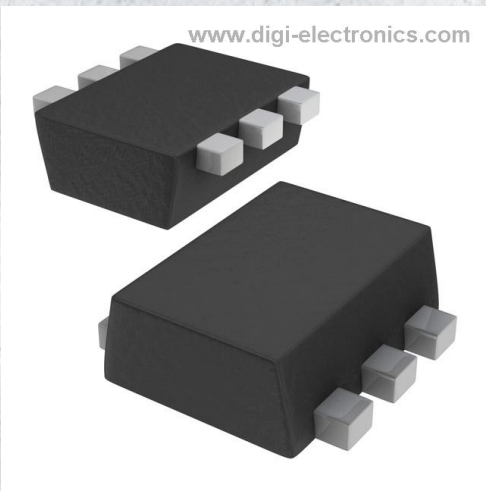
PEMB24,115 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	PEMB24,115-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	PEMB24,115
Description	TRANS PREBIAS 2PNP 50V SOT666
Detailed Description	Pre-Biased Bipolar Transistor (BJT) 2 PNP - Pre-Biased (Dual) 50V 20mA 300mW Surface Mount SOT-666

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
PEMB24,115	Nexperia USA Inc.
Series:	Product Status:
-	Not For New Designs
Transistor Type:	Current - Collector (Ic) (Max):
2 PNP - Pre-Biased (Dual)	20mA
Voltage - Collector Emitter Breakdown (Max):	Resistor - Base (R1):
50V	100kOhms
Resistor - Emitter Base (R2):	DC Current Gain (hFE) (Min) @ Ic, Vce:
100kOhms	80 @ 5mA, 5V
Vce Saturation (Max) @ Ib, Ic:	Current - Collector Cutoff (Max):
150mV @ 250µA, 5mA	1µA
Frequency - Transition:	Power - Max:
-	300mW
Mounting Type:	Package / Case:
Surface Mount	SOT-563, SOT-666
Supplier Device Package:	Base Product Number:
SOT-666	PEMB24

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.21.0095	

PEMB24

50 V, 20 mA PNP/PNP resistor-equipped transistor; R1 = 100 kΩ, R2 = 100 kΩ

10 July 2023 **Product data sheet**

1. General description

PNP/PNP Resistor-Equipped Transistor (RET) in a SOT666 ultra small and flat lead Surface-Mounted Device (SMD)plastic package.

NPN/NPN complement: PEMH24

NPN/PNP complement: PEMD24

2. Features and benefits

- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place cost

3. Applications

- Low current peripheral driver
- Control of IC inputs
- Replacement of general-purpose transistors in digital applications

4. Quick reference data

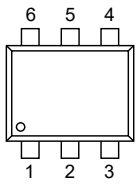
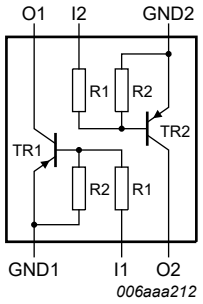
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
V_{CEO}	collector-emitter voltage	open base		-	-	-50	V
I_O	output current			-	-	-20	mA
R1	bias resistor 1 (input)		[1]	70	100	130	kΩ
R2/R1	bias resistor ratio		[1]	0.8	1	1.2	

[1] See Section "Test information" for resistor calculation and test conditions.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	GND1	GND (emitter) TR1	 SOT666	
2	I1	input (base) TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input (base) TR2		
6	O1	output (collector) TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PEMB24	SOT666	plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body	SOT666

