

# DATA SHEET

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

Product specification  
File under Discrete Semiconductors, SC07

April 1995

## N-channel FETs

PMBF4391;  
PMBF4392; PMBF4393

## DESCRIPTION

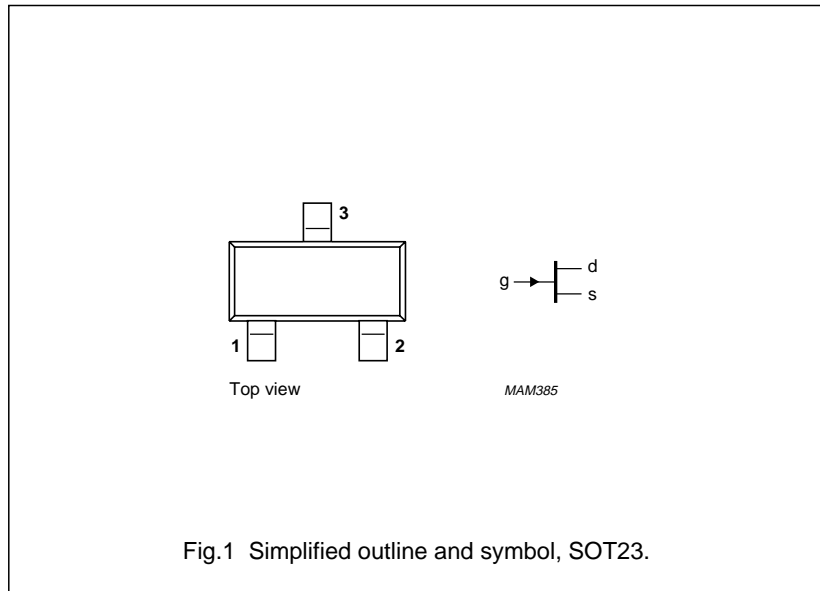
Symmetrical silicon n-channel depletion type junction field-effect transistors on a plastic microminiature envelope intended for application in thick and thin-film circuits. The transistors are intended for low-power chopper or switching applications in industry.

## 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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PMBF4393**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 $T_{amb} = 40\text{ }^\circ\text{C}$ (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<sup>(1)</sup>  $R_{th\ j-a} = 430\text{ K/W}$ **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

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

Gate-source breakdown voltage

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

Gate-source cut-off voltage

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

Drain-source voltage (on)

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

Drain-source resistance (on)

 $I_D = 0; V_{GS} = 0; f = 1\text{ kHz}; T_{amb} = 25\text{ }^\circ\text{C}$   $r_{ds\ on} < 30$   $r_{ds\ on} < -$   $r_{ds\ on} < 100\text{ }\Omega$ 

Drain cut-off current

 $-V_{GS} = 12\text{ V}$   $I_{DSX} < 0.1$   $I_{DSX} < -$   $I_{DSX} < -\text{ nA}$  $-V_{GS} = 7\text{ V}$   $I_{DSX} < -$   $I_{DSX} < 0.1$   $I_{DSX} < -\text{ nA}$  $-V_{GS} = 5\text{ V}$   $I_{DSX} < -$   $I_{DSX} < -$   $I_{DSX} < 0.1\text{ nA}$  $-V_{GS} = 12\text{ V}$   $I_{DSX} < 0.2$   $I_{DSX} < -$   $I_{DSX} < -\text{ }\mu\text{A}$  $-V_{GS} = 7\text{ V}$   $I_{DSX} < -$   $I_{DSX} < 0.2$   $I_{DSX} < -\text{ }\mu\text{A}$  $-V_{GS} = 5\text{ V}$   $I_{DSX} < -$   $I_{DSX} < -$   $I_{DSX} < 0.2\text{ }\mu\text{A}$

## N-channel FETs

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PMBF4393**y-parameters** (common source) $V_{DS} = 20 \text{ V}$ ;  $V_{GS} = 0$ ;  $f = 1 \text{ MHz}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ 

		<b>PMBF4391</b>	<b>PMBF4392</b>	<b>PMBF4393</b>
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
	$-V_{GSoff}$	= 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.

