

# DATA SHEET

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

Product specification

April 1995



# N-channel FETs

# PMBF4391; PMBF4392; PMBF4393

## DESCRIPTION

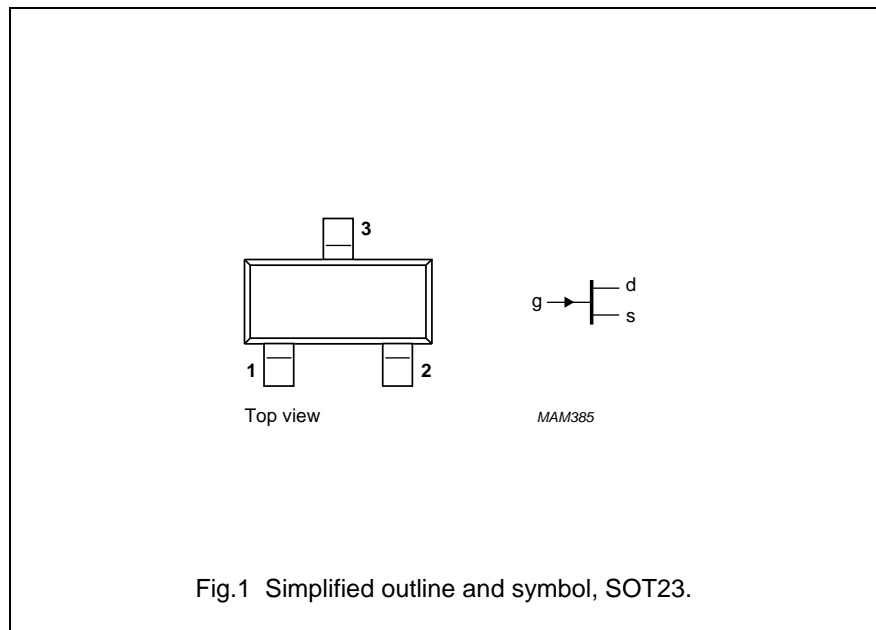
Symmetrical silicon n-channel depletion type junction field-effect transistors on a plastic microminiature envelope intended for application in thick and thin-film circuits. The transistors are intended for low-power chopper or switching applications in industry.

## 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 $f = 1\text{ kHz}$						
$I_D = 0; V_{GS} = 0$	$R_{ds\ on}$	<	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 $T_{amb} = 40\text{ °C}$ (1)	$P_{tot}$	max.	250 mW
Storage temperature range	$T_{stg}$		-65 to +150 °C
Junction temperature	$T_j$	max.	150 °C

**THERMAL RESISTANCE**

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

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

Gate-source voltage

$I_G = 1\text{ mA}; V_{DS} = 0$	$V_{GSon}$	<	1	V
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Gate-source cut-off current

$V_{DS} = 0\text{ V}; -V_{GS} = 20\text{ V}$	$-I_{GSS}$	<	0.1	nA
$V_{DS} = 0\text{ V}; -V_{GS} = 20\text{ V}; T_{amb} = 150\text{ °C}$	$-I_{GSS}$	<	0.2	$\mu\text{A}$

Drain current

$V_{DS} = 20\text{ V}; V_{GS} = 0$	$I_{DSS}$	>	50	25	5	mA
		<	150	75	30	mA

Gate-source breakdown voltage

$-I_G = 1\text{ }\mu\text{A}; V_{DS} = 0$	$-V_{(BR)GSS}$	>	40	40	40	V
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Gate-source cut-off voltage

$I_D = 1\text{ nA}; V_{DS} = 20\text{ V}$	$-V_{(P)GS}$	>	4	2	0.5	V
		<	10	5	3	V

Drain-source voltage (on)

$I_D = 12\text{ mA}; V_{GS} = 0$	$V_{DSon}$	<	0.4	–	–	V
$I_D = 6\text{ mA}; V_{GS} = 0$	$V_{DSon}$	<	–	0.4	–	V
$I_D = 3\text{ mA}; V_{GS} = 0$	$V_{DSon}$	<	–	–	0.4	V

Drain-source resistance (on)

$I_D = 0; V_{GS} = 0; f = 1\text{ kHz}; T_{amb} = 25\text{ °C}$	$r_{ds\ on}$	<	30	–	100	$\Omega$
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Drain cut-off current

$-V_{GS} = 12\text{ V}$	$V_{DS} = 20\text{ V}$	$I_{DSX}$	<	0.1	–	–	nA
$-V_{GS} = 7\text{ V}$		$I_{DSX}$	<	–	0.1	–	nA
$-V_{GS} = 5\text{ V}$		$I_{DSX}$	<	–	–	0.1	nA
$-V_{GS} = 12\text{ V}$	$V_{DS} = 20\text{ V}; T_{amb} = 150\text{ °C}$	$I_{DSX}$	<	0.2	–	–	$\mu\text{A}$
$-V_{GS} = 7\text{ V}$		$I_{DSX}$	<	–	0.2	–	$\mu\text{A}$
$-V_{GS} = 5\text{ V}$		$I_{DSX}$	<	–	–	0.2	$\mu\text{A}$

