

## N-channel enhancement-mode vertical DMOS FET

T-39-11  
ZVN0120

### FEATURES

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

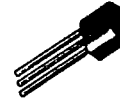
### DESCRIPTION

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.	$BV_{DSS}$	$I_D$	$R_{DS(on)}$
ZVN0120A	200V	0.16A	16 $\Omega$
ZVN0120B	200V	0.42A	16 $\Omega$
ZVN0120L*	200V	0.5A	16 $\Omega$

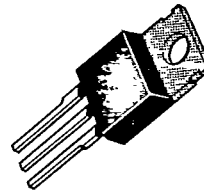
\*BS-CECC approved.



E-LINE (TO-92)  
SUFFIX A



TO-39  
SUFFIX B



TO-220  
SUFFIX L

## ZVN0120

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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 (@ $T_A = 25^\circ\text{C}$ )	0.16	0.16	0.23	A
$I_D$	Continuous drain current (@ $T_C = 25^\circ\text{C}$ )	-	0.42	0.5	A
$I_{DM}$	Pulse drain current	2	2	2	A
$V_{GS}$	Gate-source voltage	$\pm 20$	$\pm 20$	$\pm 20$	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.	Typ.	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	-	0.1	20	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
$I_{DSS}$	Zero gate voltage drain current	-	-	10	$\mu\text{A}$	$V_{DS} = \text{Max. rating}, V_{GS} = 0\text{V}$
		-	-	100	$\mu\text{A}$	$V_{DS} = 0.8 \times \text{Max. rating}, V_{GS} = 0\text{V} (T = 125^\circ\text{C}) (2)$
$I_{D(on)}$	On-state drain current (1)	0.5	1	-	A	$V_{DS} = 25\text{V}, V_{GS} = 10\text{V}$
$R_{DS(on)}$	Static drain-source on-state resistance (1)	-	-	16	$\Omega$	$I_D = 0.25\text{A}, V_{GS} = 10\text{V}$
$g_{fs}$	Forward transconductance (1) (2)	0.1	0.25	-	S	$V_{DS} = 25\text{V}, I_D = 0.25\text{A}$
$C_{iss}$	Input capacitance (2)	-	62	85	pF	} $V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
$C_{oss}$	Common source output capacitance (2)	-	9	20	pF	
$C_{rss}$	Reverse transfer capacitance (2)	-	2	7	pF	
$t_{d(on)}$	Turn-on delay time (2) (3)	-	3	7	ns	} $V_{DD} \approx 25\text{V}, I_D = 0.25\text{A}$
$t_r$	Rise time (2) (3)	-	2	8	ns	
$t_{d(off)}$	Turn-off delay time (2) (3)	-	11	16	ns	
$t_f$	Fall time (2) (3)	-	5	8	ns	

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SOURCE-DRAIN DIODE CHARACTERISTICS

Parameter	Typ.	Unit	Conditions	
$V_{SD}$	Forward ON voltage (1)	0.76	V	$V_{GS}=0V, I_S=0.16A$
$t_{rr}$	Reverse recovery time	105	ns	$V_{GS}=0V, I_F=0.16A, I_R=0.1A$

- (1) Measured under pulsed conditions. Width = 300 $\mu$ s. Duty cycle  $\leq$  2%.
- (2) Sample test.
- (3) Switching times measured with 50 $\Omega$  source impedance and < 5ns rise time on a pulse generator.