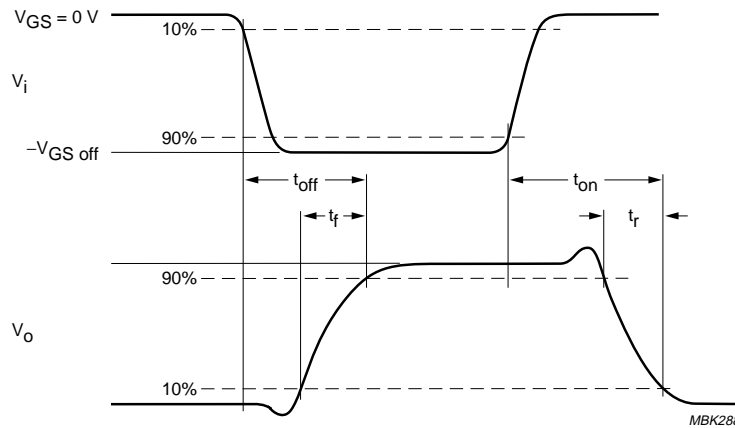


Fig.2 Switching times waveforms.

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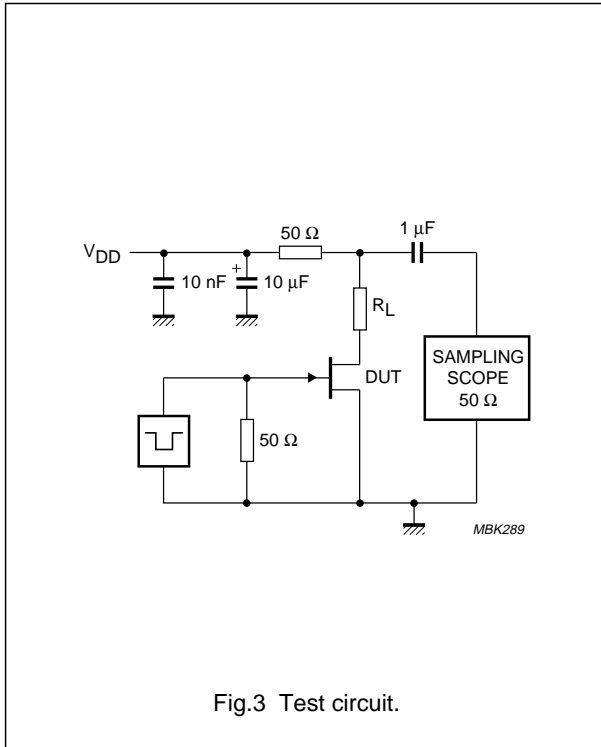


Fig.3 Test circuit.

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:

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

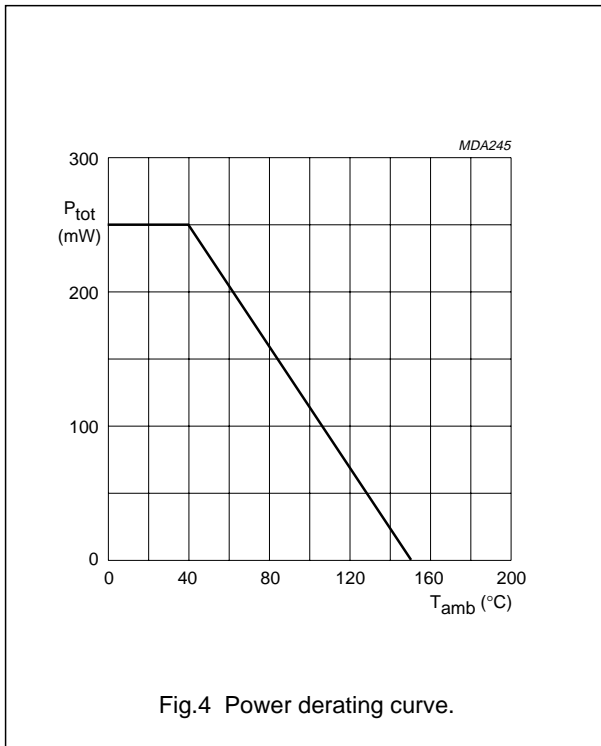


Fig.4 Power derating curve.

