P-channel enhancement mode vertical D-MOS transistor

BSS84

FEATURES

- Low threshold voltage
- Direct interface to C-MOS, TTL, etc.
- High-speed switching
- No secondary breakdown.

APPLICATIONS

- Line current interrupter in telephone sets
- Relay, high speed and line transformer drivers.

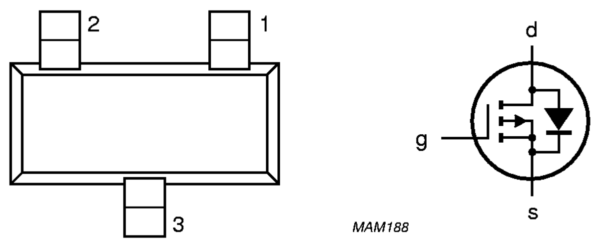
DESCRIPTION

P-channel enhancement mode vertical D-MOS transistor in a SOT23 SMD package.

CAUTION
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING - SOT23

PIN	SYMBOL	DESCRIPTION
1	g	gate
2	s	source
3	d	drain



Top view

Marking code: SP

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage (DC)		–	–50	V
V_{GSO}	gate-source voltage (DC)	open drain	–	±20	V
V_{GSth}	gate-source threshold voltage	I_D = –1 mA; $V_{DS} = V_{GS}$	–0.8	–2	V
I_D	drain current (DC)		–	–130	mA
R_{DSon}	drain-source on-state resistance	I_D = –130 mA; V_{GS} = –10 V	–	10	Ω
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	250	mW

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage (DC)		–	–50	V
V_{GSO}	gate-source voltage (DC)	open drain	–	±20	V
I_D	drain current (DC)		–	–130	mA
I_{DM}	peak drain current		–	–520	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	250	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	500	K/W

Note to the Limiting values and Thermal characteristics

1. Device mounted on a printed-circuit board.

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$; $I_D = -10$ μA	–50	–	–	V
V_{GSth}	gate-source threshold voltage	$V_{DS} = V_{GS}$; $I_D = -1$ mA	–0.8	–	–2	V
I_{DSS}	drain-source leakage current	$V_{GS} = 0$; $V_{DS} = -40$ V	–	–	–100	nA
		$V_{GS} = 0$; $V_{DS} = -50$ V	–	–	–10	μA
		$V_{GS} = 0$; $V_{DS} = -50$ V; $T_j = 125$ °C	–	–	–60	μA
I_{GSS}	gate leakage current	$V_{DS} = 0$; $V_{GS} = \pm20$ V	–	–	±10	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = -10$ V; $I_D = -130$ mA	–	–	10	Ω
$\lvert y_{fs} \rvert$	forward transfer admittance	$V_{DS} = -25$ V; $I_D = -130$ mA	50	–	–	mS
C_{iss}	input capacitance	$V_{GS} = 0$; $V_{DS} = -25$ V; f = 1 MHz	–	25	45	pF
C_{oss}	output capacitance	$V_{GS} = 0$; $V_{DS} = -25$ V; f = 1 MHz	–	15	25	pF
C_{rss}	reverse transfer capacitance	$V_{GS} = 0$; $V_{DS} = -25$ V; f = 1 MHz	–	3.5	12	pF
Switching times (see Figs 2 and 3)						
t_{on}	turn-on time	$V_{GS} = 0$ to -10 V; $V_{DD} = -40$ V; $I_D = -200$ mA	–	3	–	ns
t_{off}	turn-off time	$V_{GS} = -10$ to 0 V; $V_{DD} = -40$ V; $I_D = -200$ mA	–	7	–	ns

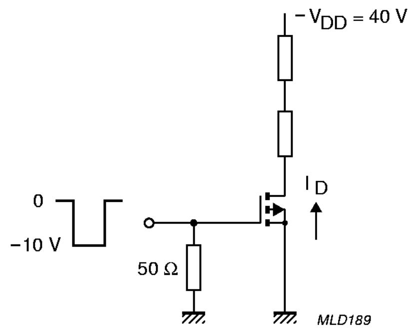


Fig.2 Switching time test circuit.