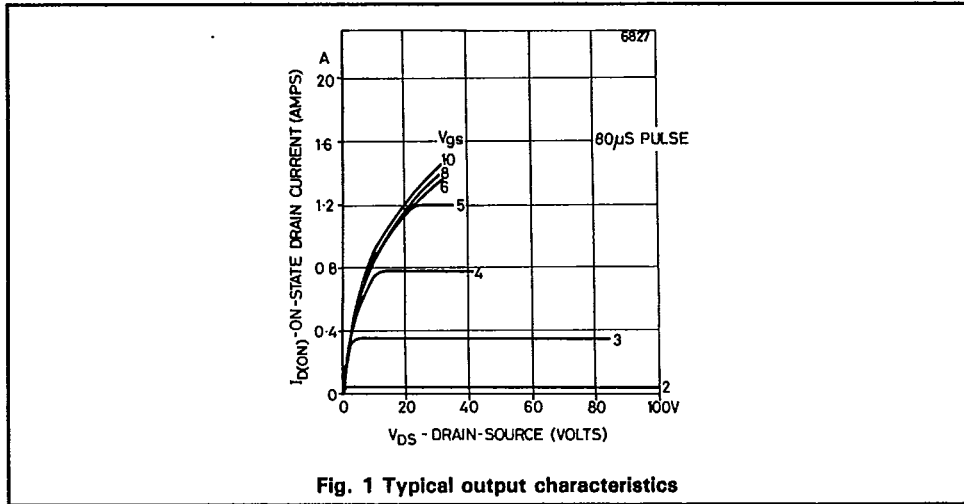


Fig. 1 Typical output characteristics

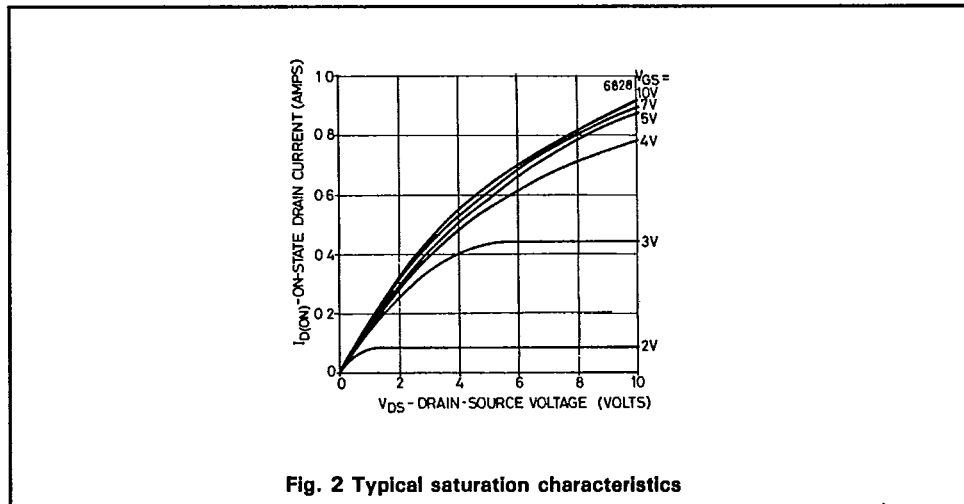
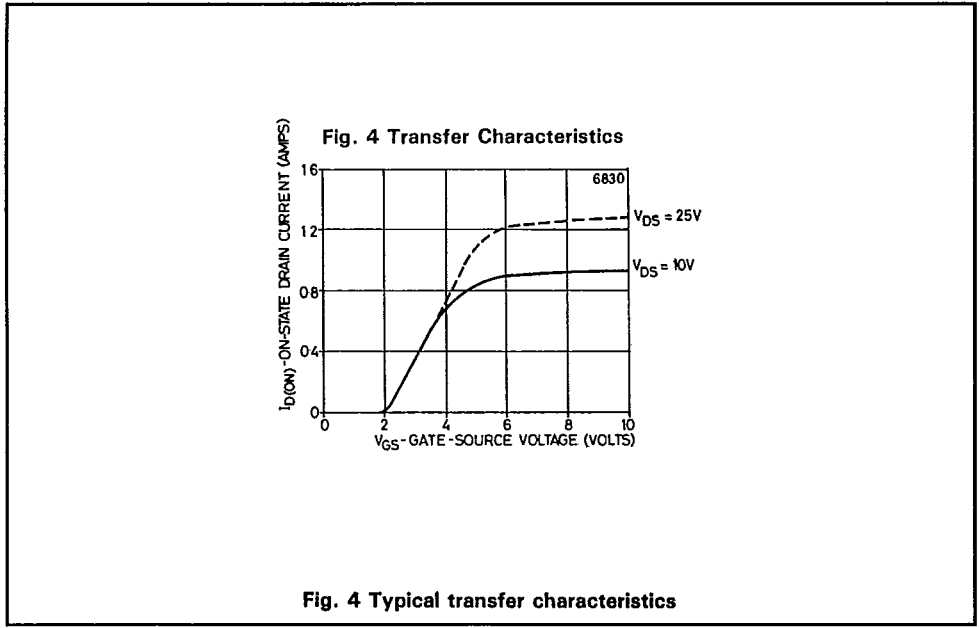
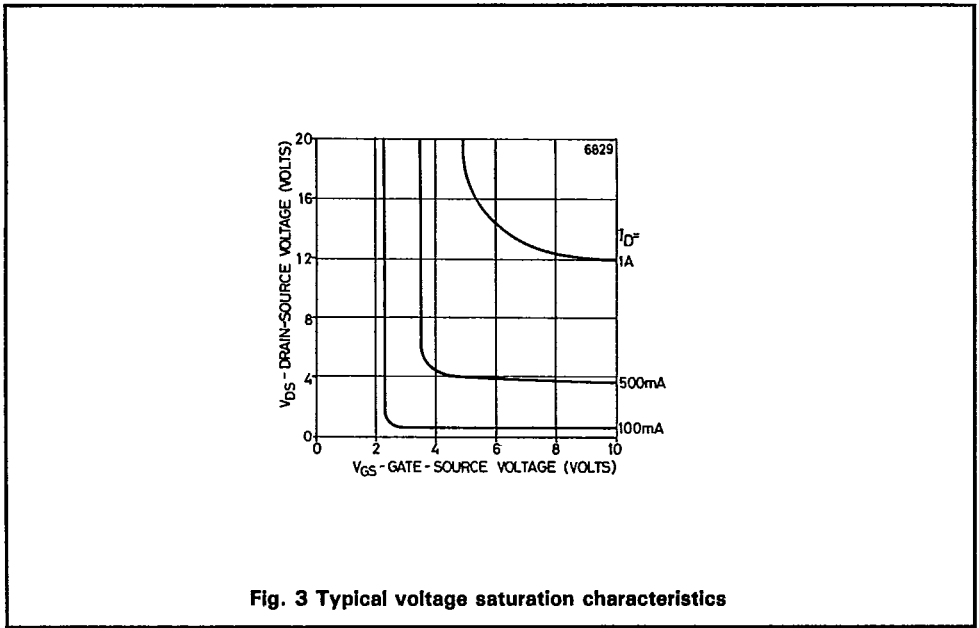


