

95D 05785 D

## P-channel enhancement mode vertical DMOS FET

T-37-25  
ZVP2110

### 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.

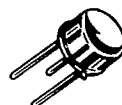
### PRODUCT SUMMARY

| Part No.  | $BV_{DSS}$ | $I_D$  | $R_{DS(on)}$ |
|-----------|------------|--------|--------------|
| ZVP2110A* | -100V      | -0.23A | 8Ω           |
| ZVP2110B* | -100V      | -0.60A | 8Ω           |
| ZVP2110L  | -100V      | -0.75A | 8Ω           |

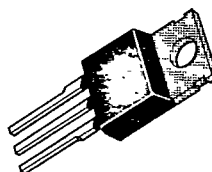
\*BS-CECC approved



E-LINE (TO-92)  
SUFFIX A



TO-39  
SUFFIX B



TO-220  
SUFFIX L

## ZVP2110

T-37-25

## ABSOLUTE MAXIMUM RATINGS

| Parameters                                                   | E-line      | TO-39    | TO-220   | Units            |
|--------------------------------------------------------------|-------------|----------|----------|------------------|
| $V_{DS}$ Drain-source voltage                                | -100        | -100     | -100     | V                |
| $I_D$ Continuous drain current (@ $T_A = 25^\circ\text{C}$ ) | -0.23       | -0.23    | -0.30    | A                |
| $I_D$ Continuous drain current (@ $T_C = 25^\circ\text{C}$ ) | -           | -0.60    | -0.75    | A                |
| $I_{DM}$ Pulsed drain current                                | -3          | -3       | -3       | 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. | Max. | Unit          | Conditions                                                                                      |
|----------------------------------------------------------|------|------|---------------|-------------------------------------------------------------------------------------------------|
| $BV_{DSS}$ Drain-source breakdown voltage                | -100 | -    | V             | $I_D = -1\text{mA}$ , $V_{GS} = 0\text{V}$                                                      |
| $V_{GS(th)}$ Gate-source threshold voltage               | -1.5 | -3.5 | 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                | -    | -1   | $\mu\text{A}$ | $V_{DS} = \text{Max. rating}$ , $V_{GS} = 0\text{V}$                                            |
|                                                          | -    | -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)                   | -750 | -    | mA            | $V_{DS} = -25\text{V}$ , $V_{GS} = -10\text{V}$                                                 |
| $R_{DS(on)}$ Static drain-source on-state resistance (1) | -    | 8    | $\Omega$      | $I_D = -375\text{mA}$ , $V_{GS} = -10\text{V}$                                                  |
| $g_{fs}$ Forward transconductance (1) (2)                | 125  | -    | mS            | $V_{DS} = -25\text{V}$ , $I_D = -375\text{mA}$                                                  |
| $C_{iss}$ Input capacitance (2)                          | -    | 100  | pF            | $V_{DS} = -25\text{V}$ , $V_{GS} = 0\text{V}$<br>$f = 1\text{MHz}$                              |
| $C_{oss}$ Common source output capacitance (2)           | -    | 35   | pF            |                                                                                                 |
| $C_{rss}$ Reverse transfer capacitance (2)               | -    | 10   | pF            |                                                                                                 |
| $t_{d(on)}$ Turn-on delay time (2) (3)                   | -    | 7    | ns            | $V_{DD} \approx -25\text{V}$ , $I_D = -375\text{mA}$                                            |
| $t_r$ Rise time (2) (3)                                  | -    | 15   | ns            |                                                                                                 |
| $t_{d(off)}$ Turn-off delay time (2) (3)                 | -    | 12   | ns            |                                                                                                 |
| $t_f$ Fall time (2) (3)                                  | -    | 15   | ns            |                                                                                                 |

