

**N-channel enhancement
mode vertical DMOS FET****T-3909**
ZVN2120**FEATURES**

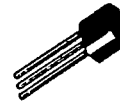
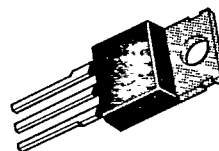
- Compact geometry
- Fast switching speeds
- No secondary breakdown
- Excellent temperature stability
- High input impedance
- Low current drive
- Ease of paralleling

DESCRIPTION

A compact interdigitated geometry forms the basis of this Ferranti MOSFET. Optimised for low on-resistance, low capacitance and fast switching this device is manufactured using the latest computer controlled processing techniques in order to achieve greater stability, reliability and ruggedness.

PRODUCT SUMMARY

Part No.	BV_{DSS}	I_D	$R_{DS(on)}$
ZVN2120A	200V	0.18A	10 Ω
ZVN2120B	200V	0.46A	10 Ω
ZVN2120L	200V	0.5A	10 Ω

**E-LINE (TO-92)
SUFFIX A****TO-39
SUFFIX B****TO-220
SUFFIX L**

ZVN2120

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ABSOLUTE MAXIMUM RATINGS

Parameters	E-line	TO-39	TO-220	Units
V_{DS} Drain-source voltage	200	200	200	V
I_D Continuous drain current (@ $T_A = 25^\circ\text{C}$)	0.18	0.18	0.27	A
I_D Continuous drain current (@ $T_C = 25^\circ\text{C}$)	—	0.46	0.50	A
I_{DM} Pulse drain current	2	2	2	A
V_{GS} Gate-source voltage	± 20	± 20	± 20	V
P_D Max. power dissipation (@ $T_A = 25^\circ\text{C}$)	0.7	0.7	1.5	W
P_D Max. power dissipation (@ $T_C = 25^\circ\text{C}$)	—	5	20	W
T_J, T_{stg} Operating/storage temperature range	-55 to +150			$^\circ\text{C}$

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

Parameter	Min.	Max.	Unit	Conditions
BV_{DSS} Drain-source breakdown voltage	200	—	V	$I_D = 1\text{mA}$, $V_{GS} = 0\text{V}$
$V_{GS(th)}$ Gate-source threshold voltage	1	3	V	$I_D = 1\text{mA}$, $V_{DS} = V_{GS}$
I_{GSS} Gate body leakage	—	20	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
I_{DSS} Zero gate voltage drain current	—	10	μA	$V_{DS} = \text{Max. rating}$, $V_{GS} = 0\text{V}$
	—	100	μA	$V_{DS} = 0.8 \times \text{Max. rating}$ $V_{GS} = 0\text{V}$ ($T = 125^\circ\text{C}$) (2)
$I_{D(on)}$ On-state drain current (1)	500	—	mA	$V_{DS} = 25\text{V}$, $V_{GS} = 10\text{V}$
$R_{DS(on)}$ Static drain-source on-state resistance (1)	—	10	Ω	$I_D = 250\text{mA}$, $V_{GS} = 10\text{V}$
g_{fs} Forward transconductance (1) (2)	100	—	mS	$V_{DS} = 25\text{V}$, $I_D = 250\text{mA}$
C_{iss} Input capacitance (2)	—	85	pF	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
C_{oss} Common source output capacitance (2)	—	20	pF	
C_{rss} Reverse transfer capacitance (2)	—	7	pF	
$t_{d(on)}$ Turn-on delay time (2) (3)	—	8	ns	$V_{DD} \approx 25\text{V}$, $I_D = 250\text{mA}$
t_r Rise time (2) (3)	—	8	ns	
$t_{d(off)}$ Turn-off delay time (2) (3)	—	20	ns	
t_f Fall time (2) (3)	—	12	ns	

(1) Measured under pulsed conditions. Width = $300\mu\text{s}$. Duty cycle $\leq 2\%$.

(2) Sample test.

(3) Switching times measured with 50Ω source impedance and $< 5\text{ns}$ rise time on a pulse generator.

