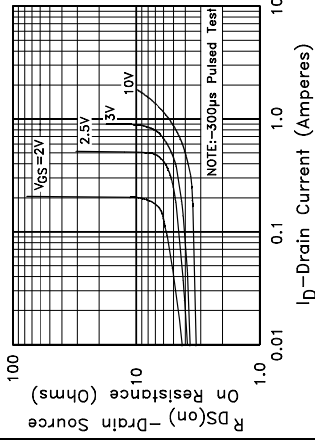


FIG. 3 Typical On Resistance vs. Drain Current

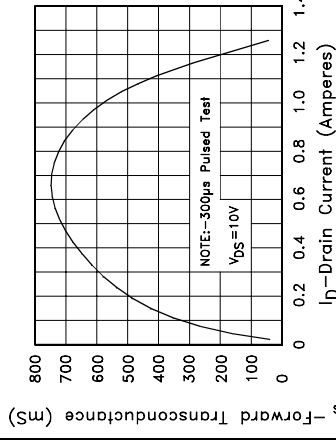


FIG. 5 Typical Transconductance vs. Drain Current

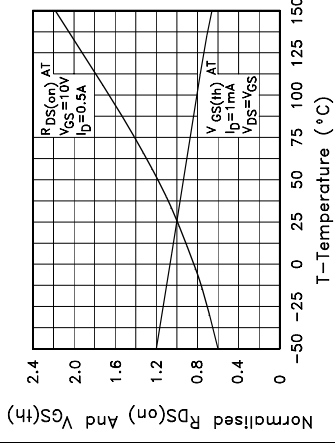


FIG. 4 Normalised $R_{DS(on)}$ And $V_{GS(th)}$ vs. Temperature

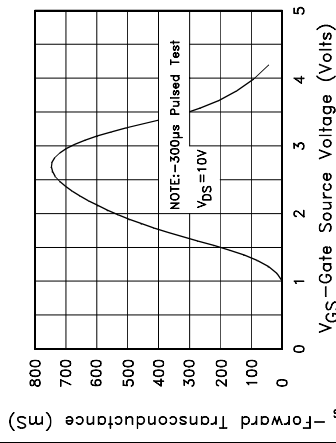


FIG. 6 Typical Transconductance vs. Gate-Source Voltage

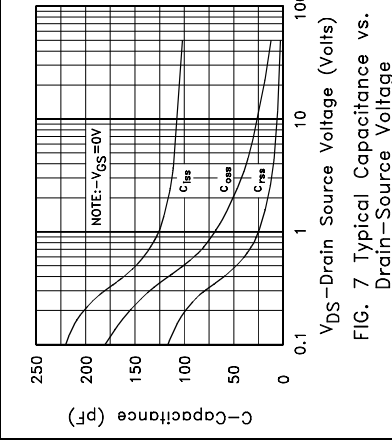


FIG. 7 Typical Capacitance vs. Drain-Source Voltage

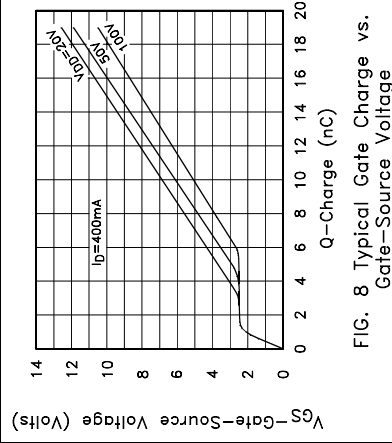


FIG. 8 Typical Gate Charge vs. Gate-Source Voltage

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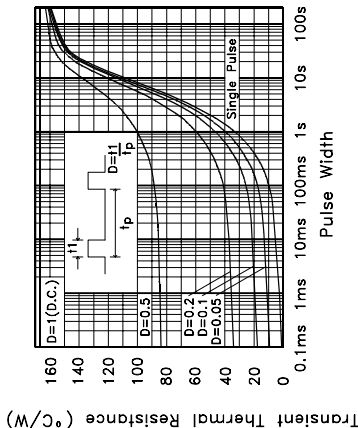


FIG. 9 Transient Thermal Resistance

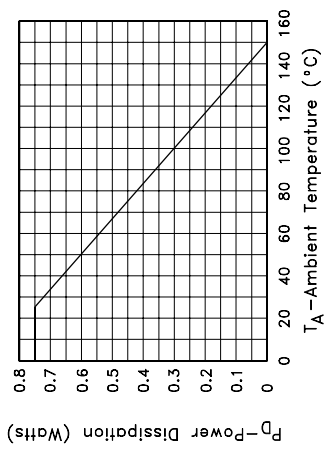


FIG. 10 Power vs. Temperature Derating Curve (Ambient)

PACKAGE PARAMETERS

ZVN4424 MODEL LAST REVISION 1/94

SUBCKT ZVN4424 30 40 50

NODES: DRAIN GATE SOURCE

M1 30 20 50 50 MOD1 L=1 W=1

CG 40 20 200

DL 30 50 240E6

D1 50 30 DIODE1

MODEL MOD1 NMOS VTO=1.25 RS=2.34 RD=1.634 IS=1E-15 KP=5.319

CGS0=101P CGD0=4P CBD=66.2P PB=1

MODEL DIODE1 D IS=5.516E-13 RS=0.2084 N=1.0078

ENDS ZVN4424

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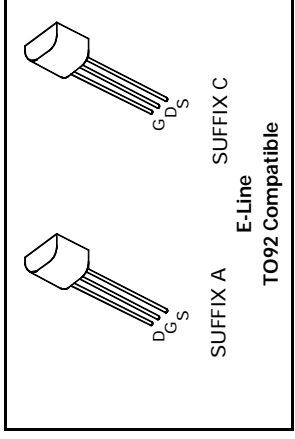
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FEATURES

- * Compact E-LINE (TO92 style) package
- * 240 Volt BV_{DS}
- * R_{DS(on)}=4.3Ω Typical at V_{GS}=2.5V
- * Low threshold
- * Fast switching

APPLICATIONS

- * Earth recall and dialling switches
- * Electronic hook switches
- * Battery powered equipment
- * Telecoms and high voltage dc-dc converters



ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Drain-Source Voltage	V _{DS}	240	V
Continuous Drain Current at T _{amb} =25°C	I _D	260	mA
Pulsed Drain Current	I _{DM}	1.5	A
Gate Source Voltage	V _{GS}	± 40	V
Power Dissipation at T _{amb} =25°C	P _{tot}	750	mW
Operating and Storage Temperature Range	T _j , T _{stg}	-55 to +150	°C