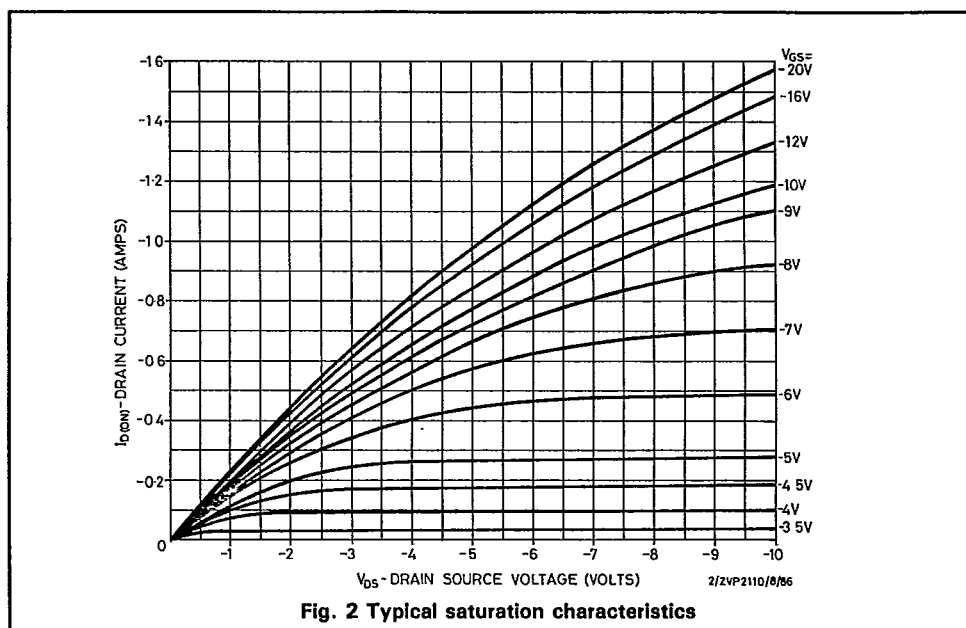
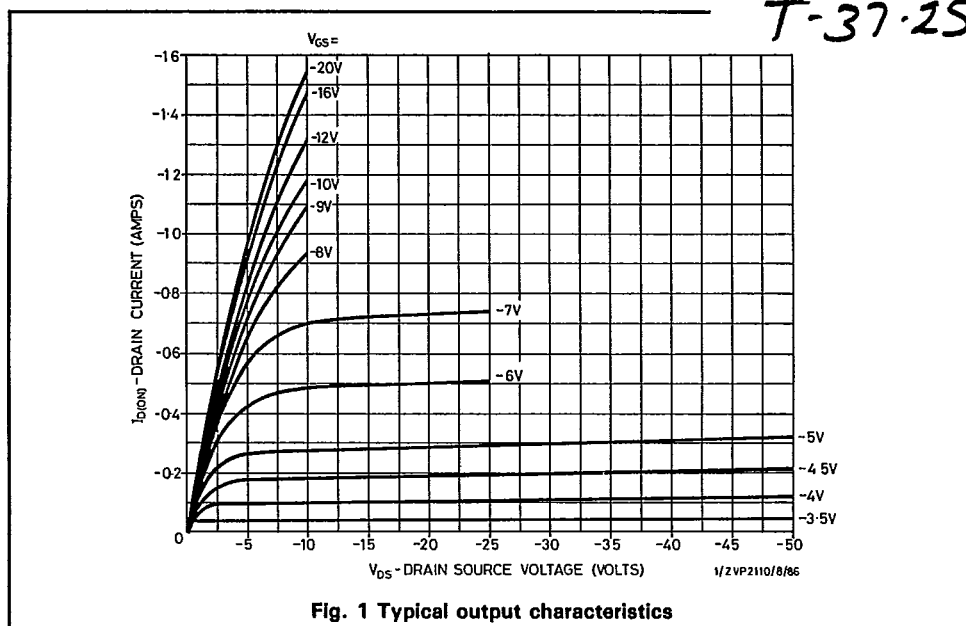
(1) Measured under pulsed conditions. Width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

(2) Sample test.