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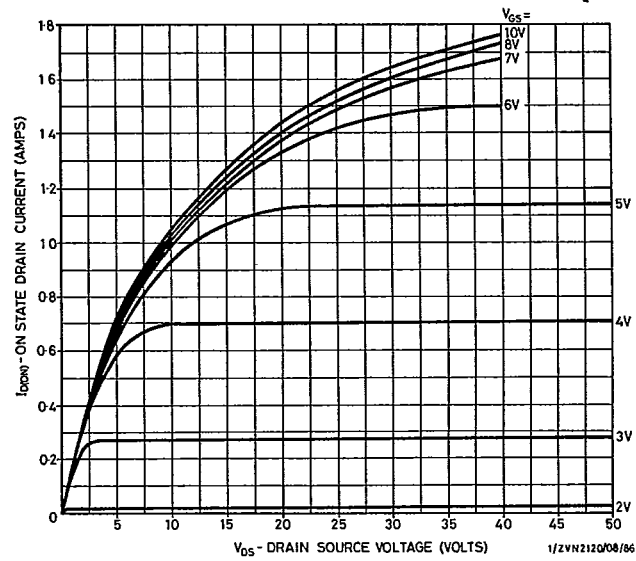


Fig. 1 Typical output characteristics

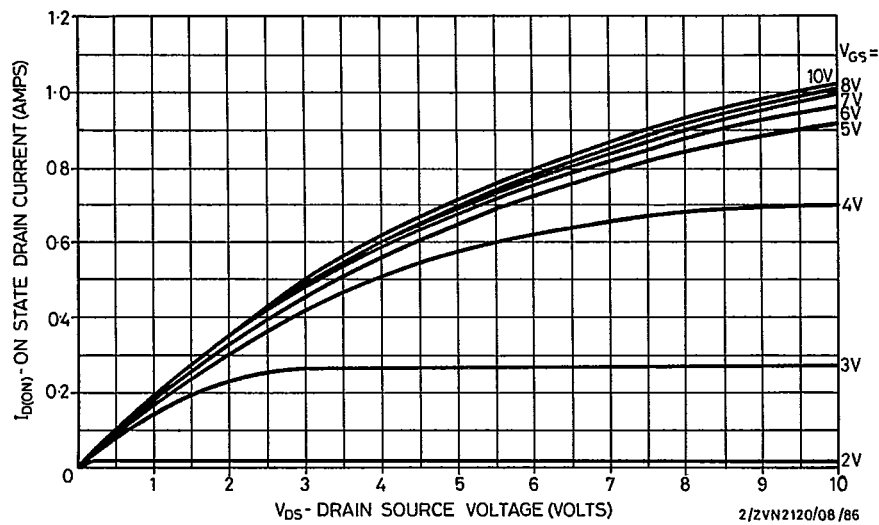
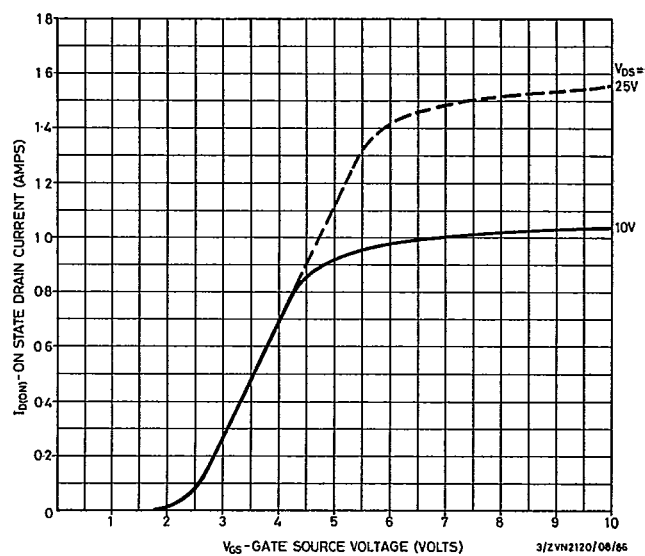
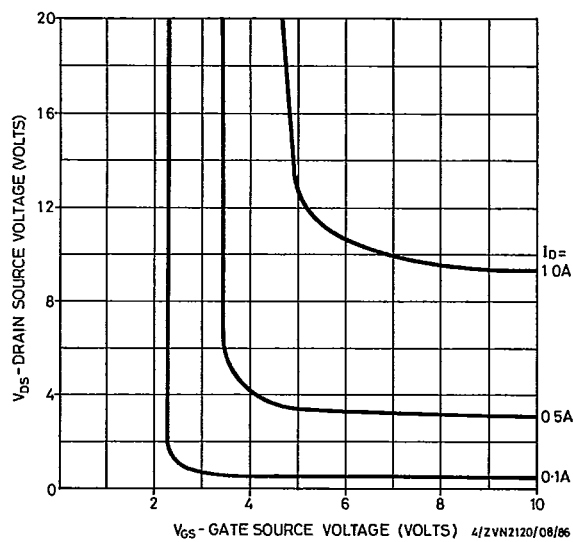