7. Marking

Table 4. Marking codes

Type number	Marking code
PEMB24	6M

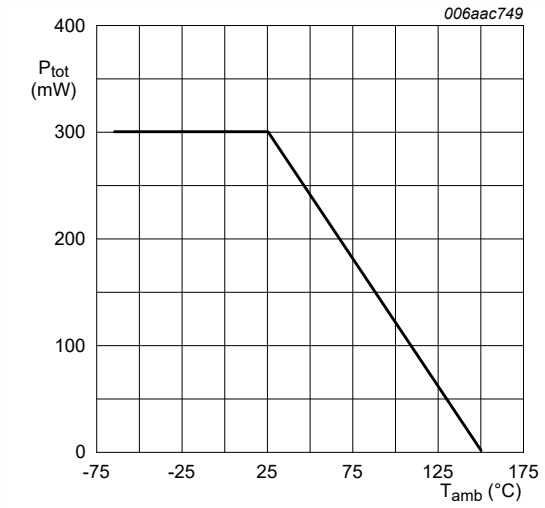
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V_{CBO}	collector-base voltage	open emitter		-	-50	V
V_{CEO}	collector-emitter voltage	open base		-	-50	V
V_{EBO}	emitter-base voltage	open collector		-	-10	V
V_I	input voltage			-40	10	V
I_O	output current			-	-20	mA
I_{CM}	peak collector current			-	-100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] [2]	-	200	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] [2]	-	300	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint.
[2] Reflow soldering is the only recommended soldering method.



FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

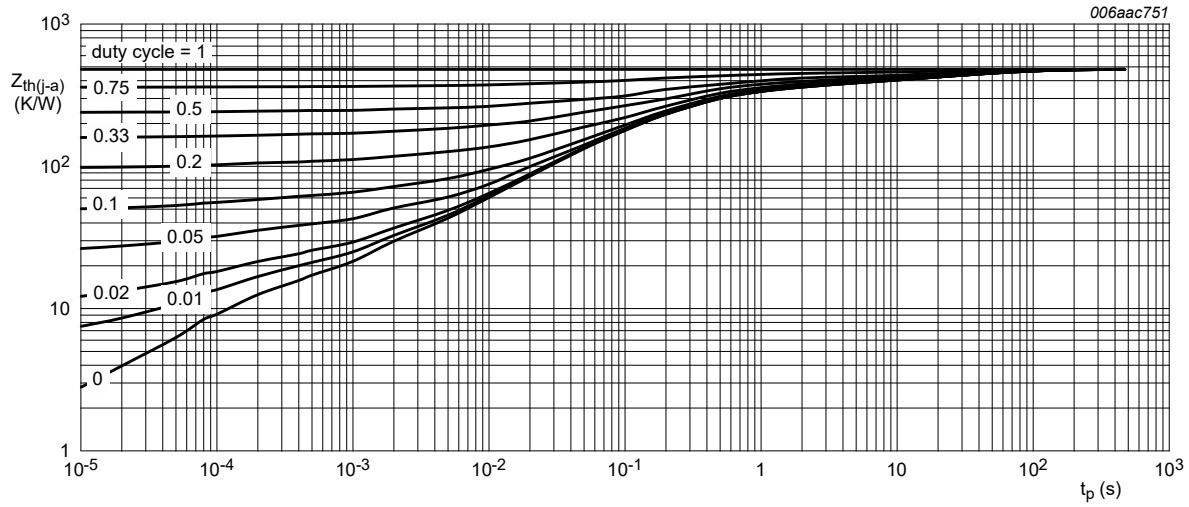
Fig. 1. Per device: Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	625	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	416	K/W

[1] Device mounted on an FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint.
[2] Reflow soldering is the only recommended soldering method.



FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

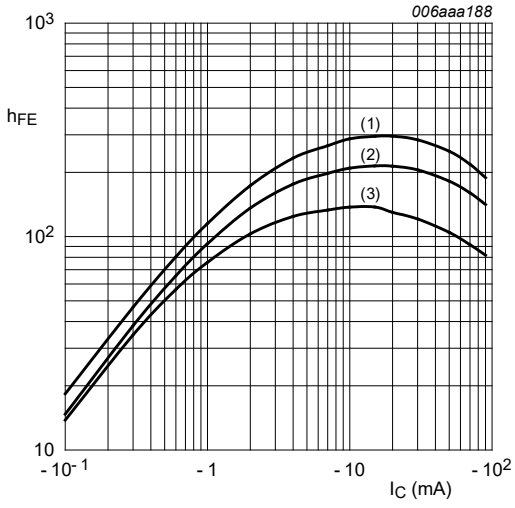
Fig. 2. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