Fig. 2 Typical saturation characteristics

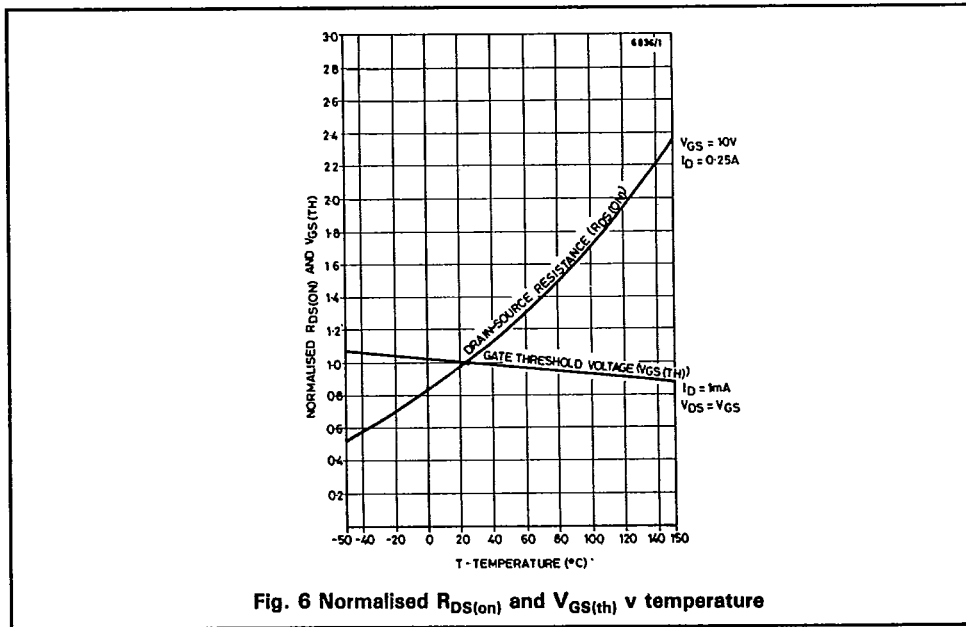
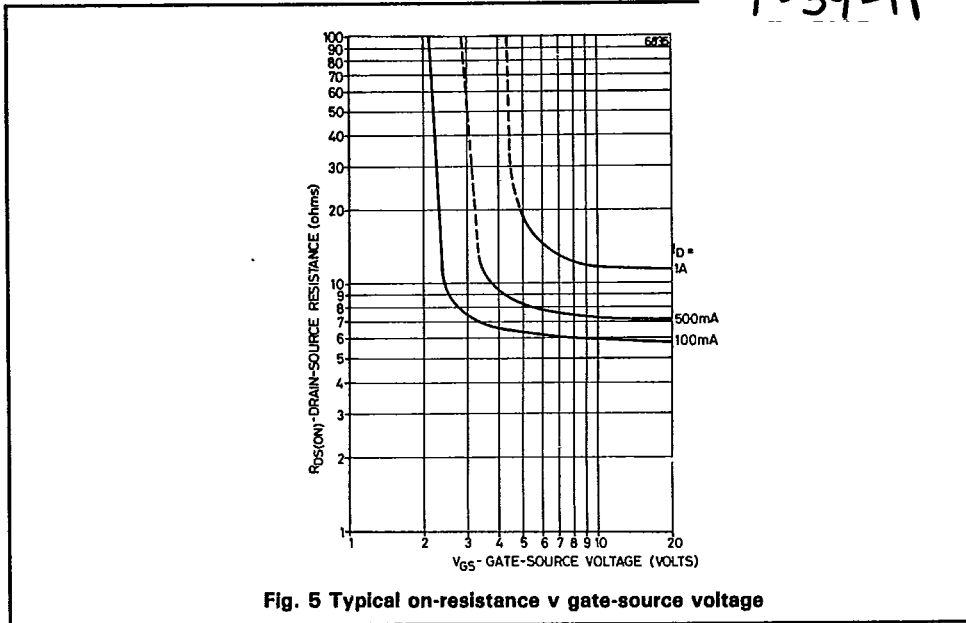
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# ZVN0120



