

# DATA SHEET

**PMBF4391; PMBF4392;  
PMBF4393**  
N-channel FETs

Product specification

April 1995



N-channel FETs

PMBF4391;  
PMBF4392; PMBF4393

DESCRIPTION

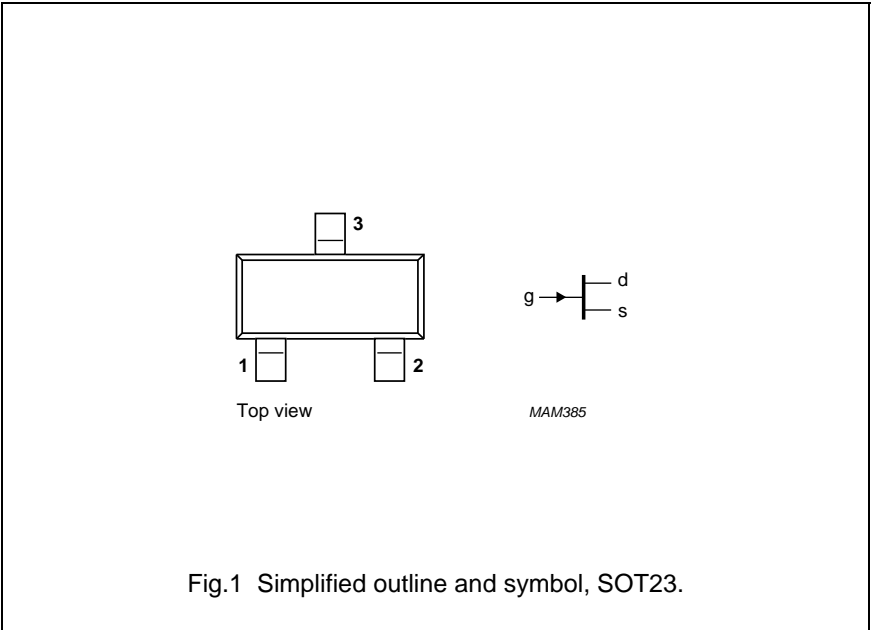
Symmetrical silicon n-channel depletion type junction field-effect transistors on a plastic microminiature envelope intended for application in thick and thin-film circuits. The transistors are intended for low-power chopper or switching applications in industry.

PINNING

- 1 = drain
- 2 = source
- 3 = gate

Note

- 1. Drain and source are interchangeable.



Marking code

- PMBF4391 = p6J
- PMBF4392 = p6K
- PMBF4393 = p6G

QUICK REFERENCE DATA

		PMBF4391		PMBF4392	PMBF4393
Drain-source voltage	$\pm V_{DS}$	max.	40	40	40 V
Drain current					
$V_{DS} = 20\text{ V}; V_{GS} = 0$	$I_{DSS}$	>	50	25	5 mA
Gate-source cut-off voltage					
$V_{DS} = 20\text{ V}; I_D = 1\text{ nA}$	$-V_{(P)GS}$	>	4	2	0.5 V
		<	10	5	3 V
Drain-source resistance (on) at $f = 1\text{ kHz}$					
$I_D = 0; V_{GS} = 0$	$R_{ds\text{ on}}$	<	30	60	100 $\Omega$
Feedback capacitance at $f = 1\text{ MHz}$					
$-V_{GS} = 12\text{ V}; V_{DS} = 0$	$C_{rs}$	<	3.5	3.5	3.5 pF
Turn-off time					
$V_{DD} = 10\text{ V}; V_{GS} = 0$					
$I_D = 12\text{ mA}; -V_{GSM} = 12\text{ V}$	$t_{off}$	<	20	—	— ns
$I_D = 6\text{ mA}; -V_{GSM} = 7\text{ V}$	$t_{off}$	<	—	35	— ns
$I_D = 3\text{ mA}; -V_{GSM} = 5\text{ V}$	$t_{off}$	<	—	—	50 ns

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## RATINGS

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

Drain-source voltage	$\pm V_{DS}$	max.	40 V
Drain-gate voltage	$V_{DGO}$	max.	40 V
Gate-source voltage	$-V_{GSO}$	max.	40 V
Gate current (DC)	$I_G$	max.	50 mA
Total power dissipation up to $T_{amb} = 40\text{ }^{\circ}\text{C}$ <sup>(1)</sup>	$P_{tot}$	max.	250 mW
Storage temperature range	$T_{stg}$	–65 to + 150	$^{\circ}\text{C}$
Junction temperature	$T_j$	max.	150 $^{\circ}\text{C}$

## THERMAL RESISTANCE

From junction to ambient <sup>(1)</sup>	$R_{th\ j-a}$	=	430 K/W
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## CHARACTERISTICS