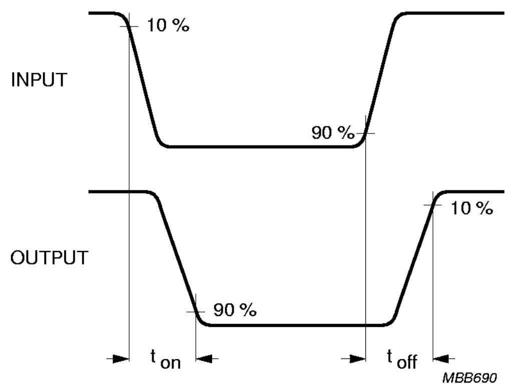


Fig.3 Input and output waveforms.

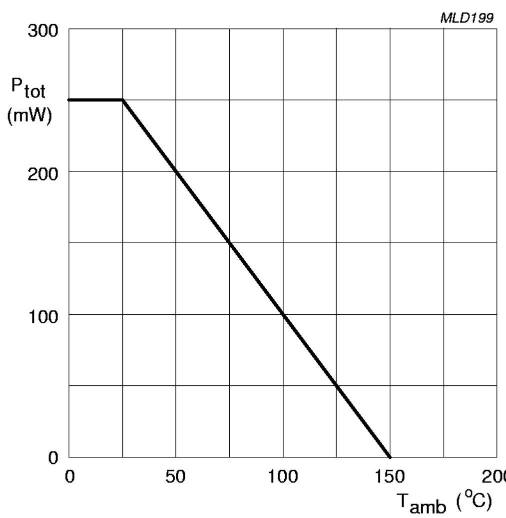
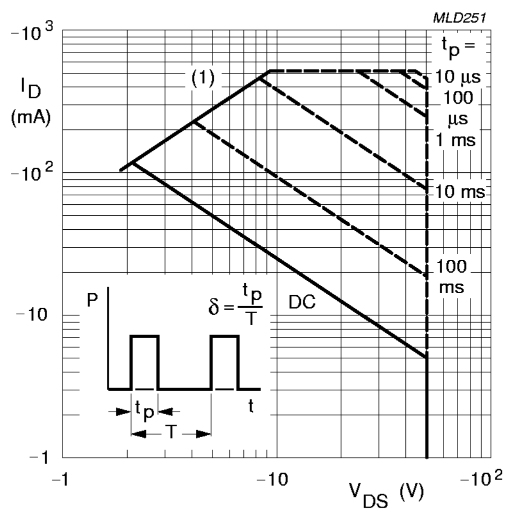


Fig.4 Power derating curve.

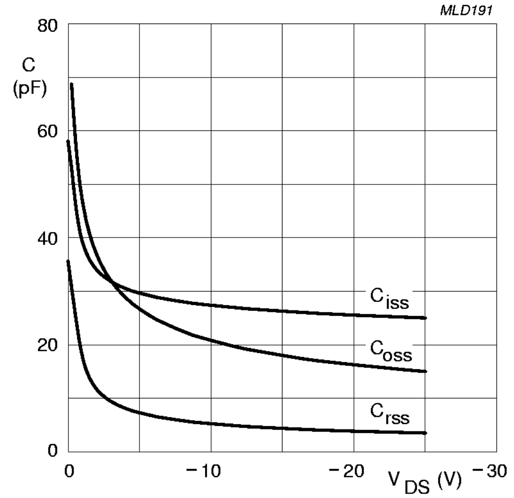


$\delta = 0.01$.

$T_{amb} = 25\ °C$.