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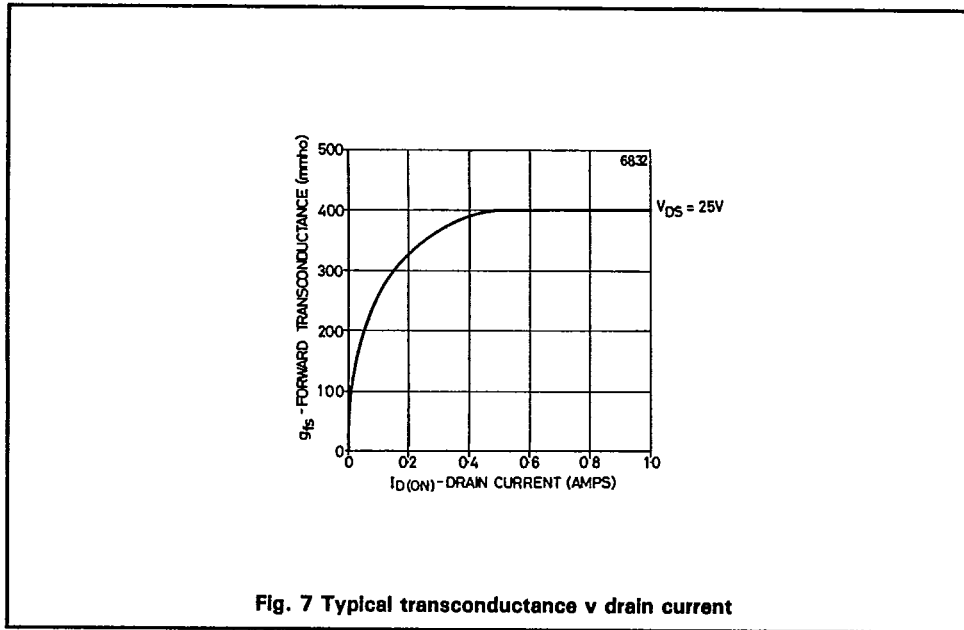


