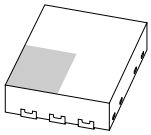

PBSM5240PF

40 V, 2 A PNP low V_{CEsat} (BISS) transistor with N-channel Trench MOSFET

Rev. 1 — 25 August 2010 **Preliminary data sheet**

1. Product profile

1.1 General description

Combination of PNP low V_{CEsat} Breakthrough In Small Signal (BISS) transistor and N-channel Trench MOSFET. The device is housed in a small and ultra thin SOT1118 Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Very low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- High energy efficiency due to less heat generation
- Smaller required Printed-Circuit Board (PCB) area than for conventional transistors

1.3 Applications

- Loadswitch
- Power management
- Power switches (e.g. motors, fans)
- Battery-driven devices
- Charging circuits

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
PNP low V_{CEsat} (BISS) transistor							
V_{CEO}	collector-emitter voltage	open base		-	-	–40	V
I_C	collector current		[1]	-	-	–2	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	[1]	-	-	–3	A
R_{CEsat}	collector-emitter saturation resistance	I_C = –500 mA; I_B = –50 mA	[2]	-	240	340	mΩ
N-channel Trench MOSFET							
V_{DS}	drain-source voltage	T_{amb} = 25 °C		-	-	30	V
V_{GS}	gate-source voltage	T_{amb} = 25 °C		-	-	±8	V

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Table 1. Quick reference data *...continued*

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_D	drain current	T_{amb} = 25 °C; V_{GS} = 10 V	[3]	-	-	0.66	A
R_{DSon}	drain-source on-state resistance	T_j = 25 °C; V_{GS} = 4.5 V; I_D = 0.2 A	[4]	-	390	460	mΩ

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

[2] Pulse test: $t_p \leq 300\ \mu s$; $\delta \leq 0.02$.

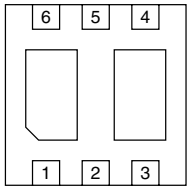
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm^2.

[4] Pulse test: $t_p \leq 300\ \mu s$; $\delta \leq 0.01$.

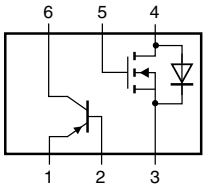
2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	emitter		
2	base		
3	drain		
4	source		
5	gate		
6	collector		



Transparent top view



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3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSM5240PF	HUSON6	Plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals; body 2 × 2 × 0.65 mm	SOT1118

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBSM5240PF	<tbd>

[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

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5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
PNP low V_{CEsat} (BISS) transistor						
V_{CBO}	collector-base voltage	open emitter		-	–40	V
V_{CEO}	collector-emitter voltage	open base		-	–40	V
V_{EBO}	emitter-base voltage	open collector		-	–5	V
I_C	collector current		[1]	-	–2	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	[1]	-	–3	A
I_B	base current		[1]	-	–300	mA
I_{BM}	peak base current		[1]	-	–1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	1.3	W
N-channel Trench MOSFET						
V_{DS}	drain-source voltage	T_{amb} = 25 °C		-	30	V
V_{DG}	drain-gate voltage	T_{amb} = 25 °C; R_{GS} = 20 kΩ		-	30	V
V_{GS}	gate-source voltage	T_{amb} = 25 °C		-	±8	V
I_D	drain current	V_{GS} = 10 V	[2]			
		T_{amb} = 25 °C		-	0.66	A
		T_{amb} = 100 °C		-	0.42	A
I_{DM}	peak drain current	T_{amb} = 25 °C; single pulse; $t_p \leq 10$ µs		-	3.56	A
P_{tot}	total power dissipation	T_{amb} = 25 °C	[2]	-	200	mW
Source-drain diode						
I_S	source current	T_{amb} = 25 °C		-	0.66	A
Per device						
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			–55	+150	°C
T_{stg}	storage temperature			–65	+150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm^2.

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6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
PNP low V_{CEsat} (BISS) transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	95	K/W
N-channel Trench MOSFET							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[2]	-	-	625	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm^2.

7. Characteristics

Table 7. Characteristics for PNP low V_{CEsat} transistor

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = –40 V; I_E = 0 A		-	-	–100	nA
		V_{CB} = –40 V; I_E = 0 A; T_j = 150 °C		-	-	–50	µA
I_{CEO}	collector-emitter cut-off current	V_{CE} = –30 V; I_B = 0 A		-	-	–100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A		-	-	–100	nA
h_{FE}	DC current gain	V_{CE} = –5 V					
		I_C = –1 mA		300	-	-	
		I_C = –100 mA		300	-	800	
		I_C = –500 mA	[1]	250	-	-	
		I_C = –1 A	[1]	160	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = –100 mA; I_B = –1 mA		-	–80	–140	mV
		I_C = –500 mA; I_B = –50 mA	[1]	-	–120	–170	mV
		I_C = –1 A; I_B = –100 mA	[1]	-	–200	–310	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = –500 mA; I_B = –50 mA	[1]	-	240	340	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = –1 A; I_B = –50 mA	[1]	-	-	–1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –5 V; I_C = –1 A	[1]	-	-	–1	V
f_T	transition frequency	V_{CE} = –10 V; I_C = –50 mA; f = 100 MHz		150	-	-	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz		-	-	12	pF