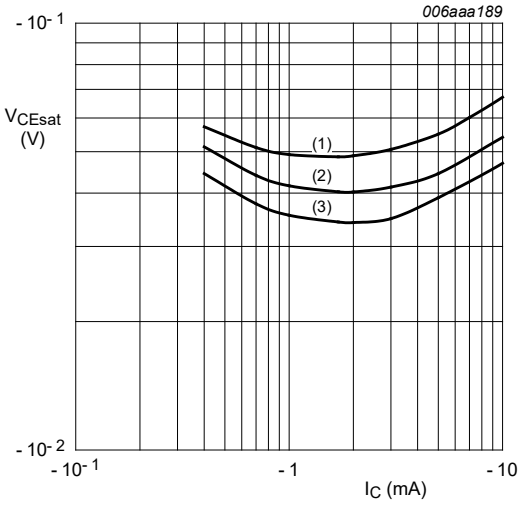
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A; T_{amb} = 25 °C		-50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = -2 mA; I_B = 0 A; T_{amb} = 25 °C		-50	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = -50 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = -30 V; I_B = 0 A; T_{amb} = 25 °C		-	-	-1	µA
		V_{CE} = -30 V; I_B = 0 A; T_j = 150 °C		-	-	-50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = -5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	-50	µA
h_{FE}	DC current gain	V_{CE} = -5 V; I_C = -5 mA; T_{amb} = 25 °C		80	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -5 mA; I_B = -0.25 mA; T_{amb} = 25 °C		-	-	-150	mV
$V_{I(off)}$	off-state input voltage	V_{CE} = -5 V; I_C = -100 µA; T_{amb} = 25 °C		-	-1.2	-0.5	V
$V_{I(on)}$	on-state input voltage	V_{CE} = -0.3 V; I_C = -1 mA; T_{amb} = 25 °C		-3	-1.6	-	V
R1	bias resistor 1 (input)		[1]	70	100	130	kΩ
R2/R1	bias resistor ratio		[1]	0.8	1	1.2	
C_c	collector capacitance	V_{CB} = -10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	2.5	pF

[1] See Section "Test information" for resistor calculation and test conditions.



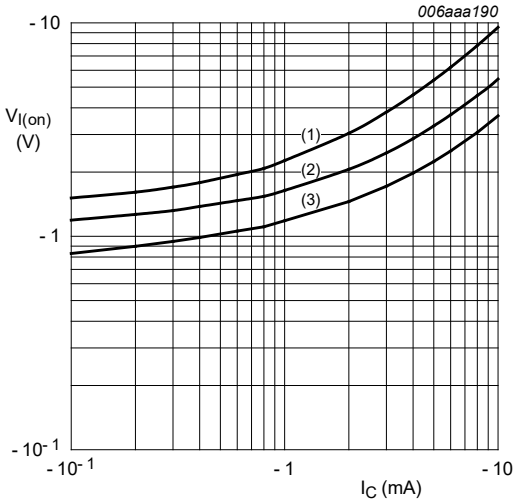
V_{CE} = -5 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

Fig. 3. DC current gain as a function of collector current; typical values



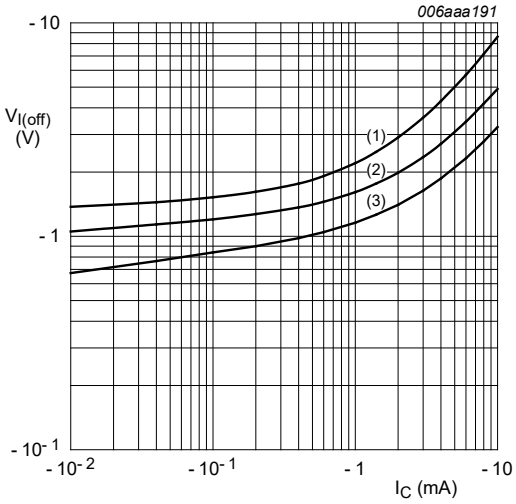
I_C/I_B = 20
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

Fig. 4. Collector-emitter saturation voltage as a function of collector current; typical values



V_{CE} = -0.3 V
(1) T_{amb} = -40 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 5. On-state input voltage as a function of collector current; typical values



V_{CE} = -5 V
(1) T_{amb} = -40 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 6. Off-state input voltage as a function of collector current; typical values