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

ZVP2110

T-37-25



## ZVP2110

T-37-25

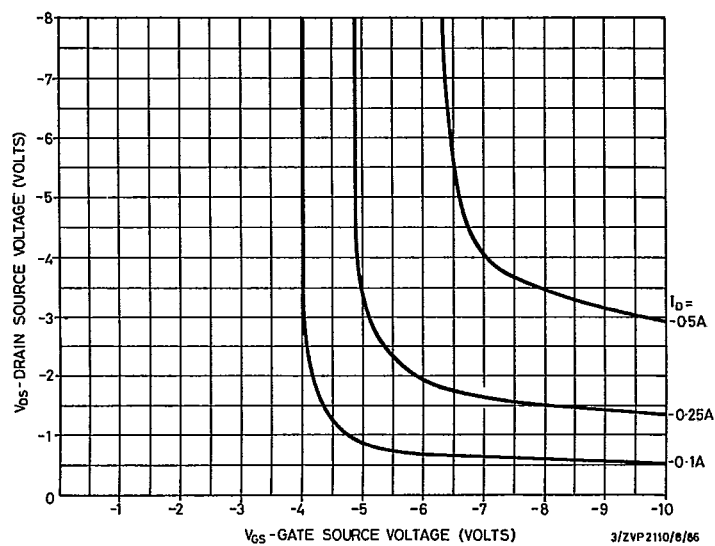


Fig. 3 Typical voltage saturation characteristics

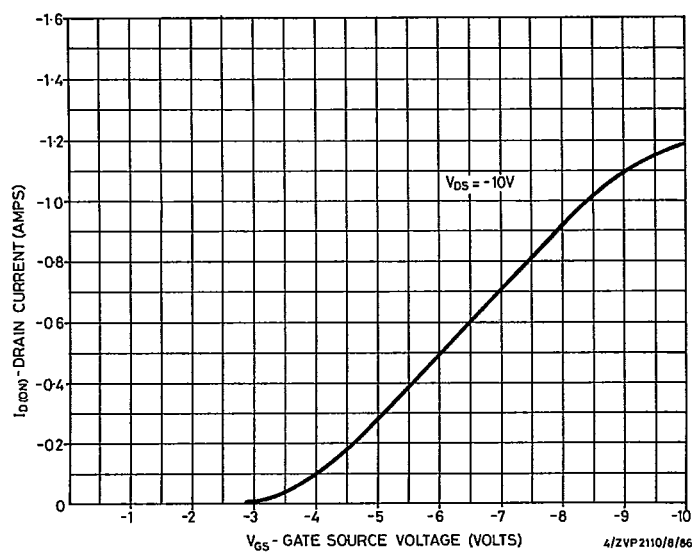


Fig. 4 Typical transfer characteristics

95D 05789 D

ZVP2110

T-37-25

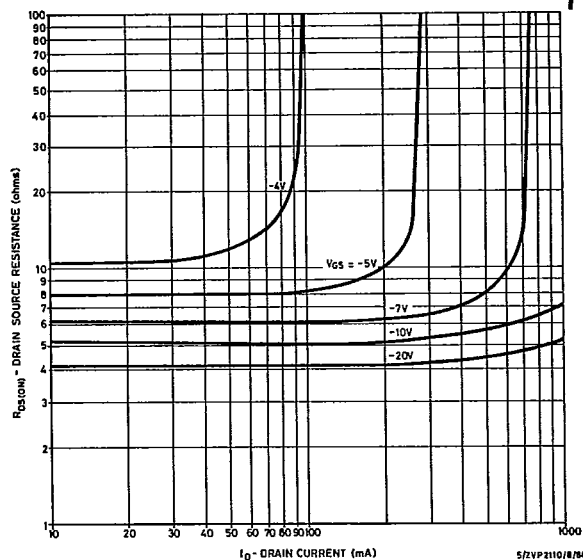
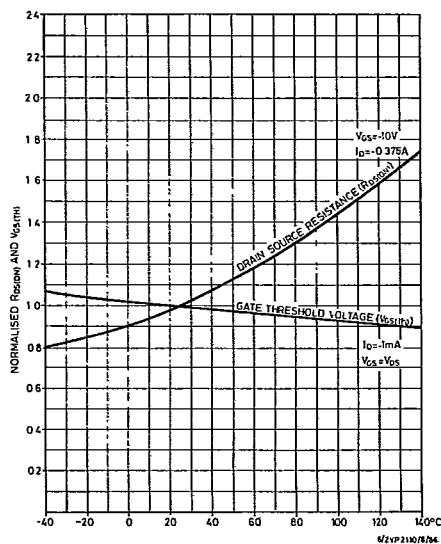