Fig. 2 Typical saturation characteristics

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ZVN2120**Fig. 3 Typical transfer characteristics****Fig. 4 Typical voltage saturation characteristics**

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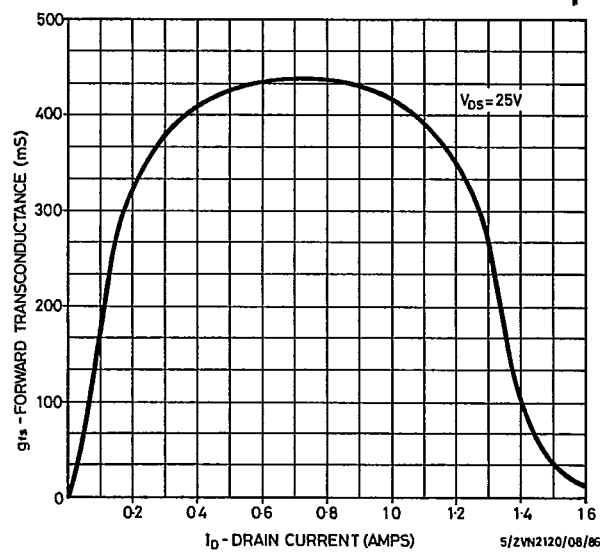


Fig. 5 Typical transconductance v drain current

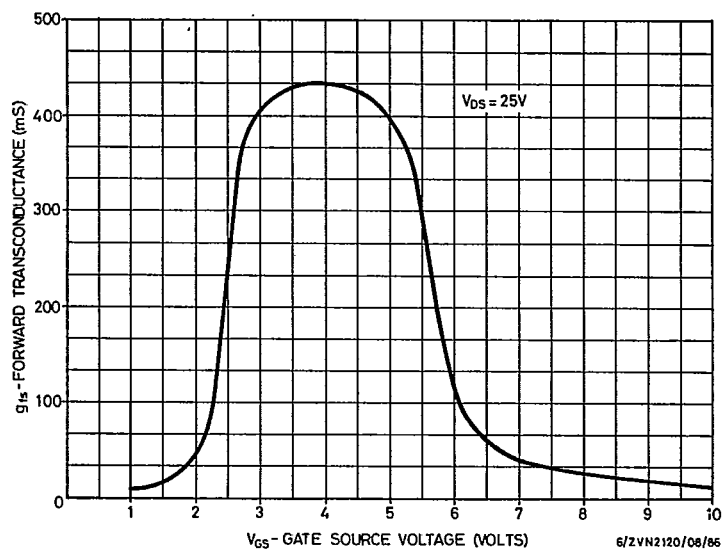