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PMBF4393

**y-parameters (common source)**

$V_{DS} = 20\text{ V}; V_{GS} = 0; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

		PMBF4391	PMBF4392	PMBF4393
Input capacitance	$C_{is}$	< 14	14	14 pF
Feedback capacitance				
- $V_{GS} = 12\text{ V}$ ; $V_{DS} = 0$	$C_{rs}$	< 3.5	-	- pF
- $V_{GS} = 7\text{ V}$ ; $V_{DS} = 0$	$C_{rs}$	< -	3.5	- pF
- $V_{GS} = 5\text{ V}$ ; $V_{DS} = 0$	$C_{rs}$	< -	-	3.5 pF
Switching times				
$V_{DD} = 10\text{ V}$ ; $V_{DS} = 0$				
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.

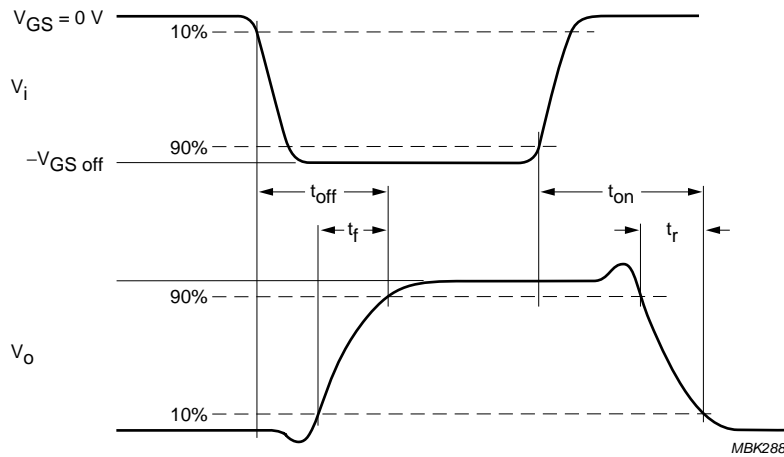


Fig.2 Switching times waveforms.

N-channel FETs

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PMBF4393

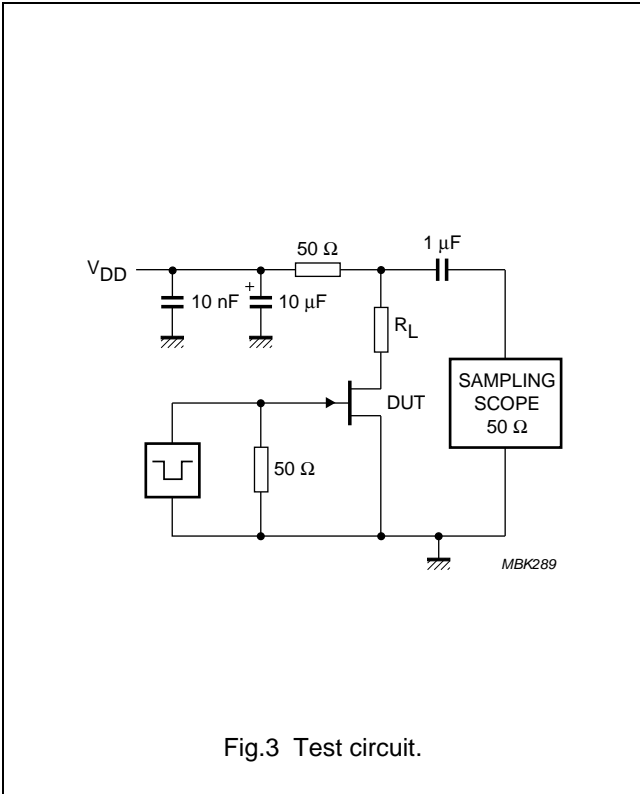


Fig.3 Test circuit.

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:

