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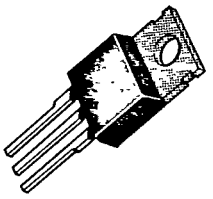
T-39-11

N-channel enhancement mode vertical DMOS FET

IRF530 IRF531 IRF532 IRF533

FEATURES

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



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DESCRIPTION

A compact cell 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	$R_{DS(on)}$
IRF530	100V	14A	0.18Ω
IRF531	60V	14A	0.18Ω
IRF532	100V	12A	0.25Ω
IRF533	60V	12A	0.25Ω

IRF530 IRF531 IRF532 IRF533

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ABSOLUTE MAXIMUM RATINGS

Parameter		IRF530	IRF531	IRF532	IRF533	Units
V_{DS}	Drain-source voltage	100	60	100	60	V
I_D	Continuous drain current (@ $T_C = 25°C$)	14	14	12	12	A
I_{DM}	Pulse drain current	56	56	48	48	A
V_{GS}	Gate-source voltage	±20	±20	±20	±20	V
P_D	Max. power dissipation (@ $T_C = 25°C$)	75	75	75	75	W
T_j, T_{stg}	Operating/storage temperature range	−55 to +150				°C

ELECTRICAL CHARACTERISTICS (at T = 25°C unless otherwise stated)

Parameter		Part No.	Min.	Max.	Unit	Conditions
BV_{DSS}	Drain-source breakdown voltage	IRF530 IRF532	100	–	V	$V_{GS} = 0V$, $I_D = 250\mu A$
		IRF531 IRF533	60	–	V	
$V_{GS(th)}$	Gate threshold voltage	All	2	4	V	$V_{GS} = V_{DS}$, $I_D = 250\mu A$
I_{GSS}	Gate-body leakage	All	–	500	nA	$V_{GS} = \pm 20V$, $V_{DS} = 0V$
I_{DSS}	Zero gate voltage drain current	All	–	250	μA	V_{DS} = Max. rating, $V_{GS} = 0V$
		All	–	1000	μA	$V_{DS} = 0.8 \times$ Max. rating $V_{GS} = 0V$ (T = 125°C) (2)
$I_{D(on)}$	On-state drain current (1)	IRF530 IRF531	14	–	A	$V_{DS} = 10V$, $V_{GS} = 10V$
		IRF532 IRF533	12	–	A	
$R_{DS(on)}$	Static drain-source on-state resistance (1)	IRF530 IRF531	–	0.18	Ω	$I_D = 8A$, $V_{GS} = 10V$
		IRF532 IRF533	–	0.25	Ω	
g_{fs}	Forward transconductance (1) (2)	All	4	–	S	$V_{DS} = 10V$, $I_D = 8A$

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ELECTRICAL CHARACTERISTICS cont.

Parameter		Part No.	Min.	Max.	Unit	Conditions
C_{iss}	Input capacitance (2)	All	–	800	pF	$V_{DS}=25V$, $V_{GS}=0V$ f = 1MHz
C_{oss}	Common source output capacitance (2)	All	–	500	pF	
C_{rss}	Reverse transfer capacitance (2)	All	–	150	pF	
$t_{d(on)}$	Turn-on delay time (2)	All	–	30	ns	$V_{DD}\approx 36V$, $I_D=8A$ $Z_O=15\Omega$
t_r	Rise time (2)	All	–	75	ns	
$t_{d(off)}$	Turn-off delay time (2)	All	–	40	ns	
t_f	Fall time (2)	All	–	45	ns	

SOURCE-DRAIN DIODE CHARACTERISTICS

Parameter		Part No.	Typ.	Max.	Unit	Conditions
V_{SD}	Diode forward voltage (1)	IRF530 IRF531	–	2.5	V	$V_{GS}=0V$, $I_S=14A$ $T_C=25°C$
		IRF532 IRF533	–	2.3	V	$V_{GS}=0V$, $I_S=12A$ $T_C=25°C$
t_{rr}	Reverse recovery time (2)	All	360	–	ns	$I_F=14A$, $dI_F/dt=100A/\mu s$ $T_j=150°C$

(1) Measured under pulsed conditions. Width = 300μs. Duty cycle ⩽2%.
(2) Sample test.