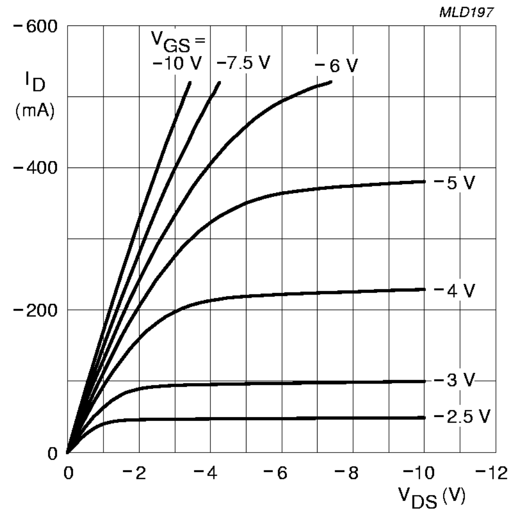
(1) R_{DSon} limitation.

Fig.5 DC SOAR.



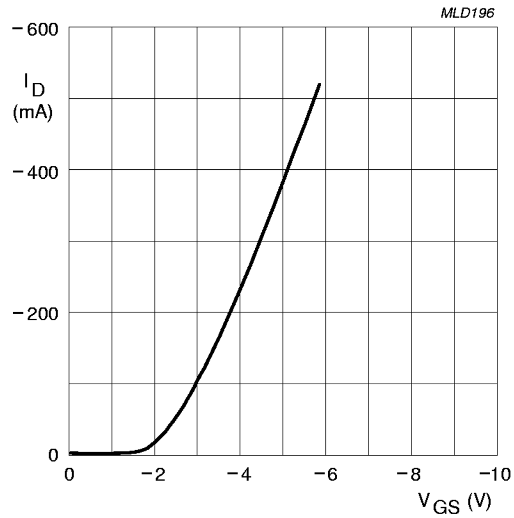
$V_{GS} = 0$; $T_j = 25$ °C; f = 1 MHz.

Fig.6 Capacitance as a function of drain source voltage; typical values.



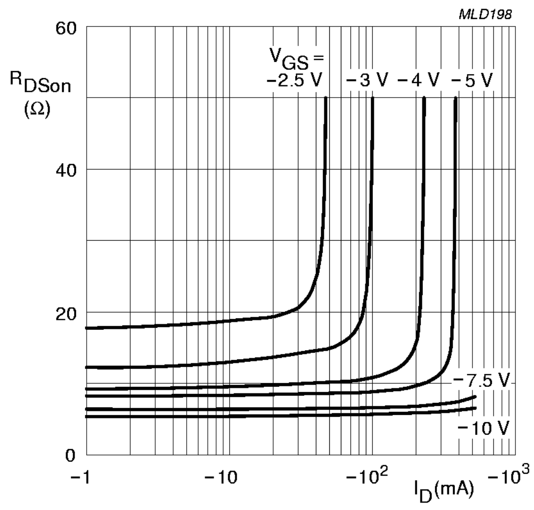
$T_j = 25$ °C.

Fig.7 Typical output characteristics.



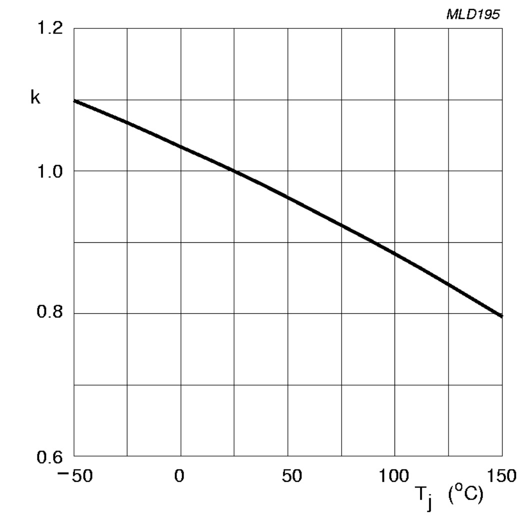
$V_{DS} = -10$ V; $T_j = 25$ °C.