Fig. 6 Typical transconductance v gate-source voltage

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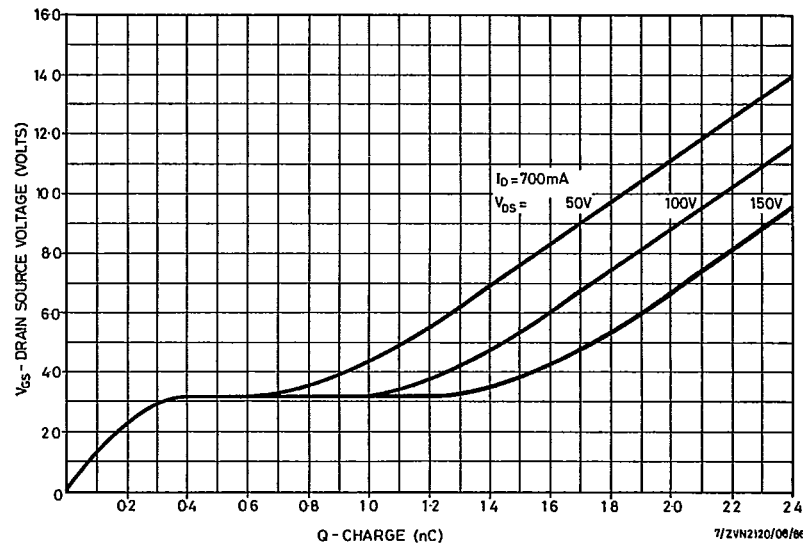


Fig. 7 Typical gate charge v gate-source voltage

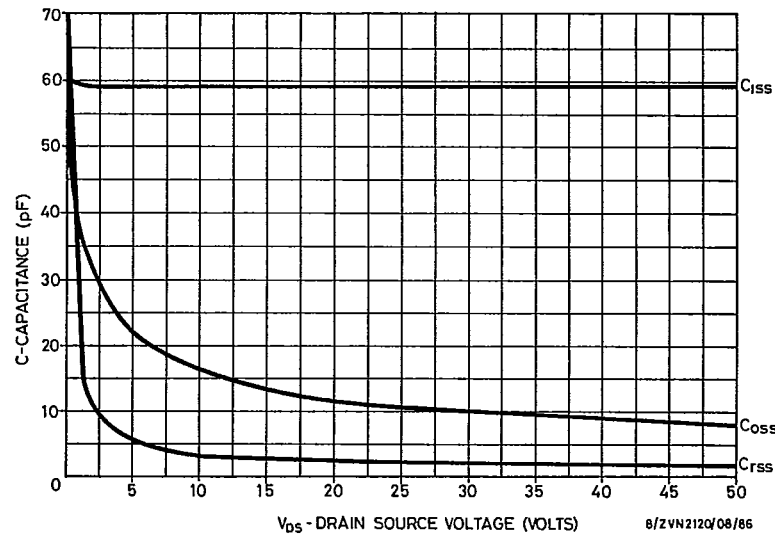


Fig. 8 Typical capacitance v drain-source voltage

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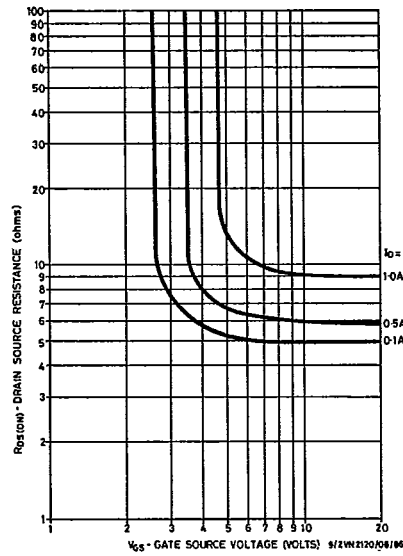
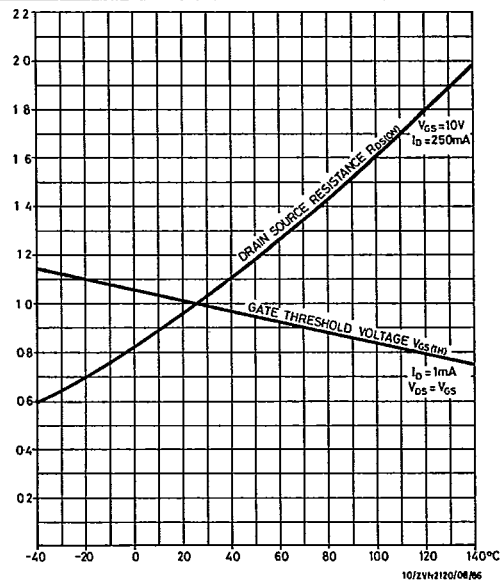