- $R_i = 50 \text{ } \Omega$

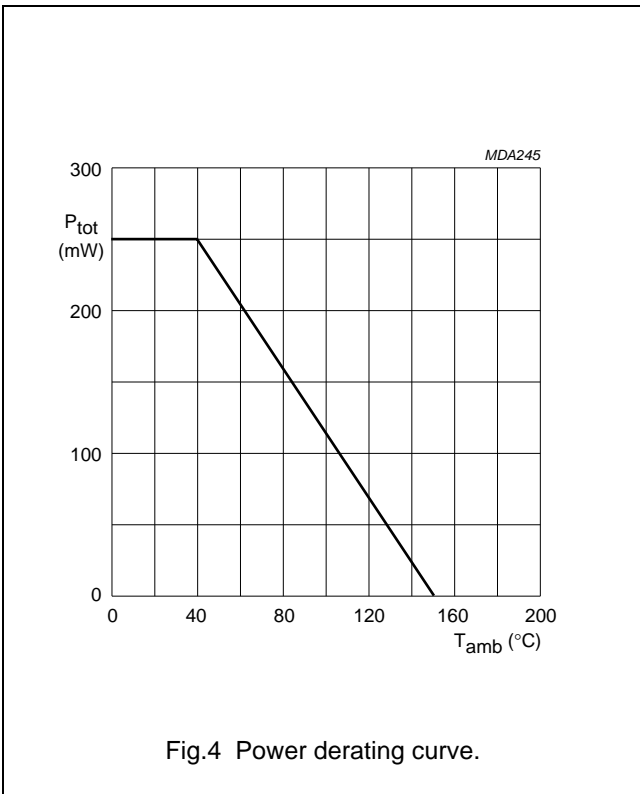


Fig.4 Power derating curve.

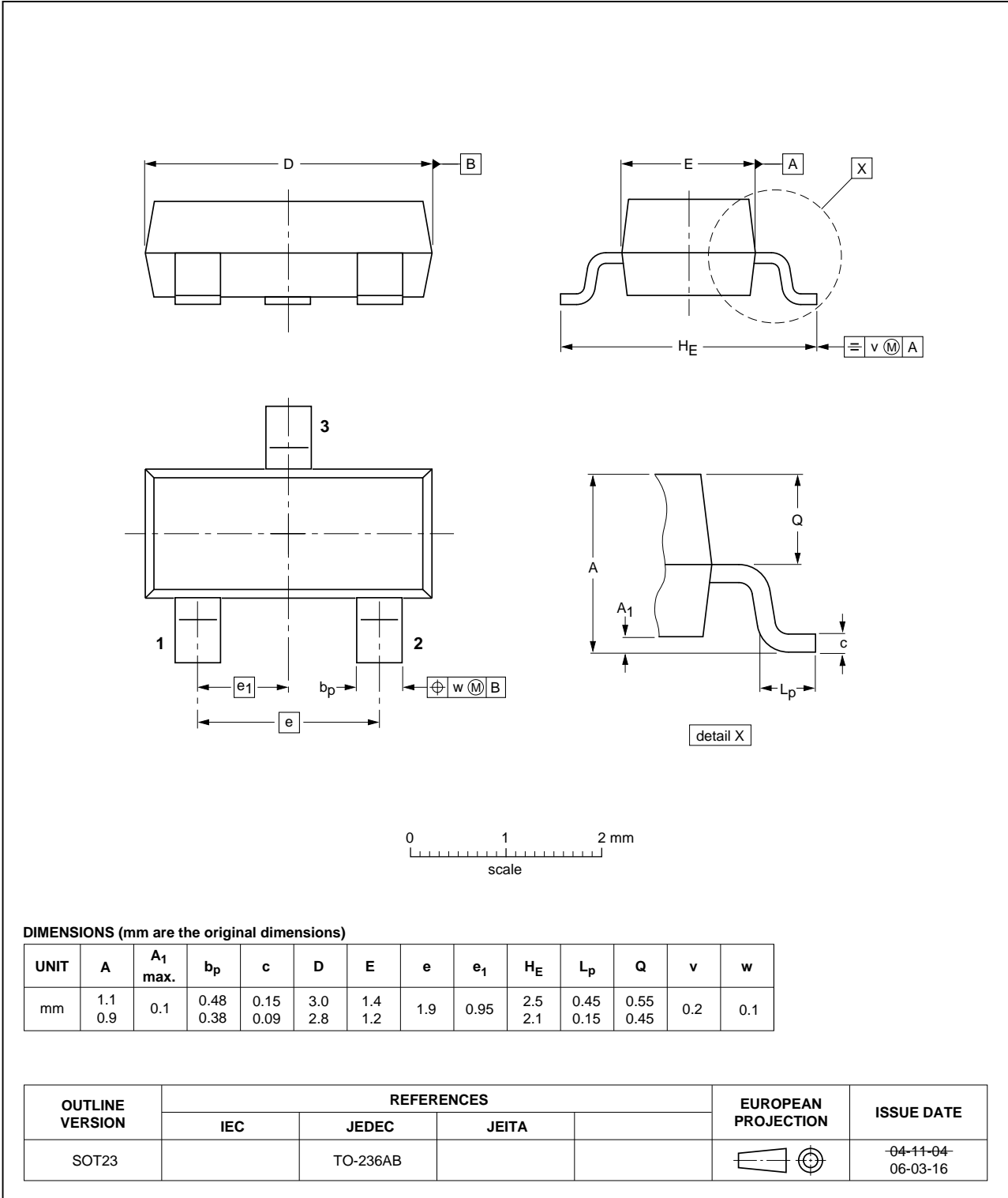
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



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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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