Fig.8 Typical transfer characteristics.



$T_j = 25$ °C.

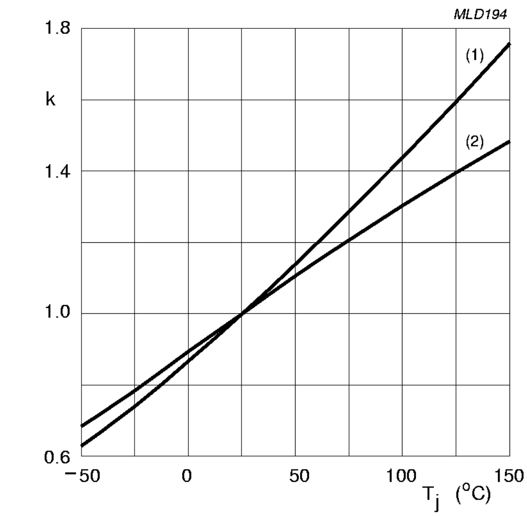
Fig.9 Drain-source on-state resistance as a function of drain current; typical values.



$$k = \frac{V_{GSth} \text{ at } T_j}{V_{GSth} \text{ at } 25\,°C}$$

$I_D = -1$ mA; $V_{DS} = V_{GS}$.

Fig.10 Temperature coefficient of gate-source threshold voltage.

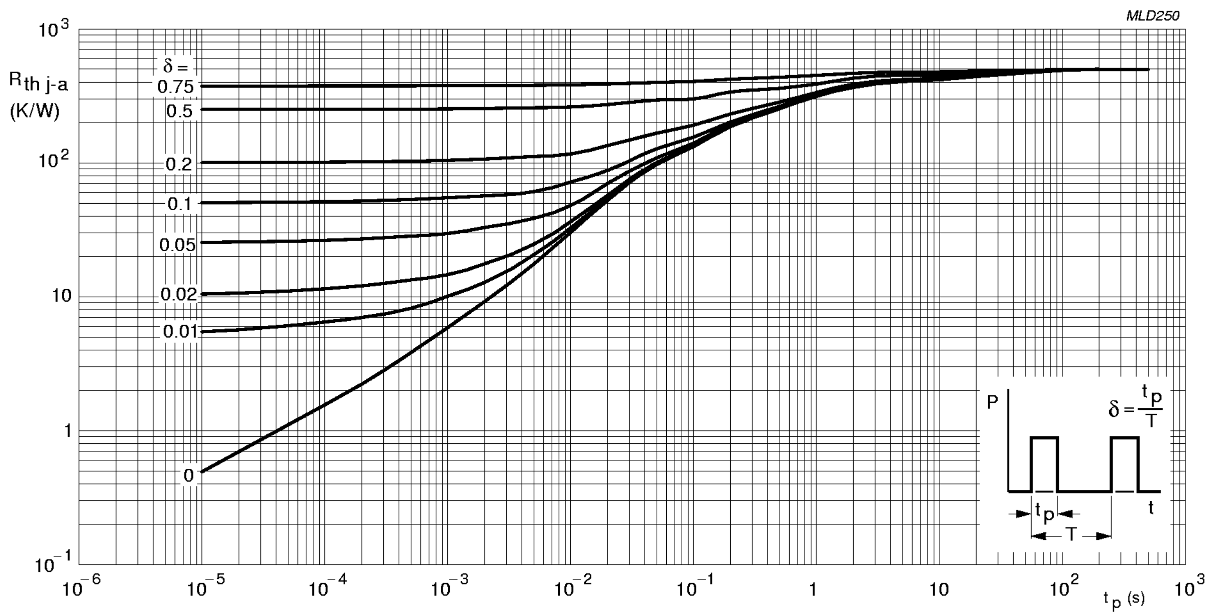


$$k = \frac{R_{DSon} \text{ at } T_j}{R_{DSon} \text{ at } 25\,°C}$$

(1) $I_D = -130$ mA; $V_{GS} = -10$ V.