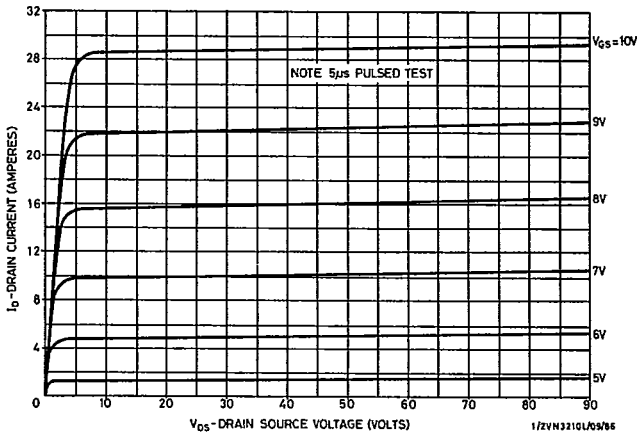

Fig. 1 Typical output characteristics

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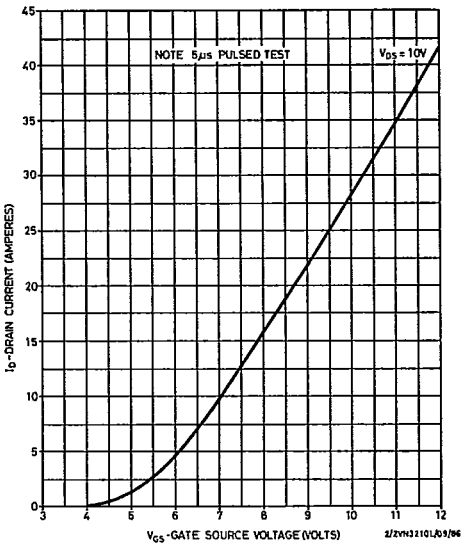

Fig. 2 Typical transfer characteristics

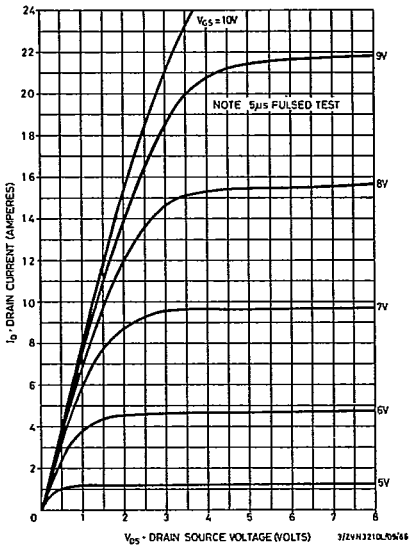

Fig. 3 Typical saturation characteristics

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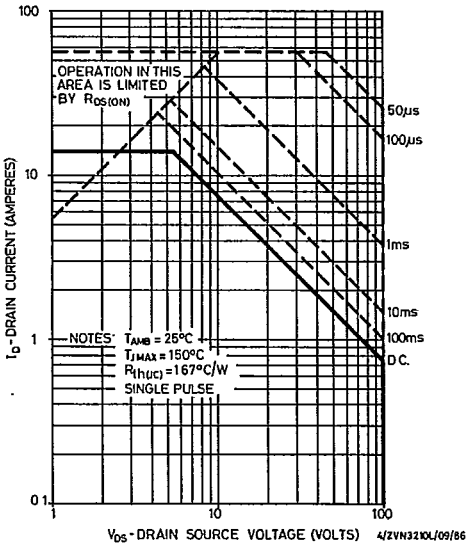

Fig. 4 Maximum safe operating area

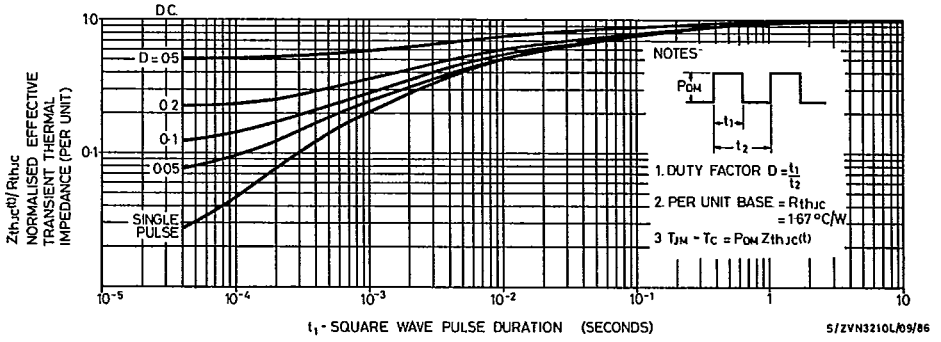

Fig. 5 Maximum effective transient thermal impedance, junction-case v pulse duration