Fig. 5 Typical on-resistance v drain current

Fig. 6 Normalised  $R_{DS(on)}$  and  $V_{GS(th)}$  v temperature

ZVP2110

T-37-25

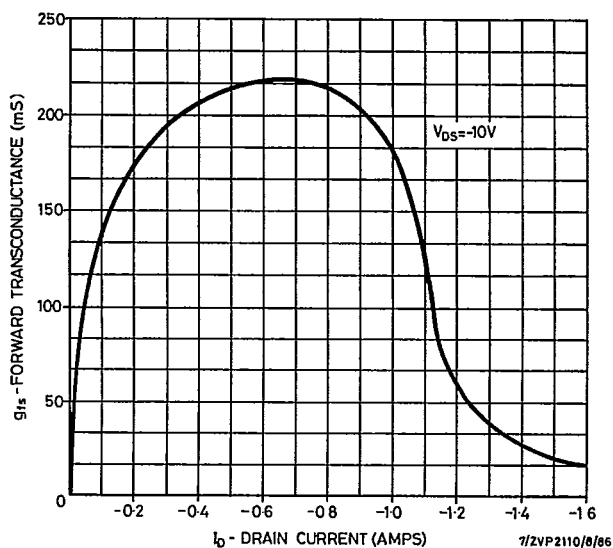


Fig. 7 Typical transconductance v drain current

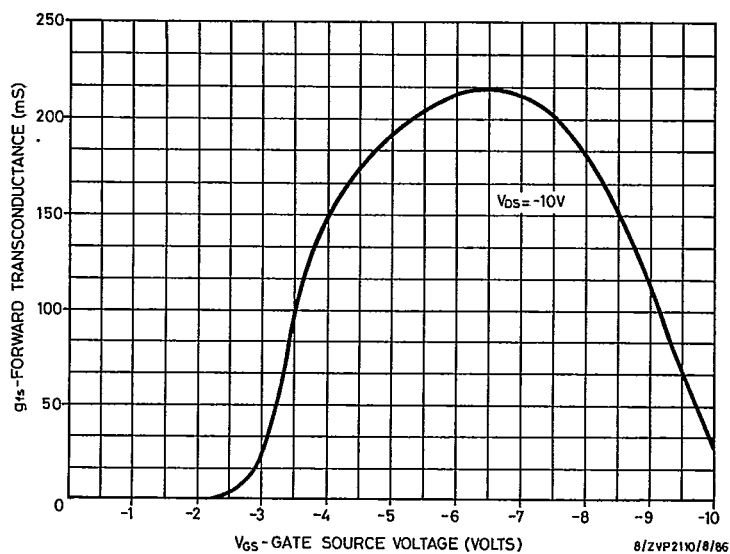


Fig. 8 Typical transconductance v gate-source voltage

95D 05791 D