 $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified

Gate-source voltage

$I_G = 1\text{ mA}; V_{DS} = 0$

$V_{GSon} < 1\text{ V}$

Gate-source cut-off current

$V_{DS} = 0\text{ V}; -V_{GS} = 20\text{ V}$

$-I_{GSS} < 0.1\text{ nA}$

$V_{DS} = 0\text{ V}; -V_{GS} = 20\text{ V}; T_{amb} = 150\text{ }^{\circ}\text{C}$

$-I_{GSS} < 0.2\text{ }\mu\text{A}$

Drain current

$V_{DS} = 20\text{ V}; V_{GS} = 0$

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$I_{DSS}$	> 50 < 150	25 75	5 mA 30 mA

Gate-source breakdown voltage

$-I_G = 1\text{ }\mu\text{A}; V_{DS} = 0$

$-V_{(BR)GSS} > 40$

Gate-source cut-off voltage

$I_D = 1\text{ nA}; V_{DS} = 20\text{ V}$

$-V_{(P)GS}$	> 4 < 10	2 5	0.5 V 3 V
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Drain-source voltage (on)

$I_D = 12\text{ mA}; V_{GS} = 0$

$V_{DSon} < 0.4$

$I_D = 6\text{ mA}; V_{GS} = 0$

$V_{DSon} < 0.4$

$I_D = 3\text{ mA}; V_{GS} = 0$

$V_{DSon} < 0.4$

Drain-source resistance (on)

$I_D = 0; V_{GS} = 0; f = 1\text{ kHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$

$r_{ds\ on} < 30$

Drain cut-off current

$-V_{GS} = 12\text{ V}; V_{DS} = 20\text{ V}$

$I_{DSX} < 0.1$

$-V_{GS} = 7\text{ V}$

$I_{DSX} < 0.1$

$-V_{GS} = 5\text{ V}$

$I_{DSX} < 0.1$

$-V_{GS} = 12\text{ V}; V_{DS} = 20\text{ V}; T_{amb} = 150\text{ }^{\circ}\text{C}$

$I_{DSX} < 0.2$

$-V_{GS} = 7\text{ V}$

$I_{DSX} < 0.2$

$-V_{GS} = 5\text{ V}$

$I_{DSX} < 0.2$

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y-parameters (common source)				PMBF4391	PMBF4392	PMBF4393
$V_{DS} = 20\text{ V}; V_{GS} = 0; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$						
Input capacitance	$C_{is}$	<	14		14	14 pF
Feedback capacitance						
$-V_{GS} = 12\text{ V} \quad ; \quad V_{DS} = 0$	$C_{rs}$	<	3.5		–	– pF
$-V_{GS} = 7\text{ V} \quad ; \quad V_{DS} = 0$	$C_{rs}$	<	–		3.5	– pF
$-V_{GS} = 5\text{ V} \quad ; \quad V_{DS} = 0$	$C_{rs}$	<	–		–	3.5 pF
Switching times						
$V_{DD} = 10\text{ V} \quad ; \quad V_{DS} = 0$						
Conditions $I_D$ and $-V_{GSoff}$	$I_D$	=	12		6	3 mA
	$-V_{GS\ off}$	=	12		7	5 V
	$R_L$	=	750		1550	3150 $\Omega$
Rise time	$t_r$	<	5		5	5 ns
Turn on time	$t_{on}$	<	15		15	15 ns
Fall time	$t_f$	<	15		20	30 ns
Turn off time	$t_{off}$	<	20		35	50 ns

Note

1. Mounted on a ceramic substrate of 8 mm × 10 mm × 0,7 mm.

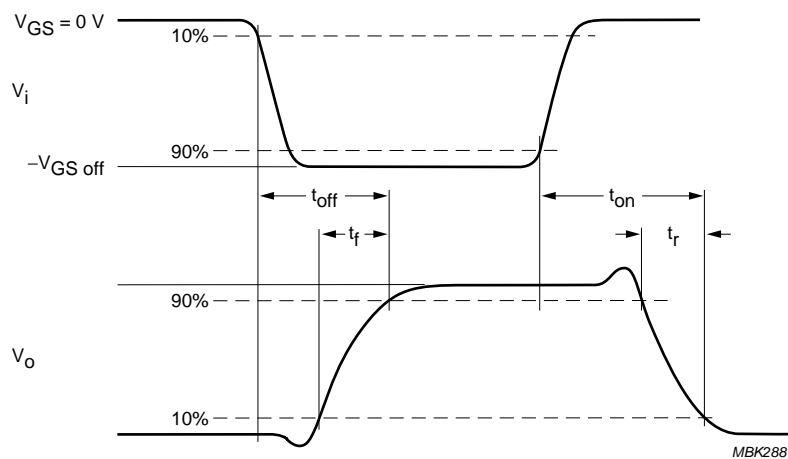
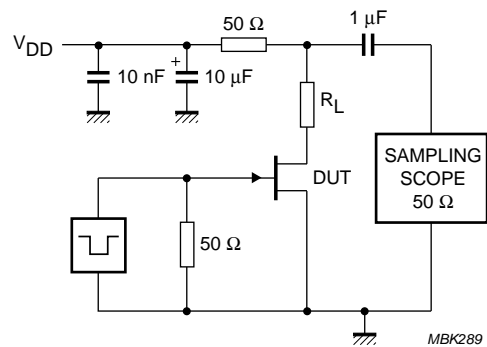


Fig.2 Switching times waveforms.