11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R_1 = \frac{V(I_2) - V(I_1)}{I_2 - I_1}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R2}{R1} = \frac{V(I_3)}{R1 \cdot I_3} - 1$$

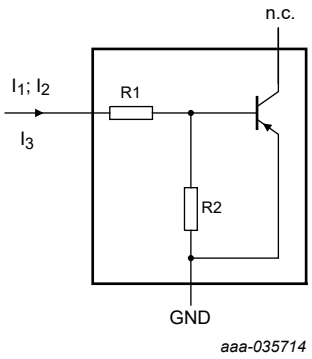


Fig. 7. PNP transistor: Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions		
			I_1	I_2	I_3
PEMB24	100	100	-20 µA	-60 µA	40 µA

12. Package outline

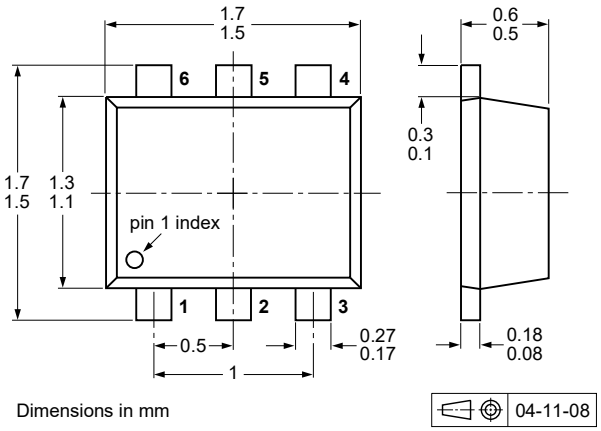


Fig. 8. Package outline SOT666

13. Soldering

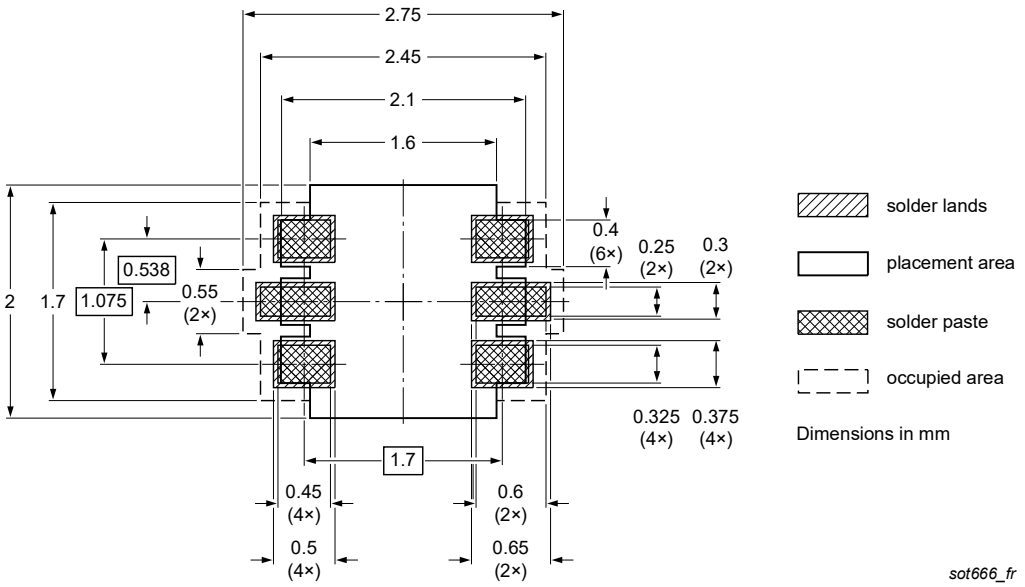


Fig. 9. Reflow soldering footprint for SOT666

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PEMB24 v.3	20230710	Product data sheet	-	PEMB24_PUMB24_2
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Family data sheet reduced to single type data sheet. • Package information removed. • Product(s) changed to non-automotive qualification.			
PEMB24_PUMB24_2	20090902	Product data sheet	-	PEMB24_PUMB24_1
PEMB24_PUMB24_1	20050218	Product data sheet	-	-

15. Legal information

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 https://www.nexperia.com.

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Date of release: 10 July 2023

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