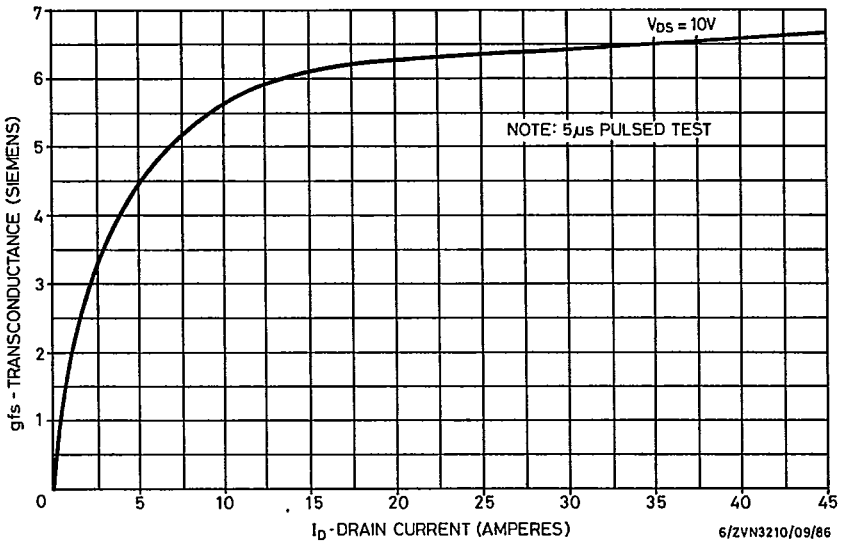

Fig. 6 Typical transconductance v drain current

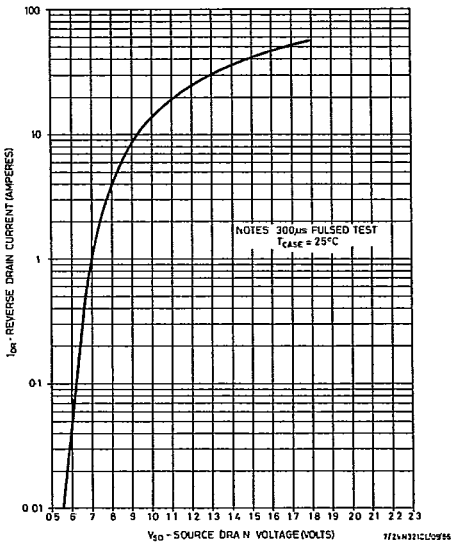

Fig. 7 Typical source-drain diode forward voltage

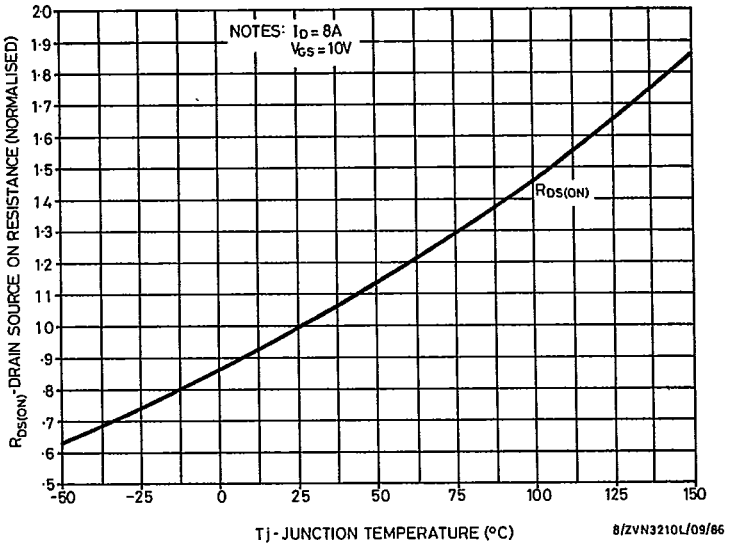

Fig. 8 Normalised on-resistance v temperature

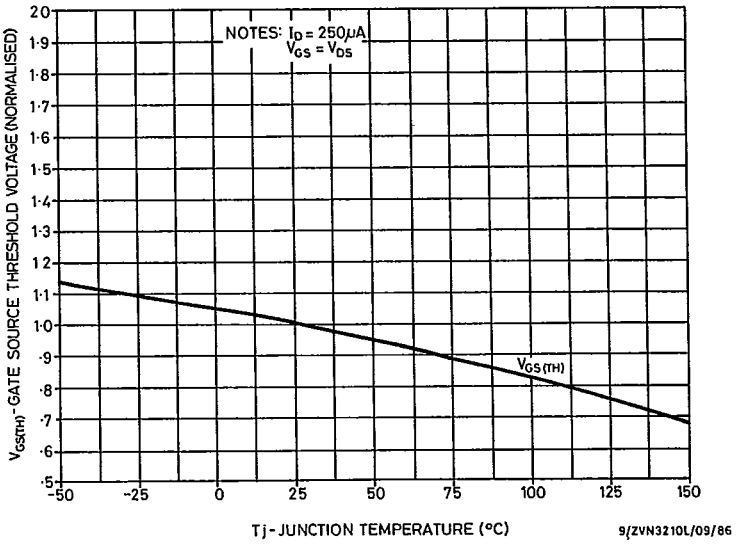

Fig. 9 Normalised gate threshold voltage v temperature

