

DATA SHEET

**PMBF4391; PMBF4392;
PMBF4393**

N-channel FETs

Product specification

April 1995



N-channel FETs

PMBF4391;
PMBF4392; PMBF4393

DESCRIPTION

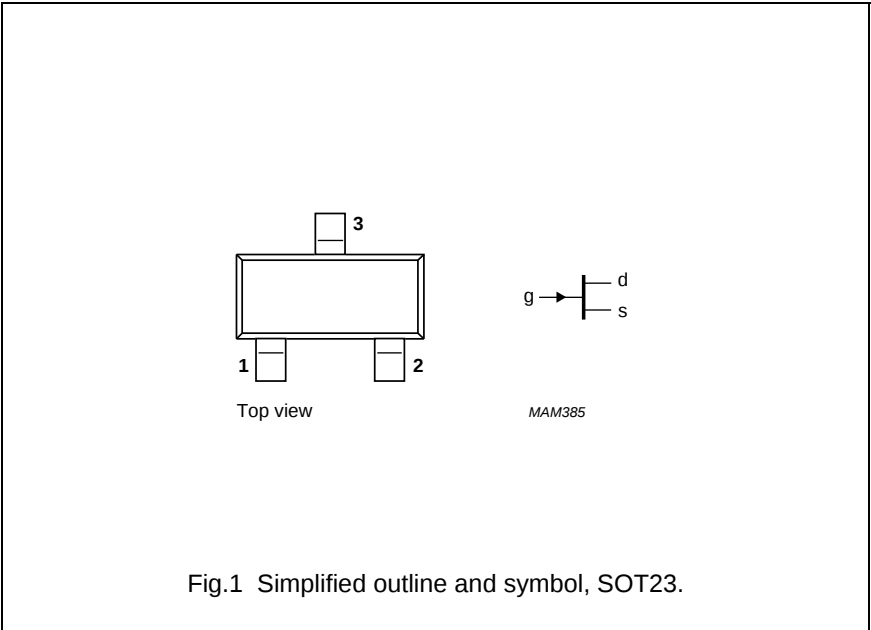
Symmetrical silicon n-channel depletion type junction field-effect transistors on a plastic microminiature envelope intended for application in thick and thin-film circuits. The transistors are intended for low-power chopper or switching applications in industry.

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 Ω
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 $T_{amb} = 40\text{ }^{\circ}\text{C}$ ⁽¹⁾	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 ⁽¹⁾	$R_{th\ j-a}$	=	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 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
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$V_{DS} = 0\text{ V}; -V_{GS} = 20\text{ V}; T_{amb} = 150\text{ }^{\circ}\text{C}$	$-I_{GSS}$	<	0.2 μA
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Drain current

$V_{DS} = 20\text{ V}; V_{GS} = 0$	I_{DSS}	> 50	25	5 mA
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		< 150	75	30 mA
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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
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		<	10	5	3 V
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Drain-source voltage (on)

$I_D = 12\text{ mA}; V_{GS} = 0$	V_{DSon}	<	0.4	–	– V
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$I_D = 6\text{ mA}; V_{GS} = 0$	V_{DSon}	<	–	0.4	– V
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$I_D = 3\text{ mA}; V_{GS} = 0$	V_{DSon}	<	–	–	0.4 V
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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	–	100 Ω
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Drain cut-off current

$-V_{GS} = 12\text{ V}$ $V_{DS} = 20\text{ V}$	I_{DSX}	<	0.1	–	– nA
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$-V_{GS} = 7\text{ V}$	I_{DSX}	<	–	0.1	– nA
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$-V_{GS} = 5\text{ V}$	I_{DSX}	<	–	–	0.1 nA
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$-V_{GS} = 12\text{ V}$ $V_{DS} = 20\text{ V}; T_{amb} = 150\text{ }^{\circ}\text{C}$	I_{DSX}	<	0.2	–	– μA
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$-V_{GS} = 7\text{ V}$	I_{DSX}	<	–	0.2	– μA
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$-V_{GS} = 5\text{ V}$	I_{DSX}	<	–	–	0.2 μA
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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						
$-V_{GS} = 12\text{ V} ; V_{DS} = 0$	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 Ω
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.

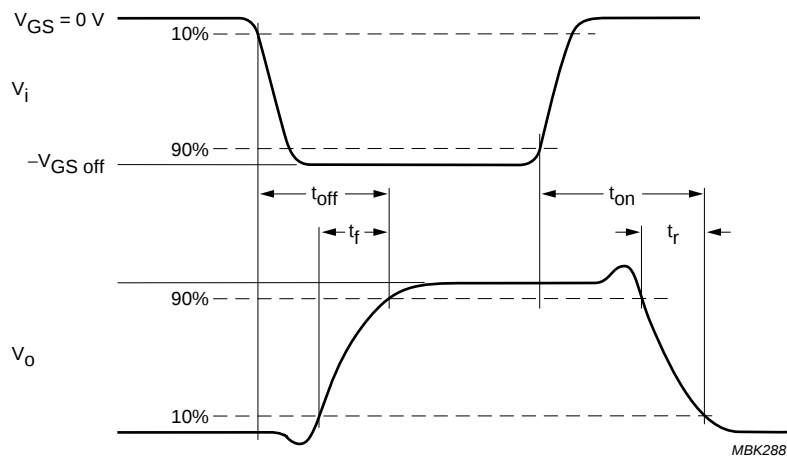


Fig.2 Switching times waveforms.

