DATA SHEET

BSD22
MOSFET N-channel depletion switching transistor

Product specification
File under Discrete Semiconductors, SC07

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Philips
Semiconductors

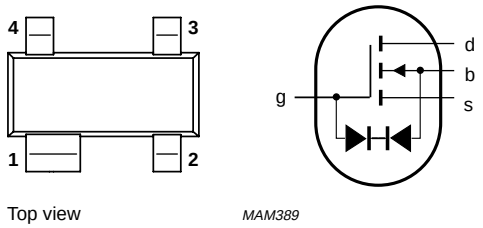
PHILIPS

MOSFET N-channel depletion switching transistor BSD22

DESCRIPTION

Symmetrical insulated-gate silicon MOS field-effect transistor of the n-channel depletion mode type.The transistor is sealed in a SOT143 envelope and features a low ON-resistance and low capacitances.The transistor is protected against excessive input voltages by integrated back-to-back diodes between gate and substrate.

Marking code: M32



Top view MAM389

Fig.1 Simplified outline and symbol.

Applications:

- analog and/or digital switch
- switch driver
- convertor
- chopper

PINNING

1 = substrate (b)
2 = source
3 = drain
4 = gate

Note

1. Drain and source are interchangeable

QUICK REFERENCE DATA

Drain-source voltage	V_{DS}	max.	20	V
Gate-source voltage	V_{GS}	max.	+ 15 – 40	V V
Drain current (DC)	I_D	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	230	mW
Junction temperature	T_j	max.	125	°C
Drain-source ON-resistance V_{GS} = 10 V; V_{SB} = 0; I_D = 1 mA	R_{DSon}	max.	30	Ω
Feed-back capacitance V_{GS} = V_{BS} = –5 V; V_{DS} = 10 V; f = 1 MHz	C_{rss}	typ.	0.6	pF

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Drain-source voltage	V_{DS}	max.	20	V
Source-drain voltage	V_{SD}	max.	20	V
Drain-substrate voltage	V_{DB}	max.	25	V
Source-substrate voltage	V_{SB}	max.	25	V
Gate-substrate voltage	V_{GB}	max.	± 15	V
Gate-source voltage	V_{GS}	max.	+ 15	V
			− 40	V
Drain current (DC)	I_D	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C(1)	P_{tot}	max.	230	mW
Storage temperature range	T_{stg}		−65 to + 150	°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient in free air(1)	$R_{th\ j\text{-}a}$	=	430	K/W

Note

1. Device mounted on a ceramic subtrate of 8 mm × 10 mm × 0.7 mm.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Drain-source breakdown voltage				
$V_{GS} = V_{BS}$ = −5 V; I_S = 10 nA	$V_{(BR)DSX}$	min.	20	V
Source-drain breakdown voltage				
$V_{GD} = V_{BD}$ = −5 V; I_D = 10 nA	$V_{(BR)SDX}$	min.	20	V
Drain-substrate breakdown voltage				
V_{GB} = 0; I_D = 10 nA; open source	$V_{(BR)DBO}$	min.	25	V
Source-substrate breakdown voltage				
V_{GB} = 0; I_S = 10 nA; open drain	$V_{(BR)SBO}$	min.	25	V
Drain-source leakage current				
$V_{GS} = V_{BS}$ = −5 V; V_{DS} = 10 V	I_{DSoff}	typ.	1.0	nA
Source-drain leakage current				
$V_{GD} = V_{BD}$ = 5 V; V_{SD} = 10 V	I_{SDoff}	typ.	1.0	nA
Gate-substrate leakage current				
$V_{DB} = V_{SB}$ = 0; V_{GB} = ± 15 V	I_{GBS}	max.	10	nA
Forward transconductance at f = 1 kHz				
V_{DS} = 10 V; V_{SB} = 0; I_D = 20 mA	g_{fs}	min.	10	mS
		typ.	15	mS
Gate-source cut-off voltage				
V_{DS} = 10 V; V_{SB} = 0; I_D = 10 µA	$-V_{(P)GS}$	max.	2.0	V

Drain-source ON-resistance				
I_D = 1 mA; V_{SB} = 0; V_{GS} = 5 V	R_{DSon}	typ. max.	25 50	Ω Ω
V_{GS} = 10 V	R_{DSon}	typ. max.	15 30	Ω Ω
Capacitances at f = 1 MHz				
V_{GS} = V_{BS} = –5 V; V_{DS} = 10 V				
Feed-back capacitance	C_{rss}	typ.	0.6	pF
Input capacitance	C_{iss}	typ.	1.5	pF
Output capacitance	C_{oss}	typ.	1.0	pF
Switching times (see Fig.3)				
V_{DD} = 10 V; V_i = –5 V to + 5 V	t_{on}	typ.	1.0	ns
	t_{off}	typ.	5.0	ns

$C_{iss} = C_{gs} + C_{gd} + C_{gb}$
$C_{oss} = C_{gd} + C_{bd}$
$C_{rss} = C_{gd}$

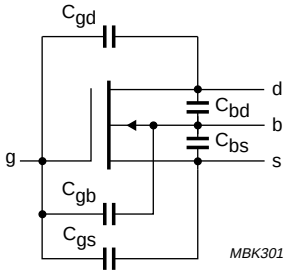
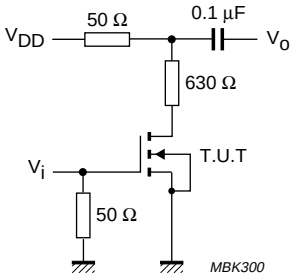


Fig.2 Capacitances model.