Fig. 9 Typical on-resistance v gate-source voltage

Fig. 10 Normalised $R_{DS(on)}$ and $V_{GS(th)}$ v temperature

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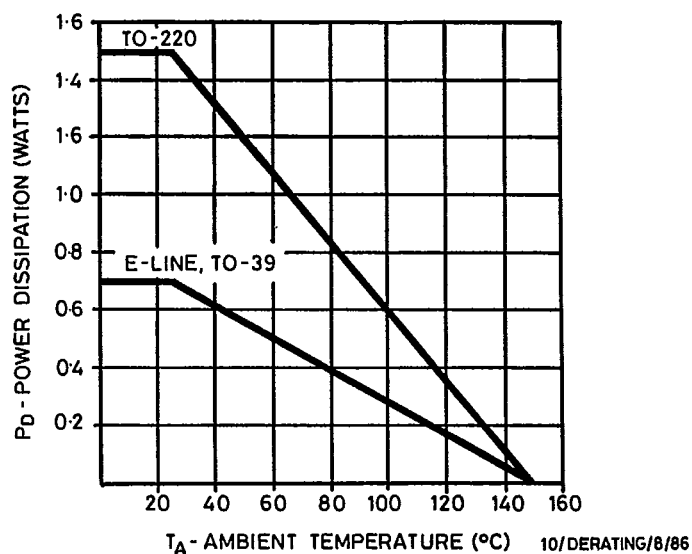


Fig. 11 Power v temperature derating curve (ambient)

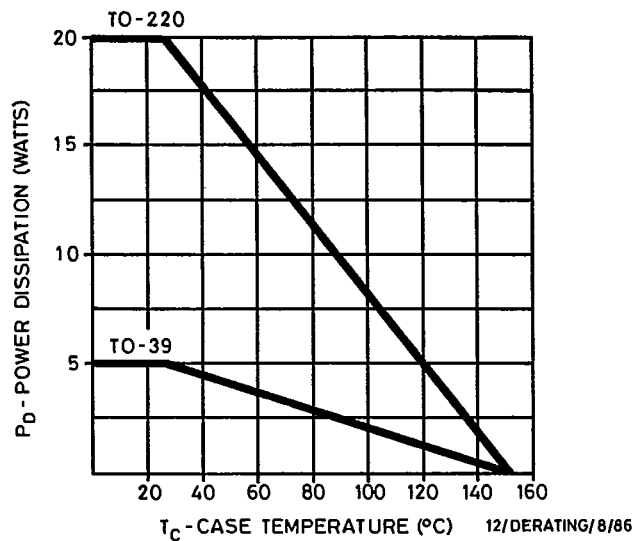
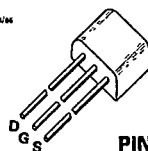
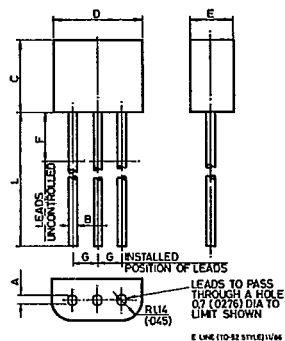


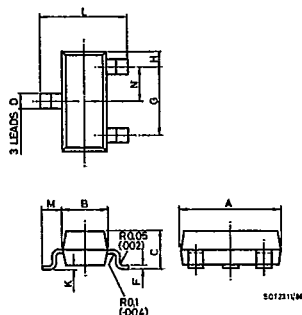
Fig. 12 Power v temperature derating curve (case)