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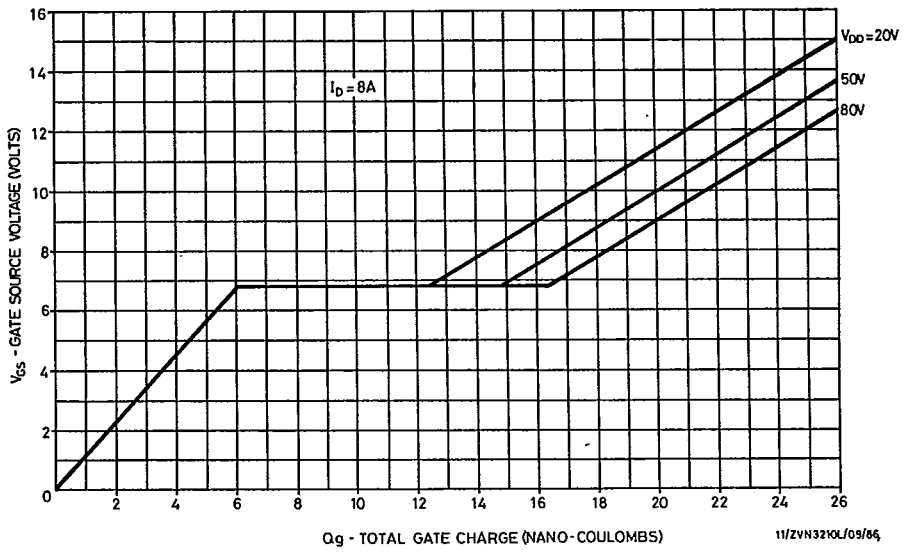

Fig. 10 Typical gate charge v gate-source voltage

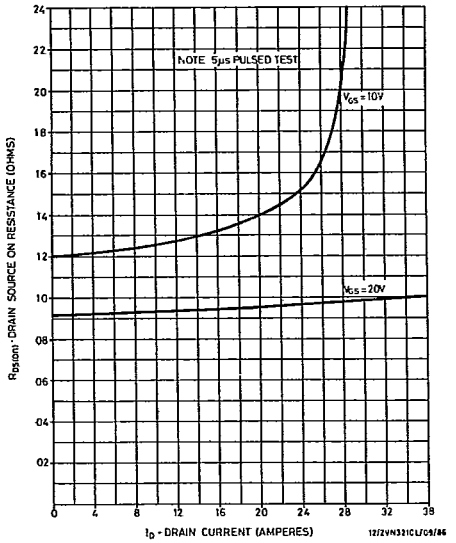

Fig. 11 Typical on-resistance v drain current

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IRF530 IRF531 IRF532 IRF533

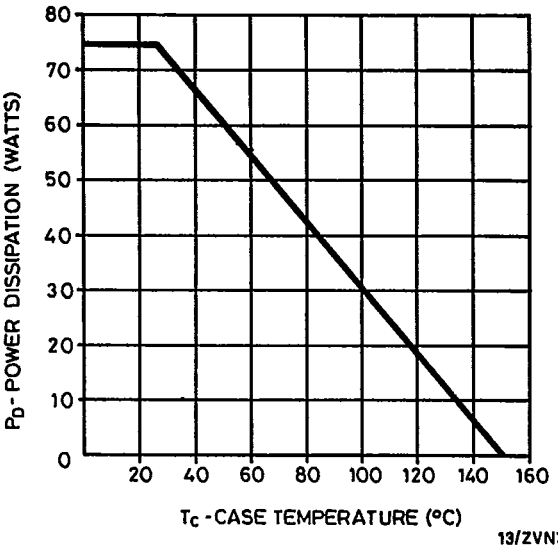

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Fig. 12 Power v temperature derating curve