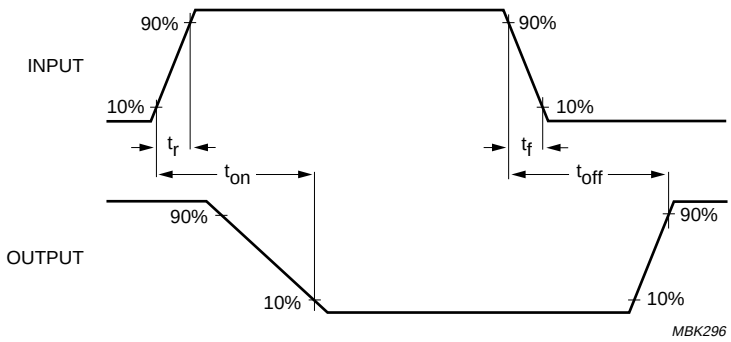
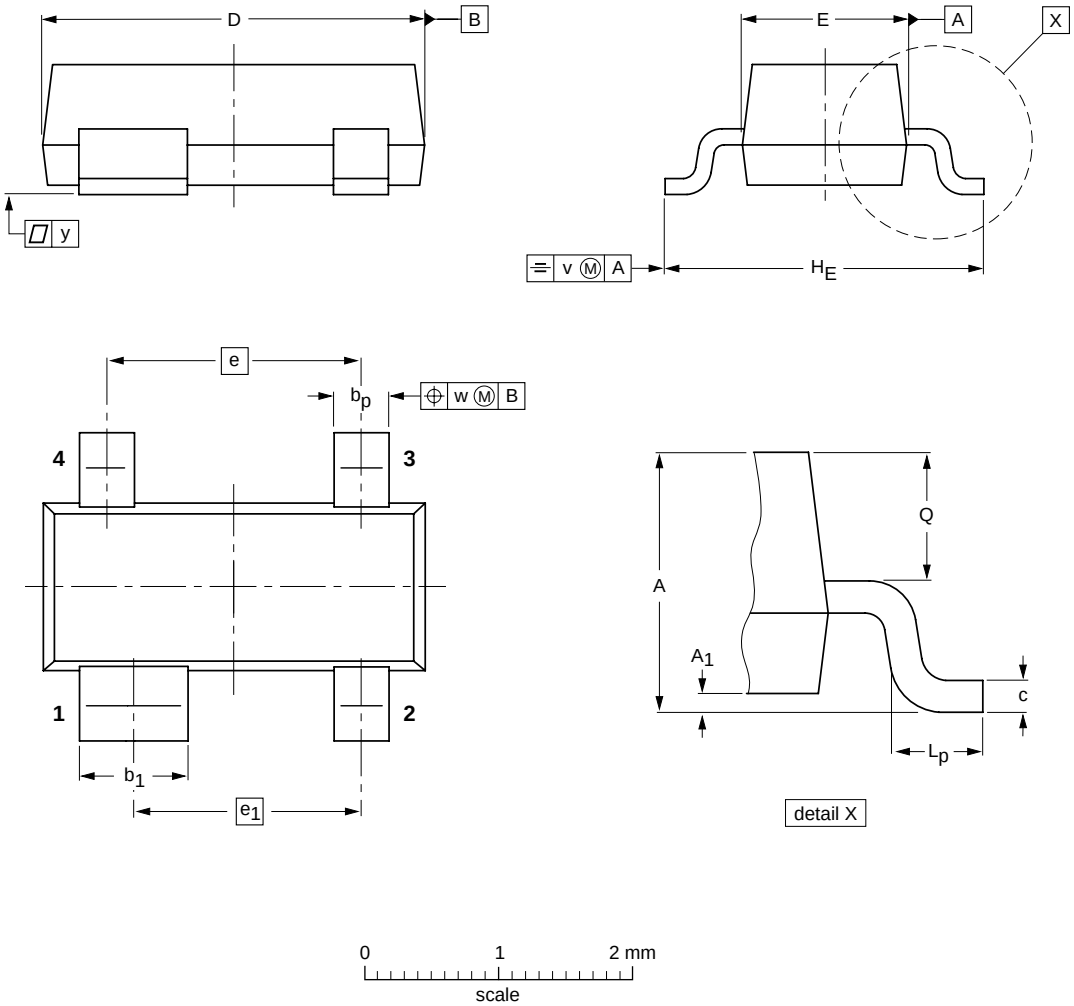


Fig.3 Switching times and input and output waveforms; R_i = 50 Ω; t_r < 0.5 ns; t_f < 1.0 ns; t_p = 20 ns; δ < 0.01.

PACKAGE OUTLINE

Plastic surface mounted package; 4 leads **SOT143B**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.9	0.1	0.48 0.38	0.88 0.78	0.15 0.09	3.0 2.8	1.4 1.2	1.9	1.7	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT143B						97-02-28

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Short-form specification	The data in this specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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