Fig. 7 Typical transconductance v drain current

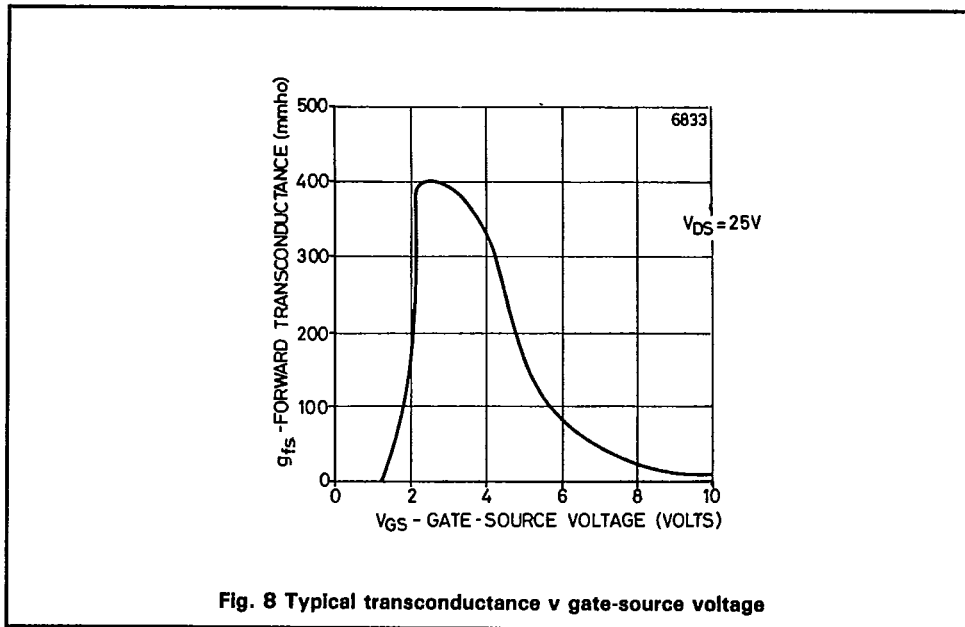


Fig. 8 Typical transconductance v gate-source voltage

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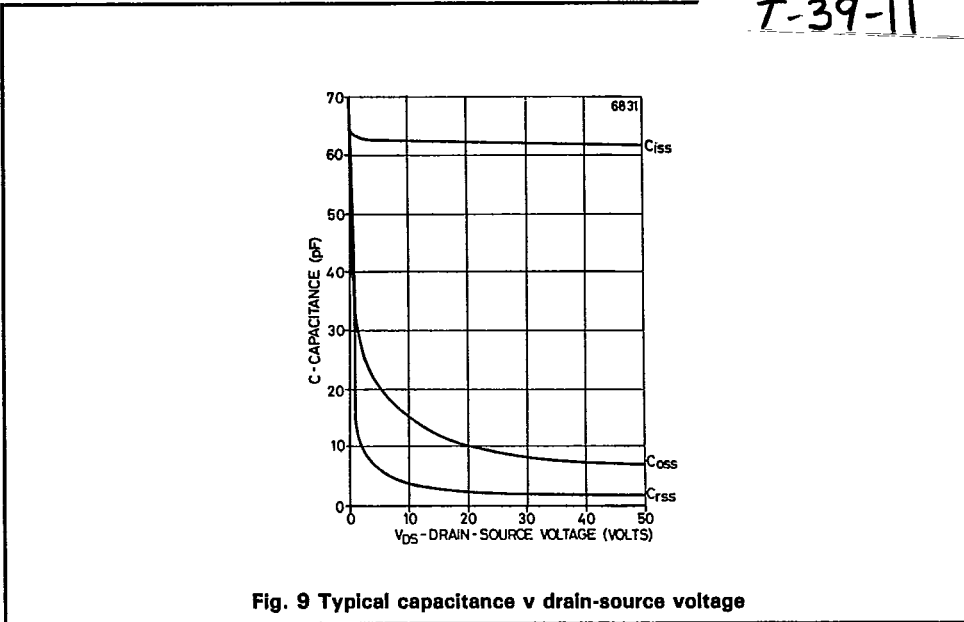