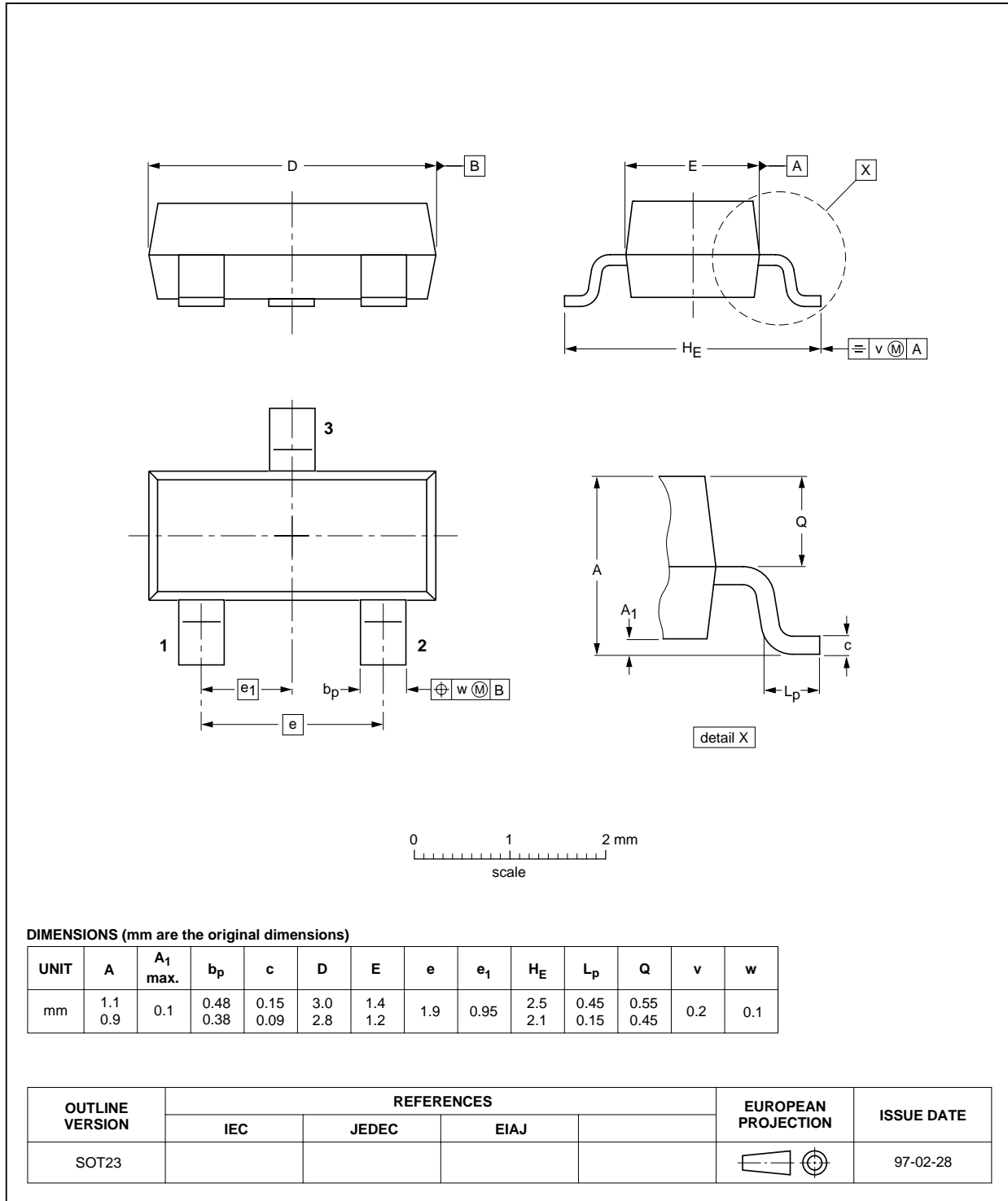
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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



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PMBF4393**DEFINITIONS**

<b>Data sheet status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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