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PACKAGE DETAILS*T-91-20***E-Line (TO-92 style)****PIN CONFIGURATION**

DIMENSION	MILLIMETRES		INCHES	
	MIN	MAX	MIN	MAX
A	0.41	0.495	0.016	0.0195
B	0.41	0.495	0.016	0.0195
C	3.61	4.01	0.142	0.158
D	4.37	4.77	0.172	0.188
E	2.16	2.41	0.085	0.095
F		2.5		0.098
G	1.27 NOM		0.050 NOM	
L	12.06	13.97	0.475	0.550

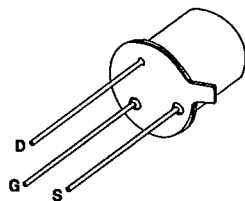
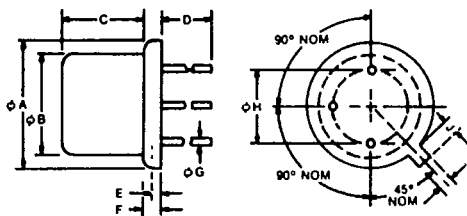
Available on tape on reels. Please enquire for details.

SOT-23**PIN CONFIGURATION**

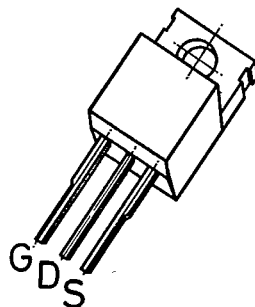
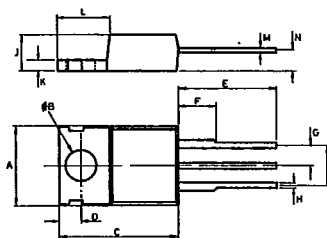
DIMENSION	MILLIMETRES		INCHES	
	MIN	MAX	MIN	MAX
A	2.75	3.04	0.108	0.120
B	1.2	1.4	0.047	0.055
C	0.89	1.12	0.035	0.044
D	0.37	0.43	0.0145	0.017
F	0.085	0.14	0.0034	0.0055
G	1.78	2.04	0.070	0.080
H	0.33	0.51	0.013	0.020
K	0.075	0.125	0.003	0.005
L	2.10	2.5	0.0825	0.0985
M	0.45	0.64	0.018	0.025
N	0.89	1.02	0.035	0.040

Available in tape on reels. Please enquire for details.

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T-91-20**PACKAGE DETAILS****TO-39****PIN CONFIGURATION**

DIMENSION	INCHES		MILLIMETRES	
	MIN	MAX	MIN	MAX
ØA	0.350	0.370	8.99	9.40
ØB	0.306	0.335	7.77	8.51
C	0.240	0.260	6.10	6.60
D	0.500		12.70	
E	0.009	0.023	0.229	0.548
F	0.018	0.045	0.458	1.143
ØG	0.016	0.021	0.406	0.533
ØH	0.190	0.210	4.83	5.33
I	0.028	0.037	0.711	0.939
J	0.026	0.040	0.660	1.016

TO-220**PIN CONFIGURATION**

DIMENSION	INCHES		MILLIMETRES	
	MIN	MAX	MIN	MAX
A	0.387	0.403	9.8	10.2
ØB	0.139	0.147	3.53	3.73
C	0.612	0.648	15.56	16.46
D	0.10	0.12	2.55	3.05
E	0.50	0.56	12.71	14.21
F		0.25		6.35
G	0.09	0.11	2.29	2.79
H	0.022	0.032	0.57	0.83
I	0.19	0.21	4.85	5.35
J	0.17	0.19	4.32	4.82
K	0.045	0.055	1.14	1.4
L	0.245	0.265	6.23	6.73
M	0.015	0.025	0.37	0.63
N	0.085	0.105	2.15	2.65