(2) $I_D = -20$ mA; $V_{GS} = -2.4$ V.

Fig.11 Temperature coefficient of drain-source on-state resistance.

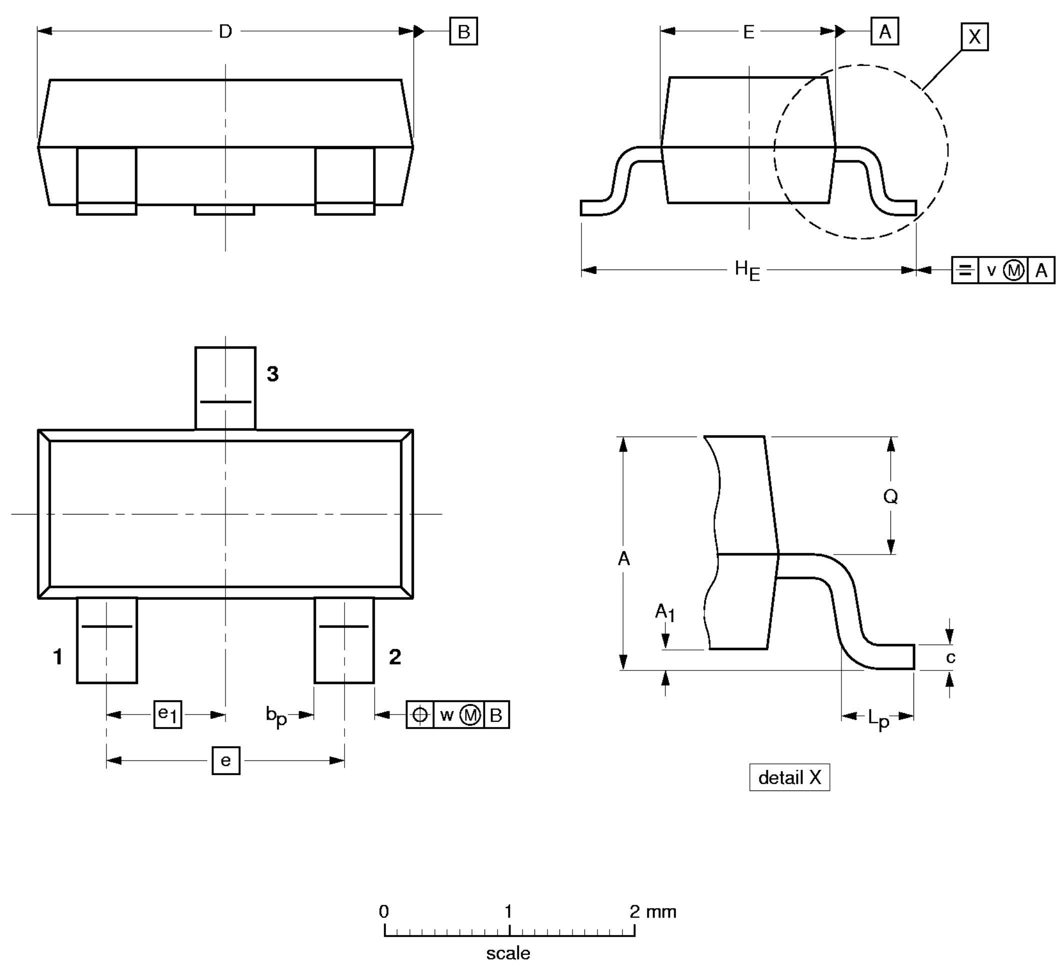


$T_{amb} = 25$ °C.

Fig.12 Thermal resistance from junction to ambient as a function of pulse time; typical values.

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads **SOT23**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT23						97-02-28