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PMBF4393

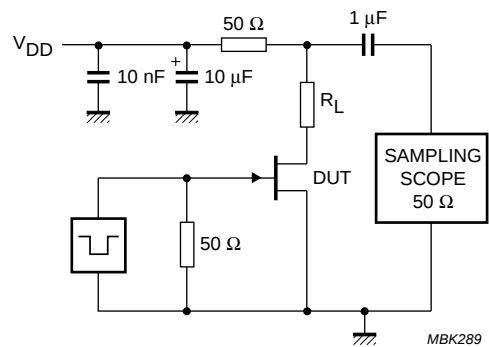


Fig.3 Test circuit.

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:

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

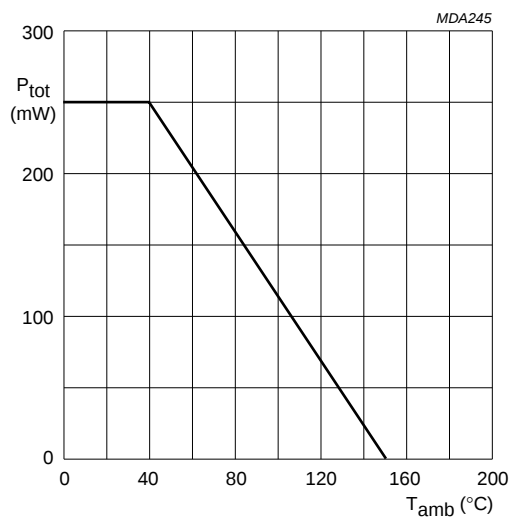


Fig.4 Power derating curve.

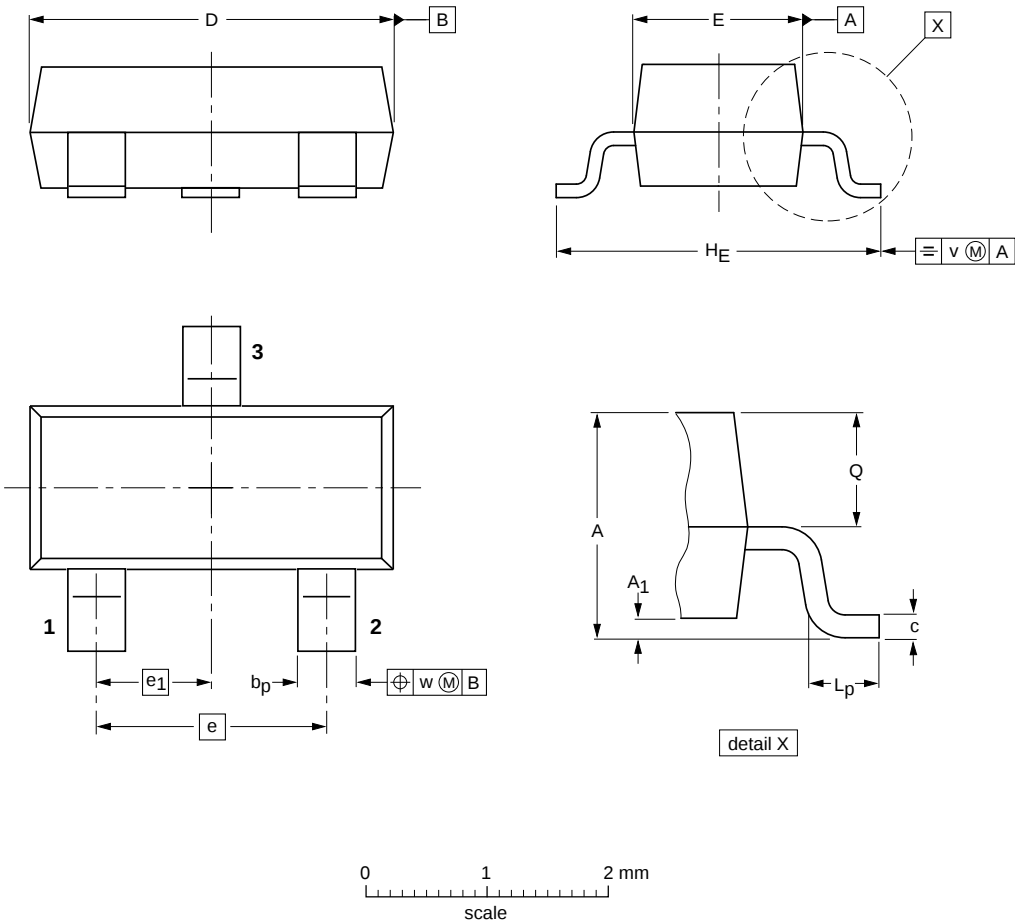
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



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	JEITA			
SOT23		TO-236AB				04-11-04 06-03-16

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DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	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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