ZVP2110

T-37-25

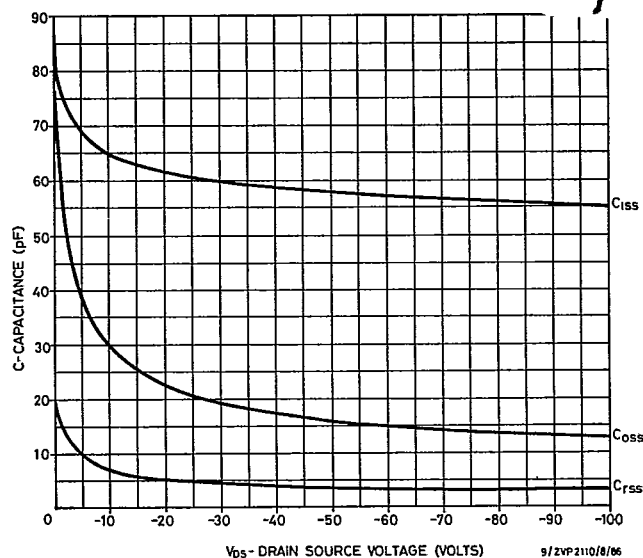


Fig. 9 Typical capacitance v drain-source voltage

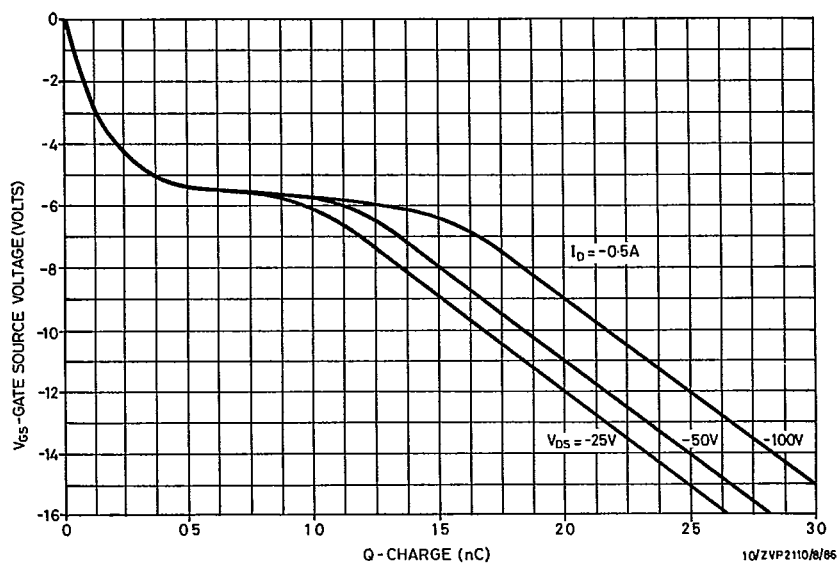


Fig. 10 Typical gate charge v gate-source voltage

T-37-25

## ZVP2110

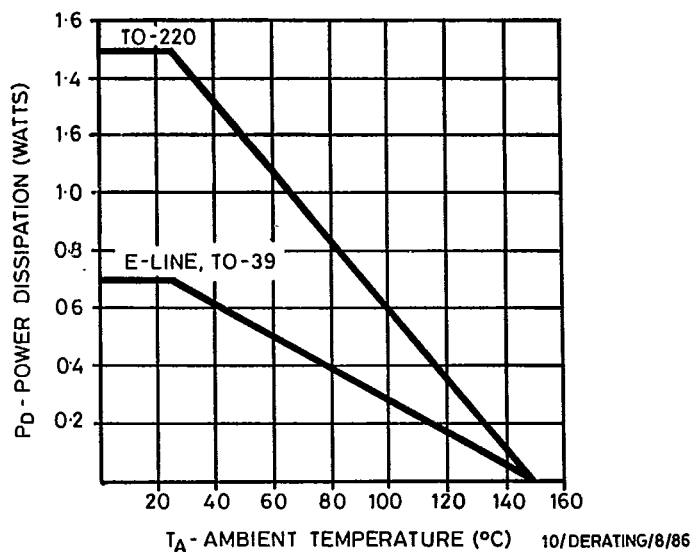


Fig. 11 Power v temperature derating curve (ambient)