Fig. 9 Typical capacitance v drain-source voltage

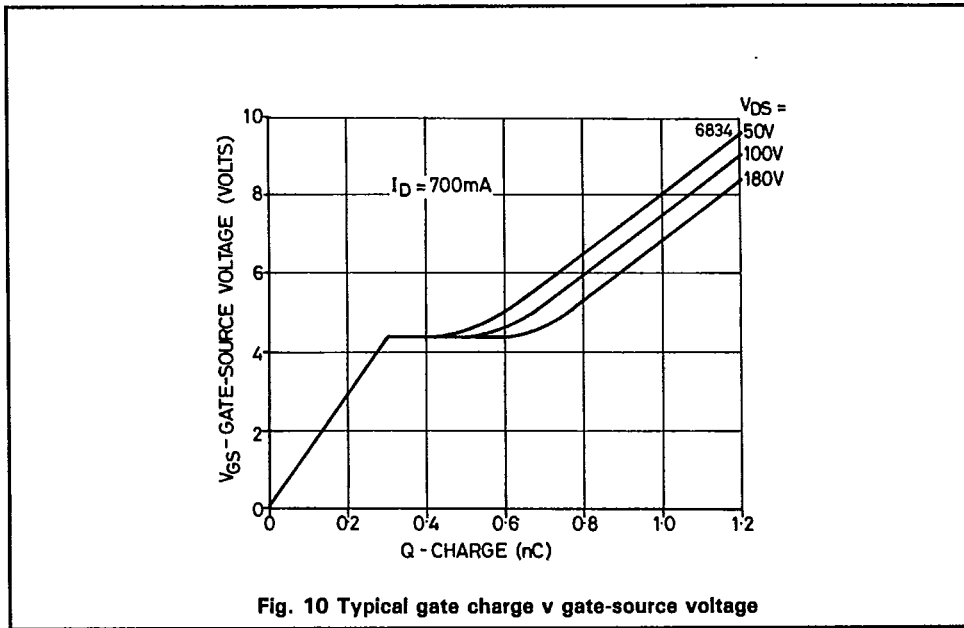


Fig. 10 Typical gate charge v gate-source voltage

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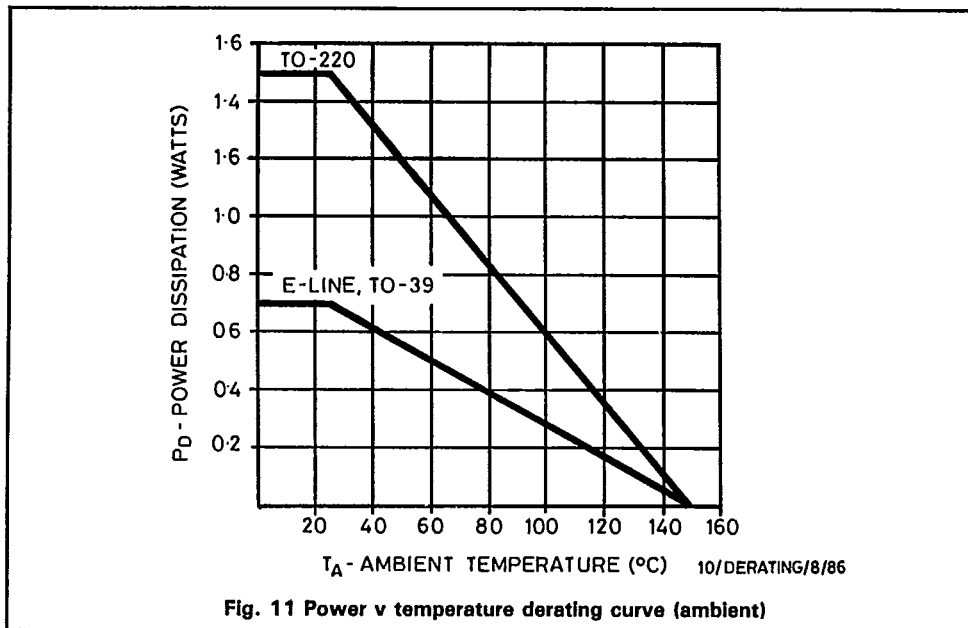


Fig. 11 Power v temperature derating curve (ambient)