PACKAGE DETAILS

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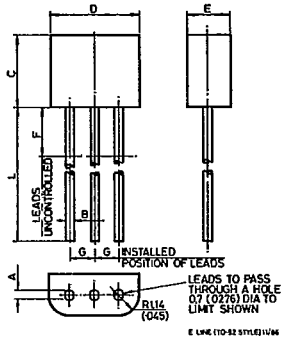
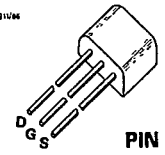
E-Line (TO-92 style)



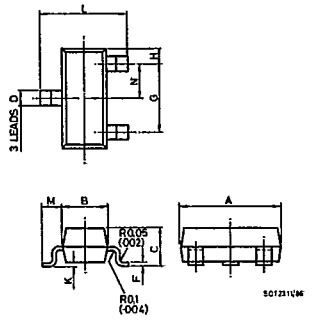
DIMENSION	MILLIMETRES		INCHES	
	MIN	MAX	MIN	MAX
A	0.41	0.495	0.016	0.0195
B	0.41	0.495	0.016	0.0195
C	3.61	4.01	0.142	0.158
D	4.37	4.77	0.172	0.188
E	2.16	2.41	0.085	0.095
F		2.5		0.098
G	1.27 NOM		0.050 NOM	
L	12.06	13.97	0.475	0.550



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.

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PACKAGE DETAILS

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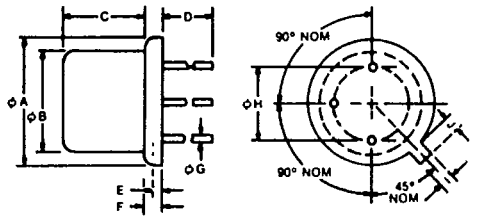
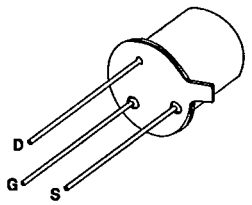


DIMENSION	INCHES		MILLIMETRES	
	MIN	MAX	MIN	MAX
ØA	0.350	0.370	8.99	9.40
ØB	0.306	0.335	7.77	8.51
C	0.240	0.260	6.10	6.60
D	0.500		12.70	
E	0.009	0.023	0.229	0.548
F	0.018	0.045	0.458	1.143
ØG	0.016	0.021	0.406	0.533
ØH	0.190	0.210	4.83	5.33
I	0.028	0.037	0.711	0.939
J	0.026	0.040	0.660	1.016



PIN CONFIGURATION

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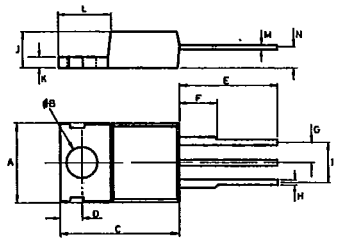
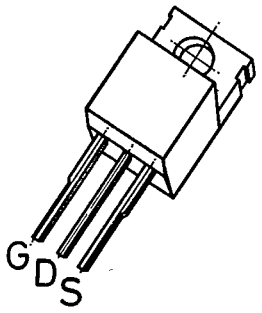


DIMENSION	INCHES		MILLIMETRES	
	MIN	MAX	MIN	MAX
A	0.387	0.403	9.8	10.2
ØB	0.139	0.147	3.53	3.73
C	0.612	0.648	15.56	16.46
D	0.10	0.12	2.55	3.05
E	0.50	0.56	12.71	14.21
F		0.25		6.35
G	0.09	0.11	2.29	2.79
H	0.022	0.032	0.57	0.83
I	0.19	0.21	4.85	5.35
J	0.17	0.19	4.32	4.82
K	0.045	0.055	1.14	1.4
L	0.245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