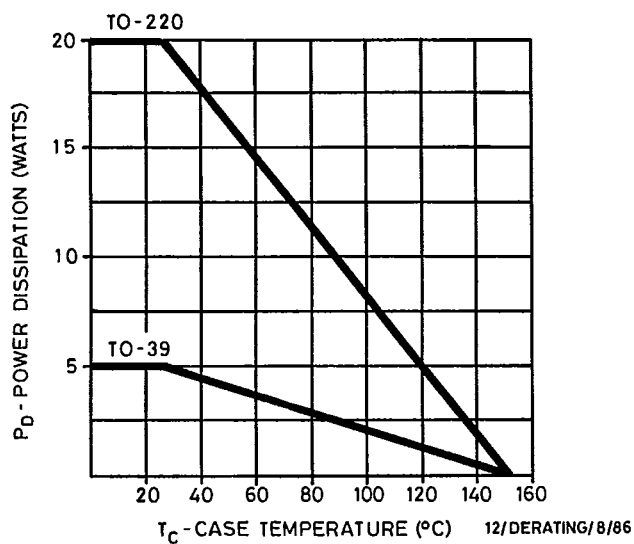
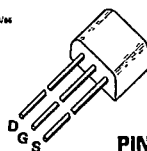
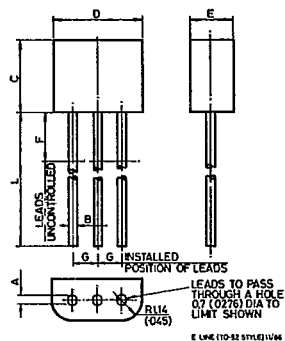


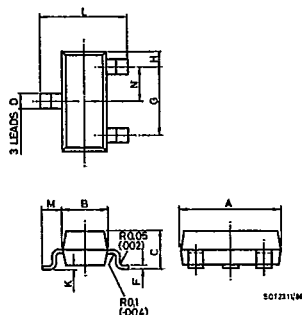
Fig. 12 Power v temperature derating curve (case)

95D 05843 D

**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  |

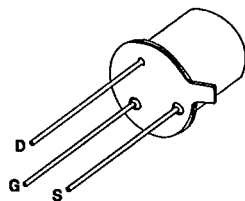
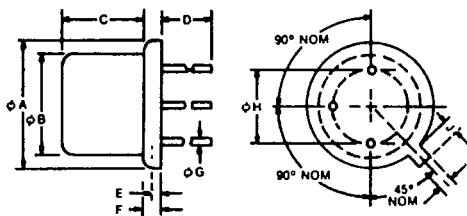
Available on tape on reels. Please enquire for details.

**SOT-23****PIN CONFIGURATION**

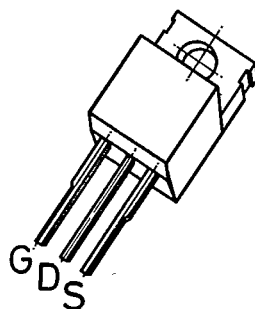
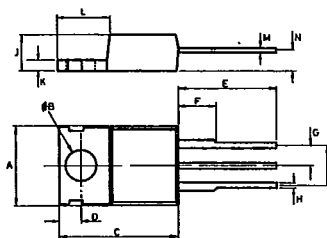
| DIMENSION | MILLIMETRES |       | INCHES |        |
|-----------|-------------|-------|--------|--------|
|           | MIN         | MAX   | MIN    | MAX    |
| A         | 2.75        | 3.04  | 0.108  | 0.120  |
| B         | 1.2         | 1.4   | 0.047  | 0.055  |
| C         | 0.89        | 1.12  | 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.

95D 05844 D

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  |