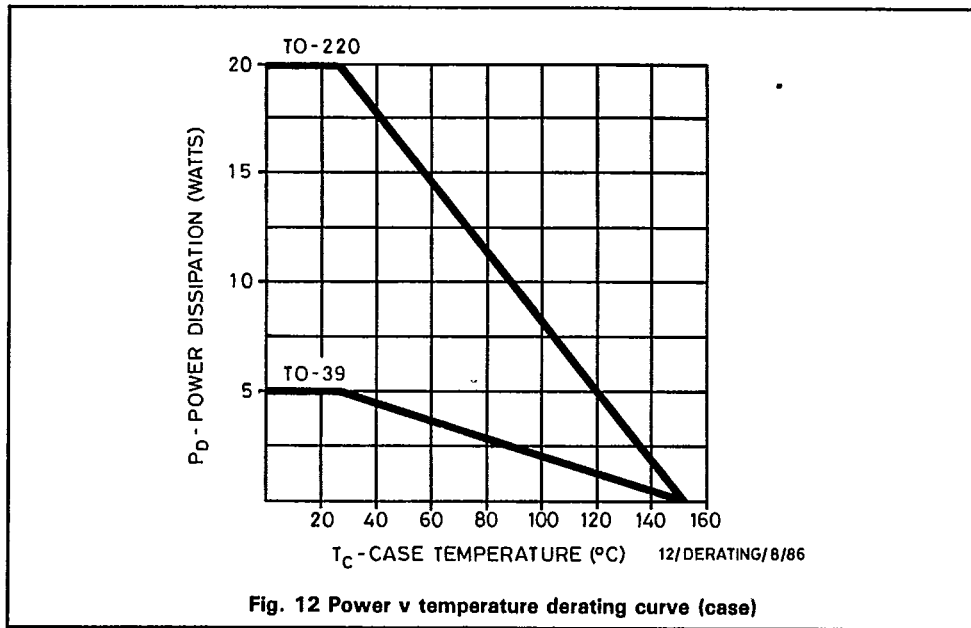


Fig. 12 Power v temperature derating curve (case)

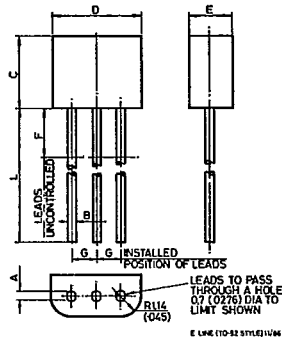


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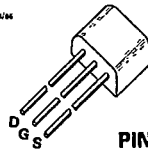
# PACKAGE DETAILS

*T-91-20*

## E-Line (TO-92 style)



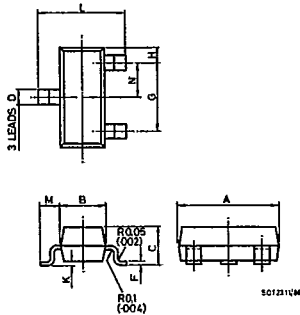
DIMENSION	MILLIMETRES		INCHES	
	MIN	MAX	MIN	MAX
A	0.41	0.495	0.016	0.0195
B	0.41	0.495	0.016	0.0195
C	3.61	4.01	0.142	0.158
D	4.37	4.77	0.172	0.188
E	2.16	2.41	0.085	0.095
F		2.5		0.098
G	1.27 NOM		0.050 NOM	
L	12.06	13.97	0.475	0.550



**PIN CONFIGURATION**

Available on tape on reels. Please enquire for details.

## SOT-23



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



**PIN CONFIGURATION**

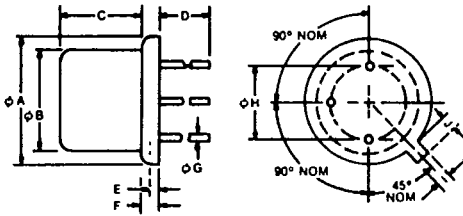
Available in tape on reels. Please enquire for details.

95D 05844 D

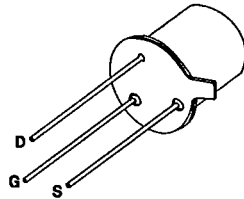
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# PACKAGE DETAILS

## TO-39

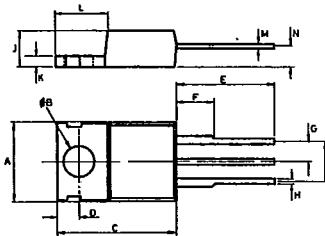


DIMENSION	INCHES		MILLIMETRES	
	MIN	MAX	MIN	MAX
ØA	0.350	0.370	8.99	9.40
ØB	0.306	0.335	7.77	8.51
C	0.240	0.260	6.10	6.60
D	0.500		12.70	
E	0.009	0.023	0.229	0.548
F	0.018	0.045	0.458	1.143
ØG	0.016	0.021	0.406	0.533
ØH	0.190	0.210	4.83	5.33
I	0.028	0.037	0.711	0.939
J	0.026	0.040	0.660	1.016

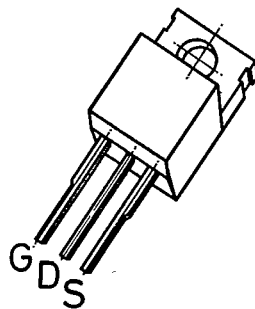


PIN CONFIGURATION

## TO-220



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



PIN CONFIGURATION