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

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Table 8. Characteristics for N-channel Trench MOSFET

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 10 μA; V_{GS} = 0 V					
		T_j = 25 °C		30	-	-	V
		T_j = −55 °C		27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 0.25 mA; V_{DS} = V_{GS}					
		T_j = 25 °C		0.45	0.7	0.95	V
		T_j = 150 °C		0.25	-	-	V
		T_j = −55 °C		-	-	1.15	V
I_{DSS}	drain leakage current	V_{DS} = 30 V; V_{GS} = 0 V					
		T_j = 25 °C		-	-	1	μA
		T_j = 150 °C		-	-	100	μA
I_{GSS}	gate leakage current	V_{GS} = ±8 V; V_{DS} = 0 V		-	10	±100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 0.2 A	[2]				
		T_j = 25 °C		-	390	460	mΩ
		T_j = 150 °C		-	663	782	mΩ
		V_{GS} = 2.5 V; I_D = 0.1 A		-	460	560	mΩ
		V_{GS} = 1.8 V; I_D = 75 mA		-	550	730	mΩ
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	I_D = 1 A; V_{DS} = 15 V; V_{GS} = 4.5 V		-	0.89	-	nC
Q_{GS}	gate-source charge			-	0.1	-	nC
Q_{GD}	gate-drain charge			-	0.2	-	nC
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz		-	43	-	pF
C_{oss}	output capacitance			-	7.7	-	pF
C_{rss}	reverse transfer capacitance			-	4.8	-	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 15 V; R_L = 15 Ω; V_{GS} = 10 V; R_G = 6 Ω		-	4	-	ns
t_r	rise time			-	7.5	-	ns
$t_{d(off)}$	turn-off delay time			-	18	-	ns
t_f	fall time			-	4.5	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	I_S = 0.3 A; V_{GS} = 0 V		-	0.76	1.2	V

[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.01$.

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8. Package outline

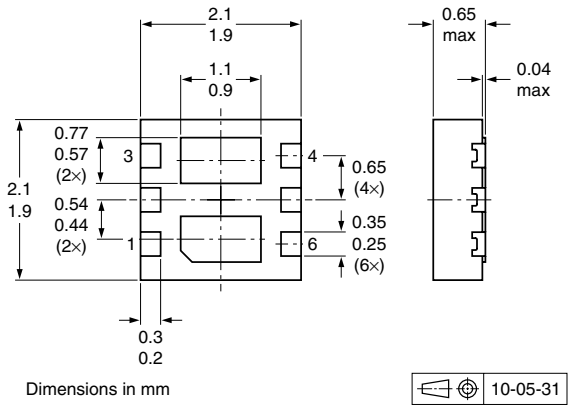

Fig 1. Package outline SOT1118

9. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity
			3000
PBSM5240PF	SOT1118	4 mm pitch, 8 mm tape and reel	-115

[1] For further information and the availability of packing methods, see Section 13.

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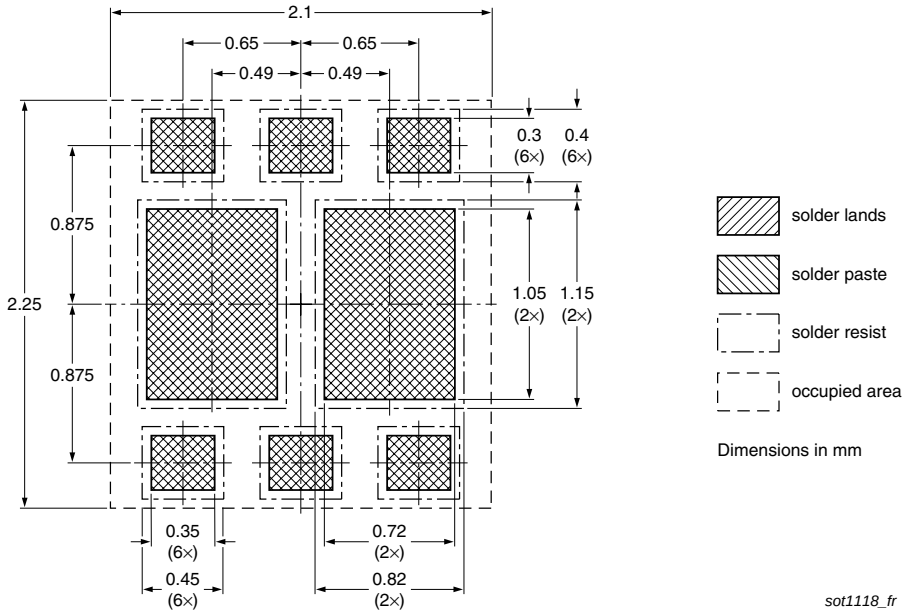
10. Soldering



Reflow soldering is the only recommended soldering method.

Fig 2. Reflow soldering footprint SOT1118

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11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSM5240PF v.1	20100825	Preliminary data sheet	-	-

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12. Legal information

12.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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Document identifier: PBSM5240PF

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