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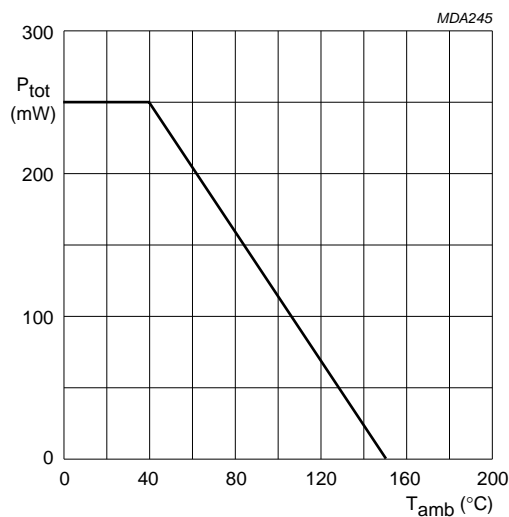


Pulse generator:

$t_r < 0.5 \text{ ns}$   
 $t_f < 0.5 \text{ ns}$   
 $t_p = 100 \text{ }\mu\text{s}$   
 $\delta = 0.01$

Oscilloscope:

$R_i = 50 \text{ }\Omega$



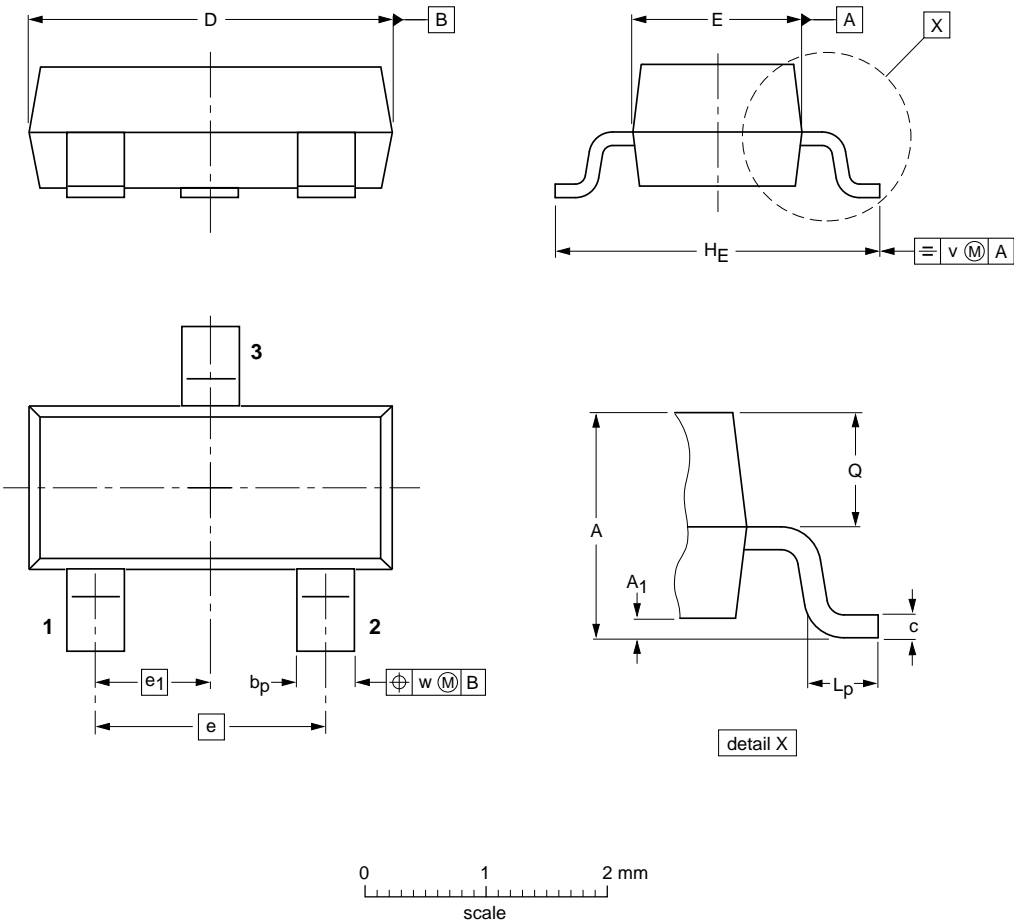
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max.	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	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	JEITA			
SOT23		TO-236AB				<del>04-11-04</del> 06-03-16

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## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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1. Please consult the most recently issued document before initiating or completing a design.
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## **Contact information**

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